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Developing stakeholder collaboration and communication for enhance project delivery

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Abstract - The study is aimed at developing stakeholder collaboration and communication for enhance building construction projects delivery using South East Nigeria as a study area. The problem of the study is failure of the stakeholders to collaborate and communicate among themselves impact on the overall constructability of building projects, (examples abound of failed and abandoned projects which are scattered all over the country, buildings collapse on regular basis in different parts of the country). The specific objective is to examine the influence of stakeholder collaboration and communication on enhancing constructability. The basic sources of data collected for the study are secondary data which include brainstorming, published relevant information and primary data gotten by the respondents/professionals. The researcher reviewed related literature which enabled him to develop a questionnaire. Data was collected through email, questionnaire and interview approach which was distributed among the stakeholders. Analysis of data was carried out with Structural Equation Modelling (SEM). The results and finding shows that stakeholders are integral to the success of construction projects as they represent diverse interest groups with a shared goal of delivering the project effectively, The researcher concluded that the independent variables are significantly related to one another and have significant effect on dependent variables. Therefore, stakeholders are encouraged to adopt constructability strategy in order to improve overall project objectives.

Keywords: Development, constructability, framework, enhancing, building, projects, delivery.

1. Introduction

The construction industry in Nigeria is one of the driving forces of the nation's economy. Many other industries are dependent on the performance of the construction industry. Irrespective of its importance the construction industry has been criticized for being quite slow in improving the approach to develop and deliver the facilities to the client. The construction industry is also known for its lack of integration between design and construction. This has been observed as one of the major factors contributing to the various problems in the construction projects. Projects have been failing to achieve their set objectives and

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the problems associated with constructability are yet to be achieved. After many years ago, the integration of design and construction has been considered as the best solution to ameliorate some of the major obstacles in the construction industry Construction Industry Institute (CII, 2016). The concept known as constructability was established and introduced to the industry with the objective to o overcome some challenges.

Constructability has become an indispensable tool for enhancing project performance. Many researchers have acknowledged that the execution of constructability leads to big quantitative and qualitative benefits for stakeholders. Constructability is one of the project quality improvement techniques which has paramount importance for the overall improvement and optimization of building projects.

Buildability, as it is known in the United Kingdom, can be implemented throughout the entire project lifecycle (i.e. from the preliminary stage to the maintenance stage). The contribution of constructability improvements by each of the participants vary accordingly due to the development of a project which went through divers stages involving many participants over its lifecycle. Among many participants involved in the project, the designers are expected to play the central role for constructability improvement. Designers are known to have remarkable functions as they are responsible for most technical problems which arise during project design, in the construction and commissioning of the project. Figure 1.1, illustrates the stages of project life cycle and the designer's level of influence on the project cost over the project time. It can be seen that the level of influence of the designer is higher at the beginning of the project and decreases towards the end of project. On the other hand, the expenditure increases as the project progresses. The figure also illustrates that the best time to achieve good constructability of a project design is at the earlier stages of project development.

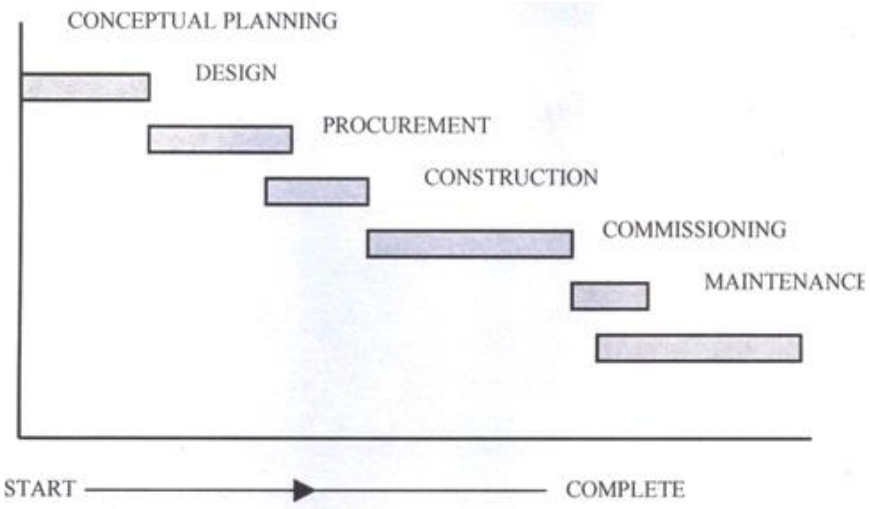

Figure 1. 1a: Project Life Cycle and Designer's Level of Influence
Source: Madelsohn 2017

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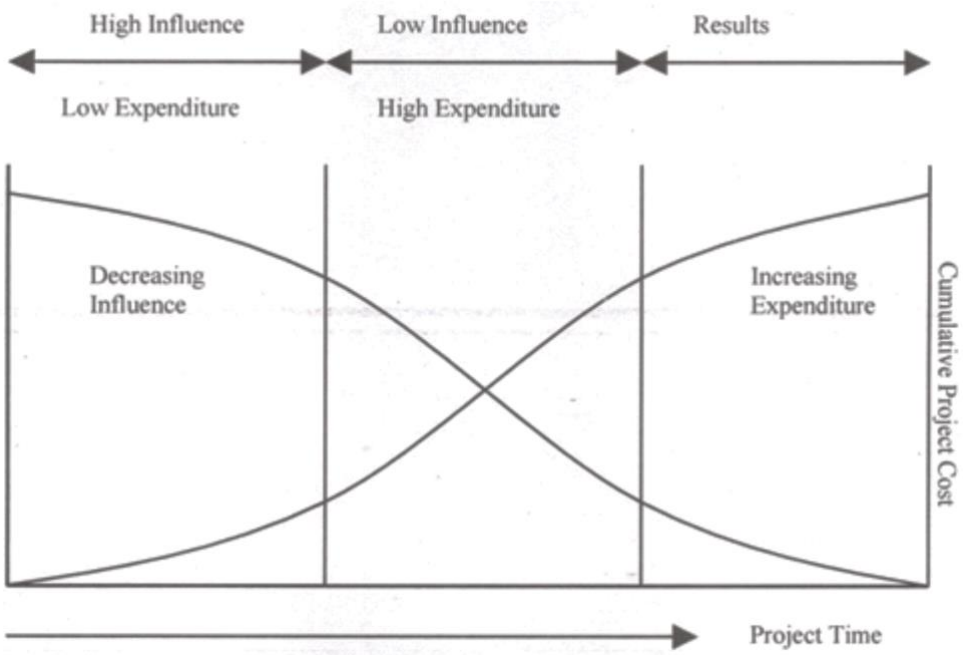

Figure 1.1b: Project Life Cycle and Designer's Level of Influence
Source: Madelsohn 2017

There have been reports that shows that problems encountered during construction can be traced back to the design process and these problems can be as high as 75% of the total problems encountered during construction (Madelsohn, 2017).

The construction industry is a complex built environment where the successful execution of building projects depends heavily on effective stakeholder collaboration and communication. Understanding the intricacies of how various stakeholders interact and communicate is crucial for optimizing constructability—the ease of executing construction activities. Challenges arise when stakeholders, including architects, contractors, and project owners, fail to align their objectives and share vital information, impacting the overall constructability of a project. Addressing these issues and fostering a collaborative environment can significantly enhance the efficiency and effectiveness of construction projects. Examples abound of failed and abandoned projects which are scattered all over the country. Buildings collapse on regular basis in different parts of the country.

This study is aimed to develop a constructability framework for enhancing building construction projects delivery. The specific objective is to examine the influence of Stakeholders collaboration and communication on enhancing constructability in selected private and public building construction projects.

***The concept of stakeholders collaboration and communication*:** Stakeholder collaboration and communication are integral to successful project management. This concept involves engaging and involving relevant stakeholders throughout the project lifecycle. Effective communication ensures that stakeholders, including team members, clients, and other involved parties, are well-informed and aligned with project goals.

Collaboration entails fostering open communication channels, addressing concerns, and incorporating feedback from stakeholders. Regular meetings, progress updates, and transparent communication help build trust and maintain a shared understanding of project objectives. This collaborative approach enhances decision-making, minimizes misunderstandings, and contributes to

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overall project success by ensuring that all stakeholders are actively involved and informed (Mitchell et al, 2020).

Chaos theory states that every system has the potential to become disorderly (chaos). According to (Wheatley, 2005) in leadership and the new science; 'chaos is the final state in a system's movement away from order. In other words, systems are dynamic and eventually change over time no matter how orderly it had been, setting the system in a state of confusion.

This is possible because a system is made up of various elements which it depends on and which has the ability to change within the context of the system itself. With the guidance of the principles of the system, these elements of the system cohere (fuse together) over time into a predictable form. According to Encyclopedia of Management 2018 chaotic movements have finite boundaries in which the capacity for infinite possibility rests. Parts of a system can combine to enable the system gain several configurations (displaying order without predictability). The systems do not exceed the boundaries of their operation.

Weather pattern is one of the major factors of chaos theory. It is an uncontrollable variable. A practical example of chaos theory was observed in a hotel building construction in Owerri, Imo State. Suddenly, there was a heavy down pour, one of the days on the canopy extension of the building under construction that was being cast. Because there was no advance preparation against any adverse weather, like providing more fortification for the cast or tapolene for the covering of the entire space or even waiting for the storm to pass, the cast was overwhelmed by the storm when it eventually came that the cast had to collapse. This brought about a big loss of time and materials because the remaining had to be pulled down and a fresh one casted.

Another area within which chaos theory is useful is that of organizations. Applying chaos theory to Individual organizational behavior allows theorists to take a step back from the management of day-to-day activities and see how organizations function as unified systems. There was chaos over the supply of a full truck-load of cement between the owner of the building under construction and the cement procurement officer. The owner of the building under construction made full payment for the product to the cement procurement officer for a full truck-load of cement. While the procurement manager delayed the supply of the product, there was an increase in the cost of the product which made him delay further on the supply. This unpredicted factor raised dust at the site because chaos theory was not considered; there was no alternative arrangement made to forestall any such occurrence. As a result, work activities suddenly stopped at the site because there was no cement for casting, plastering, block molding, etc. The workers continue to receive their full payment, the situation notwithstanding. There was cost and time overrun (Wheatley, 2012).

Stakeholder's theory is a framework for analyzing and understanding the relationships between an organization and the various groups or individuals who are affected by its activities. Unlike traditional theories, such as shareholder's theory (which focuses solely on maximizing value for shareholders), stakeholder theory asserts that an organization should create value for all of its stakeholders. These stakeholders include not only shareholders but also employees, customers, suppliers, the community, and even the environment (Freeman, 1984).

Architect, Project Manager, Owner, Engineer, Regulatory Authorities, Contractor, employee and community participated in building construction projects, their participation guarantees users requirement and the objectives of the building construction.

Stakeholders perspective on developing a constructability framework for building construction projects.

Thus, developing a constructability framework for building construction projects requires considering the perspective of various stakeholders involved in the construction process. Here's an overview of the stakeholders perspective that should be considered when developing a construction framework:

1. ***Owner/Client:***

* The Owner/Client perspective is crucial as they have the ultimate vision and requirements for the project.

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* They are concerned with project objectives, cost, schedule, and quality.
* They may prioritize specific design features or sustainability requirements.
* Their perspective helps in aligning constructability efforts with their overall project goal.

2. ***Architects/Designers:***
* Architects and designers bring their expertise to create the project's design and specifications.
* Their perspective focuses on design intent, aesthetics, functionality, and compliance with building codes and regulations.
* They need to ensure that constructability considerations do not compromise the project's design intent.

3. ***Construction Managers/ Contractors***:
* Construction managers and contractor play a critical role in executing the construction project.
* Their perspective emphasizes practicality, efficiency, and feasibility of the construction process.
* They consider factors like material availability, labour requirements, equipment usage, and construction sequencing.
* Their input helps optimize the construction methodology and ensures smooth project execution.

4. ***Subcontractors and Tradespeople (skilled manual worker):***
* Subcontractors and tradespeople perform specific tasks within the construction process.
* Their perspective is focused on the practical aspects of their trade.
* They provide insights into the constructability challenges and opportunities specific to their area of expertise.
* Their input helps in identifying potential issues during construction and developing solutions.

5. ***Engineers:***
* Engineers provide technical expertise in various fields such as structural, mechanical, electrical, etc
* Their perspective is essential for ensuring that the design and construction align with engineering principles and standards.
* They collaborate with architects, contractors, and subcontractors to address constructability issues related to their respective disciplines.

6. ***Regulatory Authorities:***
* Regulatory authorities, such as local building departments play a vital role in ensuring compliance with building codes and regulations.
* Their perspective focuses on safety, legal, requirements, and environmental considerations.
* They provide guidance on constructability aspects related to codes compliance, permits, inspections, and approvals.

7. ***Facility Managers and End Users:***
* Facility managers and end users are concerned with the functionality, maintainability, and operational efficiency of the constructed facility.
* Their perspective can help identify constructability considerations that can impact long-term facility operations and maintenance.

By considering the perspectives of these stakeholders, a comprehensive constructability framework can be developed that takes into account the needs and requirements of all parties involved in the building construction project. This framework will help ensure that the project is designed and constructed in a way that maximizes efficiency, reduces risks, cost, time and achieves the desired project objectives (Mitchell et al, 2020).

2. Method

2.1 Research Design

The methods of research design adopted for this study are secondary data and a survey which are defined by (Nworuh, 2004). Secondary data is already published information relevant to the subject matter while

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survey means an investigation of the opinion behavior or project. Abia State Integrated Infrastructure Development Project (ABSIIP) Umuahia and International market Abakaliki owned by Ebonyi State Government was constructed by JMK Nigeria Limited and Vaastrop Nigeria Ltd as the consultant were used by the researcher as a secondary data research. The information obtained from secondary data research was not manipulated hence the researcher only extracted what happened during the execution.

Building construction in Owerri Imo State, owned by an individual and being constructed by a Construction Company and Imo International Conference Centre (IICC), Owerri, Imo State owned by Imo State Government is being constructed by BENICOUX Nig. Ltd was used as a survey, the researcher visited some of the building project sites and offices for on the site observation and assessment. A well-structured and standardized questionnaire on development of constructability framework for building construction projects was used. The questionnaire was designed based on five point Likert scale and was administered to professionals.

Personal interviews were also conducted with some project managers, affected host community members and professionals. However, interviews were used only when and where the efforts of the researchers to administer questionnaire proved unsuccessful.

2.2 The Study Area

South East Nigeria refers to the southeastern region of Nigeria, one of the six geopolitical zones in the country, will be adopted for this study. It is made up of five States, namely:

Abia: Located in the southern part of the region, Abia State is known for its commercial activities, particularly in the city of Aba, which is renowned for its thriving small and medium-scale industries.

Anambra: Anambra State is situated in the central part of the South East. It is known for its rich cultural heritage and is often referred to as the "Light of the Nation." The state capital, Awka, is an emerging urban center, and the commercial city of Onitsha is a major economic hub in the region.

Ebonyi: Ebonyi State is located in the southeastern part of Nigeria and is known for its agricultural resources, particularly rice production. The state capital, Abakaliki, has experienced significant development in recent years.

Enugu: Enugu State is in the southwestern part of the South East. The city of Enugu, which is the state capital, was once the capital of Nigeria during the colonial era. It is known for its coal mining history and is often referred to as the "Coal City."

Imo: Imo State is situated in the southeastern part of Nigeria. The state capital, Owerri, is a major commercial and entertainment center. Imo State is also known for its rich cultural heritage, including the famous Mmanwu festival.

The South East region is predominantly inhabited by the Igbo ethnic group, who are known for their entrepreneurial spirit, rich cultural heritage, and significant contributions to Nigeria's socio-economic development. The region has diverse economic activities, including trade, agriculture, manufacturing, and services.

2.3 Population of the Study

The study populations were public and private construction sectors such as consultants and professionals. Professionals are as follows, Engineers, Architects, Project Managers, Quantity Surveyors, Contractors, Builders, etc. Project Owners was also among the population. These professionals engaged in planning, design, management and execution of projects and therefore formed the nucleus of the respondents for the study in their organizations. However, the targeted population in the study composed of the registered Architects, Quantity Surveyors, Facilities Managers, Land Srveyors, Civil and Structural Engineers, Building Services Engineers (Mechanical and Electrical) and Builders as they are the primary participants who have substantial involvement and responsibilities in BIM. The study excluded the other construction professionals because they were not among the primary participants that normally coordinate the development of information models in BIM. The researcher targets five (5) construction firms across the country with relevant capacity to handle BIM, and with BIM experience; namely Julius Berger Nigeria

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Limited, Danata and Sowoe Nigeria Limited, Setraco Nigeria Limited, CCEC and Network Projects. The population is as shown in Table 1.

Table 1 Construction professionals in Selected Construction Firms

S/N	Professional group	Population	Source
1	Architects	604	Nigerian Institute of Architecture (2019)
2	Builders	410	Nigerian Institute of Building (2019)
3	Quantity Surveyors	764	Nigerian Institute of Quantity Surveying (2019)
4	Facilities Managers	255	International Facilities Managers Association (Nigeria Chapter) (2019)
5	Civil and Structural Engineers	613	Nigerian Society of Engineers (2019)
6	Building Services Engineers	2216	Nigerian Society of Engineers (2019)
TOTAL		**4862**	

From the study population, the total population of construction professionals within the study area is 4862 which represent the sample frame. A study of this nature cannot cover such a population hence sampling procedure.

2.4 Sampling Design and Procedure

Sequel to the researcher's inability to examine all the unit of the population in this study, three sampling techniques were adopted. They are simple random, judgmental sampling and stratified sampling. The simple random was used to administer questionnaires to staff and the judgmental sampling helped the researchers to select five building and five companies operating in South East and stratified sampling techniques, was adopted for professional grouping based on their respective professional undertakings. From the study population, the total population of construction professionals within the study area is 4862 which represent the sample frame.

Purposive sampling also known as purposeful sampling or selective sampling was adopted. It is a non-probability sampling technique used in qualitative research. It involves selecting participants or cases based on specific criteria or characteristics that are relevant to the research question or hypothesis. Its features are (a) Non-random selection, (b) Based on researcher's judgment, (c) Focus on specific characteristics or criteria, (d) Aimed at achieving depth and insight, and (f) Typically used in qualitative research.

2.5 Method of Data Collection

The questionnaire was designed as multi-choice five grade points (1-5) known as Likert scale (Likert, 1974) and open-ended pattern in order to give respondent the flexibility to express their views and as such provide alternative set of answers which best represents the actual situation in their respective organizations. The data which was generated was further substantiated by observations and oral interviewers in some cases.

2.6 Method of Data Analysis and Presentation

The main tools employed in the analysis of the primary data collected for the study is Descriptive Statistics Analysis and Structural Equation Modelling were used to examine the influence of Stakeholders collaboration and communication on enhancing constructability in selected private and public building construction projects.

3. Results and Discussion

3.1 Results

An examination of field data is provided in this chapter. Additionally, it discusses, evaluates, and displays the study's findings. While the inferential tools attempted to draw conclusions about the hypotheses based

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on the field data, the descriptive analysis of the data, which included the use of tables and percentages, was utilized to provide a full description of the respondents' characteristics and opinions.

Table 2 Influence of Stakeholders collaboration and communication on enhancing constructability in selected private and public building construction projects (number responded)

Code	Influence of Stakeholder	1	2	3	4	5	N
X111	Stakeholders are people that have interest in the organization.	0	0	4	8	40	52
X112	We collaborate with different interest group during constructability project to minimize risk.	0	0	8	16	28	52
X113	We seek stakeholders input when making decision on constructability project.	0	0	4	18	30	52
X114	Stakeholder inclusivity/inclusiveness enhances project delivery.	0	0	4	24	24	52
X115	Poor collaboration with stakeholders can cause poor constructability.	0	0	8	24	20	52
X116	Lack of communication with stakeholders can result to misunderstanding.	0	0	12	24	16	52
X117	Lack of stakeholders engagement can affect project delivery.	0	0	2	22	28	52

N = Number of Respondents

3.1.1 Influence of Stakeholders collaboration and communication

Table 3 Influence of Stakeholders collaboration and communication on enhancing constructability in selected private and public building construction projects (x & sd)

Code	Influence of Stakeholder	1	2	3	4	5	$\bar{x}$	Sd.
X111	Stakeholders are people that have interest in the organization.	0	0	4	8	40	4.69	.612
X112	We collaborate with different interest group during constructability project to minimize risk.	0	0	8	16	28	4.38	.745
X113	We seek stakeholders input when making decision on constructability project.	0	0	4	18	30	4.50	.642
X114	Stakeholder inclusivity/inclusiveness enhances project delivery.	0	0	4	24	24	4.38	.631
X115	Poor collaboration with stakeholders can cause poor constructability.	0	0	8	24	20	4.23	.703
X116	Lack of communication with stakeholders can result to misunderstanding.	0	0	12	24	16	4.08	.737
X117	Lack of stakeholders engagement can affect project delivery.	0	0	2	22	28	4.50	.577

Table 3 sought to determine the influence of stakeholders collaboration and communication on enhancing constructability. The benchmark for selection as to which applies is based on the 5-point Likert-scale. From the result, stakeholders are people that have interest in the organization (M=4.69, sd=0.61) and collaborate with different interest group (M=4.38, sd=0.74). Also, because the inclusiveness of stakeholders enhances project delivery (M=4.38, sd=0.63), inputs are sought from them prior to making decisions on constructability project (M=4.50, sd=0.64). Not only does poor collaboration with stakeholders induce poor

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constructability (M=4.23, sd=0.70), even lack of communication (M=4.08, sd=0.73) and lack of engagement (M=4.50, sd=0.57), which affects project delivery.

Hypotheses Testing

H_{01}: There are no significant influences of stakeholders collaboration and communication on enhancing constructability in selected private and public building construction projects.

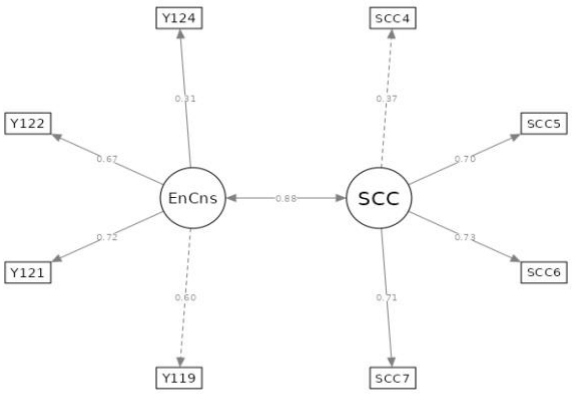

Fig. 1 Structural equation for stakeholders collaboration and enhancing constructability in selected private and public building construction projects

Table 3 Model tests

Label	χ^2	df	p
User Model	30.0	19	0.052
Baseline Model	205.5	28	<.001
Scaled User	37.7	19	0.007
Scaled Baseline	131.3	28	<.001

Table 3 reveals that parsimony holds, since $\boldsymbol{\chi^2}$/df (1.58) <5.0, which depicts the model is fit. Also, the $\boldsymbol{p-val}$ is non-significant (0.052). This is further supported by the baseline fit indices of CFI, TLI, NNFI, RNI which are above 0.90 with RMSEA (0.10) as shown in Tables 4

Table .4 Fit indices

			95% Confidence Intervals		
Type	**SRMR**	**RMSEA**	**Lower**	**Upper**	**RMSEA p**
Classical	0.146	0.107	0.000	0.176	0.113
Robust	0.123	0.274	0.190	0.361	<.001
Scaled	0.123	0.139	0.072	0.203	0.021

Table 5 Measurement model

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Latent	Observed	Estimate	SE	β	z	P
SCC	SCC4	1.000	0.000	0.366		
	SCC5	1.925	0.717	0.704	2.69	0.007
	SCC6	1.996	0.646	0.730	3.09	0.002
	SCC7	1.941	0.734	0.710	2.64	0.008

Table 5 shows the standardized regression weights indicating stakeholder collaboration and communication significantly and positively influence enhancing constructability ($\boldsymbol{\beta} = 0.36, 0.70, 0.73, 0.71$; $p - val < 0.05$). Hence, the rejection of the null hypothesis and the conclusion that, stakeholders collaboration and communication have significant influence on enhancing constructability in selected private and public building construction projects.

3.2 Discussion of Findings

Influence of Stakeholders collaboration and communication on enhancing constructability

It was ascertained that stakeholders are people that have interest in the organization and collaborate with different interest group. This is because construction projects are complex and require a wide range of tasks, from planning to carrying out to delivering the finished product. Different stakeholders are impacted by each action, therefore collaboration is essential to resolving problems as they emerge. To prevent delays or rework, for instance, architects, engineers, and contractors must work together to make sure that design specifications are realistic and doable for construction. These interests may have to do with money, operations, regulations, or the local community. Their cooperation with various interest groups guarantees that the project moves forward without hiccups, accomplishes its goals, and lives up to everyone's expectations. Therefore, it could be said that stakeholders are integral to the success of construction projects, as they represent diverse interest groups with a shared goal of delivering the project effectively. This finding is in consonance with (Mitchell et al, 2020) and (Nnene, 2024) who averred that, collaborative approach enhances decision-making, minimizes misunderstandings, and contributes to overall project success, without any unnecessary hiccups during execution, by ensuring that all stakeholders are actively involved and informed.

More so, the inclusiveness of stakeholders enhanced project delivery, which most probably accounts for why inputs are sought from stakeholders prior to making decisions on constructability project. Involving diverse groups in the planning and decision-making processes is important because it allows project managers to benefit from a wider range of expertise, improved communication, and a greater capacity to manage risks and resolve conflicts. This is because the construction industry places a high value on stakeholder inclusivity. Stakeholder participation is very vital in constructability projects to ensure that the designs are workable, affordable, and sustainable. This approach' collaborative nature ensures that the project achieves its goals and is successfully completed in addition to facilitating smoother project execution by encouraging creativity and accountability. This finding is in consonance with (Eskerod & Huemann, 2024) who averted that stakeholder engagement is rather considered a must to provide fertile grounds for co-creating better futures in project delivery. This was further stretched by (Mwesigwa et al., 2020) who posited that when all the relevant issues are included in the contract, contract terms are explicitly stipulated, all the unanticipated changes are described and when all the parties involved are restrained by a binding force of a contract, conflicts and opportunism reduces and stakeholder's concerns are addressed.

In addition, inadequate teamwork, inadequate correspondence, and insufficient involvement with stakeholders resulted in subpar constructability and project completion. There is typically a big gap between the design team and the construction crew as a result of poor collaboration. For instance, engineers and architects can produce designs that seem fantastic on paper but are challenging or impractical to build.

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These problems might not be discovered until building has begun if designers and contractors don't work together throughout the planning stage, which could result in expensive design revisions and delays. Involving stakeholders also guarantees that their issues are taken care of and that they are made to feel part of the project's development. Stakeholder concerns about budgetary constraints, environmental issues, or safety regulations might be disregarded if they are not sufficiently involved. These unresolved issues may come up again later in the project, necessitating expensive redesigns or changes that could have been prevented. This finding tally with (Irfan et al, 2019) who averted that in the construction industry, all project constraints are affected by stakeholder conflicts. Factors that result in stakeholder conflicts indicated a positive relationship with cost, time and resources. This means that any increase or decrease in the effect of stakeholder conflicts will directly influence these three project constraints.

4. Conclusion

Sequel to the findings discussed above, the study concludes as follows:

- It was ascertained that stakeholders are people that have interest in the organization and collaborate with different interest group. This is because construction projects are complex and require a wide range of task from planning to finished product.
- Stakeholders are integral to the success of construction projects, as they represent diverse interest groups with a shared goal of delivering the project effectively (Mitchell et al, 2020)

Contribution to knowledge

- The study promotes effective collaboration and communication among stakeholders for efficient building construction projects.
- The study has identified a different concept in research objective, geographic coverage, sample size.

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