

Beneficiaries of Frugal Practices and Public Building Projects Delivery in Southwest, Nigeria

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ABSTRACT: *Persistent challenges such as building failures, project delays, cost overruns, and abandoned projects in public university building projects have underscored the need for research into the factors that can mitigate these issues. This study primarily aims to evaluate the effect of beneficiaries of frugal practices (clients, consultants, contractors, suppliers, and end-users) on the delivery of these projects in Lagos, Ogun, and Osun States. Adopting a cross-sectional survey research design, primary data were collected using structured questionnaires from construction professionals in public universities across Lagos, Ondo, and Osun States in Southwest Nigeria. A multi-stage sampling technique was employed, beginning with the purposive selection of states and universities, followed by stratified random sampling of 251 respondents from a population of 708 professionals. Data analysis was conducted using Partial Least Square-Structural Equation Modelling (PLS-SEM) to explore the relationships between variables. The findings reveal that stakeholders benefit in varying degrees from frugal practices. Especially, clients and contractors benefit positively from frugal practices while significantly suppliers and end users are not negatively impacted by the practice. End users and suppliers notably impact project delivery outcomes, particularly in cost performance, satisfaction levels, and adherence to timelines. Frugal practice exhibited the most substantial negative impact on end users, emphasizing the necessity of their involvement and satisfaction in project planning and execution. The study recommends that project managers and policymakers prioritize the active involvement of end users and maintain robust supplier relationships to enhance project performance.*

KEYWORDS: frugal practices, building project delivery, public universities, stakeholder involvement, infrastructure development.

INTRODUCTION

In recent years, the construction industry in Southwest Nigeria has faced numerous challenges, particularly concerning public building projects in universities. Issues such as building failures, project delays, cost

overruns, and abandoned projects have become increasingly prevalent, highlighting the need for effective project management practices. These problems not only result in financial losses but also compromise the safety and functionality of educational infrastructure, adversely affecting students, faculty, and the broader community (Afolabi et al., 2021; Olanrewaju et al., 2022). The root causes of these issues are multifaceted, encompassing inadequate funding, poor planning, inefficient resource management, and a lack of stakeholder engagement (Adeyemi & Olaleye, 2020). Despite efforts to address these problems, the persistence of these challenges indicates the need for alternative approaches. Frugal practices, which emphasize cost-efficiency and resource optimization, have emerged as a potential solution. However, there is a limited understanding of how the involvement of different beneficiaries such as clients, consultants, contractors, suppliers, and end users, impacts the delivery of public building projects when frugal practices are implemented (Ekanayake et al., 2022).

Previous studies have examined various aspects of project management and stakeholder involvement in the construction industry. Research by Adekunle, Smith, and Johnson (2019) highlighted the critical role of suppliers in ensuring timely project completion, while Green, Williams, and Davis (2020) emphasized the multifaceted contributions of suppliers to project outcomes, including cost management and resource availability. Jones, White, and Miller (2021) explored the influence of consultancy involvement on project performance, revealing context-specific impacts. Additionally, Johnson et al. (2018) and Wang, Liu, and Chen (2019) underscored the significant positive relationship between end-user satisfaction and project success. Despite these valuable insights, gaps remain in the existing literature. Specifically, there is a lack of comprehensive studies that simultaneously consider the roles of all key beneficiaries of frugal practices in public building projects within the Nigerian context. Furthermore, the nuanced impacts of these beneficiaries on different dimensions of project delivery—such as cost performance, time adherence, and client satisfaction—are not well understood. This gap necessitates a focused investigation to elucidate the specific benefits derived from frugal practices by each beneficiary in building projects delivery (Ogunlana et al., 2022). The primary objective of this study is to assess the degrees of the beneficiaries of frugal practices in public building project delivery in public universities in Lagos, Ogun, and Osun States, Nigeria. By employing a rigorous path analysis approach, this research aims to evaluate the quality of data obtained from surveys and examine the relationships between the involvement of various beneficiaries and key project delivery metrics. The study focuses on construct reliability, validity, and discriminant validity to ensure robust and credible findings (Ajayi & Oyedele, 2023). The justification for this study lies in its potential to inform better management practices and enhance the success rates of public building projects in Nigeria. By identifying the specific impacts of different beneficiaries on project outcomes, stakeholders can tailor their strategies to leverage the strengths of each group effectively. This, in turn, can lead to more efficient resource utilization, reduced project delays, and improved satisfaction levels among end users (Balogun et al., 2023). Ultimately, the findings of this study could contribute to the development of more resilient and sustainable educational infrastructure, thereby supporting the broader goals of educational development and socioeconomic progress in the region (Oluwaseun et al., 2022).

LITERATURE REVIEW

Beneficiaries of Frugal Practices

Every project consists of various interests, with stakeholders holding these interests (Olander & Landin, 2005). Beneficiaries are stakeholders who directly benefit from the developed facilities; they include owners/clients, customers, developers, and facility managers. Intermediaries, such as design consultants, architects, engineers, project managers, contractors, and suppliers, contribute to the development of these facilities (Charlesraj & Gupta, 2019). Both groups reap certain common benefits. However, there is limited literature on the perspectives of beneficiaries and intermediaries involved in construction projects in relation to frugal practices (Osman et al., 2017). According to the PMBOK, effective stakeholder management is crucial for increasing project success rates (Project Management Institute, 2017). A survey of 150 project managers across eight industries found that stakeholders' interests are the largest criterion for project success (Collins & Baccarini, 2004). Nonetheless, managing stakeholders can be challenging, creating disagreements and uncertainties (Johansen et al., 2014). Complex engineering and global projects, which involve many interested groups or organizations, are significantly impacted by both internal and external stakeholders in various ways, including arising uncertainty or conflicts (Olander & Landin, 2005; Aaltonen & Kujala, 2010; Aaltonen & Sivonen, 2009; Davis, 2016). While stakeholders can pressure the project and potentially be harmful, they can also create opportunities. Each stakeholder has unique influences on projects, representing both threats and opportunities. Effective management requires tracking progress and measuring performance, given the most important outcomes (Todorovic et al., 2015). The traditional Iron Triangle of time, cost, and quality has evolved, as recent works show that project success depends on many factors beyond these (Atkinson, 1999; Todorovic et al., 2015). Success and performance measurement depend on comparing results with objectives and identified success criteria, which are determined by the interests of directly or indirectly involved stakeholders (Project Management Institute, 2017; Atkinson, 1999). Stakeholders are categorized as external or internal (Cleland, 1986). Internal stakeholders include project managers, team members, and sponsors, who are involved throughout the project lifecycle. Mismanagement of stakeholder perceptions can lead to a project being seen as successful by some and unsuccessful by others. For instance, a project might not meet all stakeholders' requirements. Successful project construction begins with the project owner (Ryd, 2004). Clients, who typically have the most significant satisfaction stakes in any project delivery, must adopt effective practices to ensure high performance during the construction process (Al-Kharashi & Skitmore, 2009). Clients generally expect high quality, low cost, and timely completion (Forques, 2006). Ownership provides control and responsibility. Economically, ownership grants residual control rights and profit responsibilities (Foss & Foss, 1999). Control rights allow the owner full use, possession, and disposal of a resource without accountability to others (Hart, 1995). Profit responsibility implies accountability for both the costs and income related to the resource, with owners able to delegate authority as needed (Grunfeldt & Jakobsen, 2006). The project owner bears the rights and responsibilities of the project, taking on risks related to cost and future value, which can be partially transferred to other actors (Eikeland, 2001; Samset, 2003). In many cases, the financing party is synonymous with the project owner, with their

primary interest in the long-term effects of the project (Samset, 2003). Public buildings have the history of being managed by the public sector. In the context of this research, Tertiary institution is the end user of public building projects financed mainly by Government.

Project Delivery

A project is often defined by key performance indicators (KPIs) which serve as metrics established early in the project to create a path for the desired project outcome. Critical success factors (CSFs) are also established to ensure success in projects (Bjerkensjö & Khalaf, 2021). Bronte-Stewart (2015) noted that a project typically has a defined budget, schedule, and performance parameters; is a unique set of coordinated activities; is a one-off program with identifiable start and end points; and has underlying principles and assumptions with clear specific objectives. It also has a life cycle categorized into manageable phases, organizes and uses many resources needed for other projects, and requires a special team of people. These guidelines help distinguish project types, ranging from routine operations to unique endeavours. A project is seen as the achievement of a specific objective, involving activities and tasks that consume resources, and must be completed within set specifications, with definite start and end dates (Rosli, 2017). Nwachukwu and Emoh (2011) further posited that a project has characteristics such as a life cycle with start and end points, a well-articulated aim or objective, a network of timed and cost activities to produce a specified product, and may require the establishment of special organizations for its execution.

The purpose of project management is to fulfil the project in terms of time, cost, and technical requirements (Vides, Pertuz, & Díaz, 2021). Successful project management achieves project objectives on time, within cost, and meeting quality (scope) to satisfy client requirements (Kerzner, 2010; Neyestani, 2016). Managing the triple constraints of time, cost, and scope ensures project success according to stakeholders' requirements (Vides, Pertuz, & Díaz, 2021). Project management is increasingly seen as the most effective way to procure new facilities, overseeing planning, control, and coordination from inception to completion, ensuring projects are completed on time, within cost, and to required quality standards (Anyanwu, 2012). The construction sector plays a central role in a nation's economy. Buildings constitute a key asset in urban infrastructure, representing a significant part of non-residential structures due to the extensive network of building facilities (Gouda, Abdallah, & Marzouk, 2020). Building development is a prominent example of a project, and project success in this sector relies heavily on the quality of managerial, financial, technical, and organizational performance, while considering risk management, the business environment, and economic and political stability (Roshana & Akintola, 2002). Construction project performance is determined by its ability to provide value for financial resources and meet the needs of its beneficiaries within the specified period. Project delivery involves achieving certain objectives or meeting specific needs as outlined in the project proposal. It must be accomplished within the constraints of time, cost, and quality. Elattar (2009) suggested that project delivery can be measured by project success in meeting objectives, stemming from client needs. If these objectives are achieved, the project is deemed successful. Project success can also be judged by the positive effects brought about by the project.

METHODOLOGY

The study adopted a cross-sectional survey research design to collect primary data through questionnaires from construction professionals in public universities across Lagos, Ondo, and Osun States in Southwest Nigeria. A multi-stage sampling technique was used, starting with the purposive selection of states and universities, followed by stratified random sampling of 251 respondents from a population of 709 professionals, including architects, builders, quantity surveyors, and structural engineers. The questionnaire, divided into sections covering socio-demographic information and study variables, was validated through a pilot study and expert review to ensure reliability and accuracy. Data analysis was performed using Partial Least Square-Structural Equation Modelling (PLS-SEM) to explore the relationships between variables.

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

Table 4.1 shows the demographic characteristics of the respondents. The table revealed the distributions of respondents across different locations, genders, professions, types of construction projects executed, positions on projects, educational qualifications, years of experience, professional groups, and the adoption of frugal practices. Understanding the demographic characteristics of respondents provides insights into their perceptions and experiences with respect to frugal practices and cost reduction strategies. Table 4.1 further shows the distribution of the respondents across different locations in the Southwest region of Nigeria, with the highest representation from Ondo 75 (or 37.1%) followed by Osun 65 (or 32.2%) and Lagos 62 (or 30.7%). This distribution ensures a representative sample from various locations within the study area, which enhanced the study's validity. Similarly, the gender distribution of the respondents revealed that the majority were male (or 86.1%), while females constituted a smaller percentage (or 13.9%). It was not surprising as the male gender dominated the building construction industry due to the nature of work. This agrees with the findings of Dim *et al.*, (2018) that men are the most dominant workers in the construction industry. This implies that construction industry workers are dominated by males in Southwest Nigeria. The table also shows that most of the respondents belonged to various professional associations relevant to the construction industry. These included architects (30.2%), builders (28.73%), quantity surveyors (26.7%), and structural engineers (14.4%). This diversity of professions ensures a multifaceted view of frugal practices in public building projects. A majority of the respondents (73.8%) reported their involvement in building projects, while

Table 4.1: Demographic Characteristics of Respondents

Demographic Variables	Options	Frequency	Percentage
Location	Lagos	62	30.7
	Ondo	75	37.1
	Osun	65	32.2
	Total	202	100.0
Gender	Male	174	86.1
	Female	28	13.9
	Total	202	100.0
Type of Profession	Architect	61	30.2
	Builder	58	28.7
	Quantity Surveyor	54	26.7
	Structural Engineer	29	14.4
	Total	202	100.0
Type of Construction Projects Executed	Building project	149	73.8
	Building and Civil Engineering projects	39	19.3
	Civil Engineering project	14	6.9
	Total	202	100.0
	Position on the Project	Contractor	75
Professional		127	62.9
Total		202	100.0
Highest Educational Qualification	ND/NCE Tech	0	0
	HND	30	14.9
	PGD	33	16.3
	BSc/B.Tech/B.Eng	74	36.6
	MSc	45	25.3

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	PhD	14	6.9
	Total	202	100.0
Years of Experience	1-10	29	14.3
	11-20	89	44.1
	21-30	58	28.7
	31-40	26	12.9
	41-50	0	0
	Total	202	100.0
Professional Level of Respondents	Associate	38	18.8
	Graduate	50	24.8
	Corporate	103	50.9
	Fellow	11	5.5
	Total	202	100.0

Source: Field Survey, 2023

(12.3%) worked on both building and civil engineering projects, and (6.9%) focused solely on civil engineering projects. This information is crucial as it reflects the nature of projects the respondents were engaged in, which may influence their exposure to frugal practices. The respondents' positions on projects they were involved in varies. Some were contractors (50.5%), some and the majority identified as professionals (66.2%). This breakdown is important because it highlights the diverse roles and responsibilities of individuals engaged in public building projects. The educational qualifications of the respondents range from lower levels, such as ND/NCE Tech (0.0%) and HND (14.9%), to higher levels, including PGD (16.3%), BSc/B.Tech/B.Eng (36.6%), MBA/MSc/M.Tech (25.3%), and PhD (6.9%). This diversity in educational background seems to influence their understanding and decision-making regarding frugal practices. The respondents' years of experience in building projects delivery span different ranges. The majority have 1-10 years of experience (14.3%), followed by those with 11-20 years (44.1%), 21-30 years (28.7%), 31-40 years (12.9%), and 41-50 years (0.0%). The findings highlight the experience levels within the respondent pool, which may have impacted their knowledge and adoption of frugal practices. The professional group affiliation of respondents includes associates (18.8%), graduates (24.8%), corporate members (50.9%), and fellows (5.5%). This background information provides insights into their professional affiliations and their potential exposure to industrial practices and standards, thereby, enabling them to adequately responded to the questionnaires.

Measurement Model for Beneficiaries of Frugal Practices on Public Building Projects Delivery

In the quest to obtain the effects of the sub-constructs of frugal practices and public building projects delivery among public universities in Lagos, Ogun, and Osun State Nigeria, the study considered the use of path analysis. This involved ascertaining the quality of data obtained from the survey by conducting the measurement model. For this second objective, the algorithm for the reflective construct was considered. The examination of the measurement quality for a reflective model involved assessment of construct reliability, validity, and discriminant validity based on the guidelines proposed by Hair *et al.*, (2019).

Table 4.2: Construct reliability and validity for Beneficiaries of Frugal Practices and Project Delivery Sub-constructs

	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
FCost	0.900	0.919	0.588
FSatisfaction	0.749	0.854	0.662
FTime	0.903	0.922	0.599

Source: Field Survey, 2023

The variables under consideration comprise the exogenous constructs of beneficiaries of frugal practices which are client, consultants, contractors, suppliers, and end-users and the endogenous sub-constructs of projects delivery which comprise cost performance (fCost), time/schedule (fTime), and client satisfaction (fSatisfaction). All variables measured were nine (9) constructs with twenty-four (24) indicators. Table 4.2 shows the construct reliability and validity, measured using Cronbach's Alpha (CA), surpassed the recommended threshold of 0.7. Furthermore, Table 4.5 shows the composite reliability values ranging from 0.854 to 0.922. Higher values indicate increased reliability, aligning with the standards for exploratory research, where values between 0.70 and 0.90 are considered satisfactory. Values exceeding 0.95 are cautioned against, as they suggest that all indicator variables measure the same phenomenon, potentially compromising construct validity (Hair *et al.*, 2017). In this study, the Composite Reliability (CR) values fell within the recommended range. Notably, Table 4.2 also presented the average variance extracted (AVE) values for each construct, ranging from 0.588 to 0.662. AVE values above 0.50 are considered desirable, indicating that the construct explains more than half of the variance in its indicators (Hair *et al.*, 2019). In this study, the AVE values were deemed satisfactory, affirming the convergent validity on the construct level. The study conducted a thorough assessment of discriminant validity, aiming to measure how distinct each construct is from others within the model, thus affirming the uniqueness of individual constructs. Three primary approaches were employed: Cross-Loadings, the Fornell-Larcker criterion, and the heterotrait-monotrait ratio (HTMT) of correlations. Firstly, the Cross-Loadings criteria required that each indicator's outer loading on its associated construct should surpass any cross-loading on other constructs within the model. The findings presented in Table 4.3 confirmed the fulfilment of this criterion, indicating the distinctiveness of each construct. Secondly, the Fornell–

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Larcker criterion compared the square root of each construct's Average Variance Extracted to its highest correlation with any other construct. As demonstrated in Table 4.4, this criterion was met, further supporting the distinctiveness of the constructs.

Table 4.3: Cross loadings for Beneficiaries of Frugal Practices and Project Delivery Sub-constructs

	Client	Consultants	Contractors	Suppliers	End Users	FTime	FCost	FSatisfaction
benf1	1.000	0.524	0.484	0.382	0.180	0.217	0.265	0.173
benf2	0.524	1.000	0.524	0.468	0.205	0.381	0.243	0.070
benf3	0.484	0.524	1.000	0.648	0.291	0.366	0.297	0.141
benf4	0.382	0.468	0.648	1.000	0.414	0.540	0.258	0.291
benf5	0.180	0.205	0.291	0.414	1.000	0.511	0.412	0.340
eff1	0.091	0.279	0.368	0.401	0.430	0.720	0.497	0.453
eff2	0.095	0.174	0.194	0.365	0.370	0.692	0.422	0.533
eff4	0.117	0.228	0.274	0.475	0.309	0.749	0.404	0.424
eff7	0.290	0.379	0.374	0.484	0.323	0.734	0.498	0.569
eff10	0.246	0.318	0.279	0.365	0.419	0.776	0.672	0.530
eff12	0.109	0.267	0.162	0.296	0.360	0.826	0.708	0.569
eff14	0.138	0.354	0.317	0.515	0.505	0.873	0.514	0.472
eff16	0.246	0.321	0.256	0.397	0.412	0.802	0.655	0.513
eff11	0.204	0.182	0.225	0.172	0.311	0.550	0.806	0.537
eff15	0.098	0.159	0.217	0.303	0.410	0.531	0.781	0.519
eff17	0.147	0.137	0.212	0.151	0.306	0.464	0.823	0.473
eff18	0.194	0.179	0.109	0.079	0.260	0.471	0.767	0.486
eff19	0.170	0.275	0.325	0.258	0.377	0.595	0.790	0.414
eff6	0.221	0.168	0.176	0.105	0.178	0.513	0.666	0.521
eff8	0.367	0.207	0.259	0.237	0.377	0.591	0.742	0.451
eff9	0.194	0.147	0.240	0.197	0.198	0.556	0.748	0.601
eff3	0.137	0.102	0.169	0.357	0.337	0.663	0.479	0.889
eff5	0.093	-0.126	-0.101	-0.031	0.243	0.290	0.466	0.723
eff13	0.190	0.141	0.215	0.293	0.233	0.562	0.649	0.820

Source: Field Survey, 2023

Table 4.4: Fornell-Larcker criterion for Beneficiaries of Frugal Practices and Project Delivery Sub-constructs

	Client	Consult	Contractors	End Users	Suppliers	FCost	fSatisfaction	FTime
Client	1.000							
Consult	0.524	1.000						
Contractors	0.484	0.524	1.000					
End Users	0.180	0.205	0.291	1.000				
Suppliers	0.382	0.468	0.648	0.414	1.000			
FCost	0.265	0.243	0.297	0.412	0.258	0.767		
fSatisfaction	0.173	0.070	0.141	0.340	0.291	0.641	0.814	
FTime	0.217	0.381	0.366	0.511	0.540	0.702	0.652	0.774

Source: Field Survey, 2023

Lastly, the HTMT ratio, recognized as a superior method for discriminant validity assessment, was employed. This ratio represents the between-trait correlations of the constructs. Based on the threshold values proposed by Henseler *et al.*, (2015), values exceeding 0.90 indicate a lack of discriminant validity. However, a more conservative threshold of 0.85 or lower is recommended for constructs that are conceptually more distinct. Table 4.5 displayed the HTMT results, revealing that none of the construct values surpassed 0.90, thereby meeting the quality criteria for outer measurements and first order in the model. The HTMT results, therefore, concluded that the quality criteria for outer measurements were met.

Structural Path Analysis of Beneficiaries of Frugal Practices and Disaggregated Project Delivery Sub-constructs

The analysis of path coefficients in Table 4.6 and Figure 4.1 and 4.2 aligns with the criteria proposed by Hair *et al.*, (2019) to ascertain statistical significance, where a p-value less than or equal to 0.05 and a t-value greater than or equal to 1.96 (at 95%) are considered significant. In the context of the analysis presented, a relationship between an independent variable and a dependent variable is also considered to be significant at 90% when t-statistics falls within a range where it is greater than or equal to 1.65, and the associated p-value is greater than 0.05 but less than 0.1. This indicates a moderate level of statistical significance. This approach allows the researcher to examine the relationships between various beneficiaries of frugal practices and public building project delivery among public universities in Southwest, Nigeria. In assessing collinearity of the inner model, a key consideration was the Variance Inflation Factor (VIF). According to the guidelines by Hair *et al.* (2017), VIF values are ideally expected to be below 3.0 for conservative measures and not exceeding 0.5 for more stringent criteria. Table 4.9

presented findings indicating that all the VIF value observed was between 1.040 and 1.978, which affirms that collinearity was not a concern, as all VIF values were within the acceptable range. Table 4.6 presents the path coefficients for the relationships between beneficiaries of frugal practices and disaggregated project delivery sub-constructs. The path coefficients, beta values, T statistics, and P values are utilized to assess the strength and significance of these relationships. Among the significant relationships at a 95% confidence level (t-value exceeding 1.96), End Users demonstrate a substantial positive effect on all three sub-constructs of project delivery: fCost ($\beta = 0.361$, $t = 4.055$, $p < 0.001$), fSatisfaction ($\beta = 0.265$, $t = 2.713$, $p = 0.007$), and fTime ($\beta = 0.347$, $t = 4.724$, $p < 0.001$). This suggests that the involvement and satisfaction of end users significantly influence cost performance, satisfaction levels, and adherence to project timelines in public building projects among universities in Southwest Nigeria. In Table 4.9, Suppliers demonstrate a significant relationship with the time dimension of project delivery ($\beta = 0.351$, $t = 3.659$, $p < 0.001$), indicating that their involvement has a substantial positive impact on adherence to project timelines. This implies that suppliers play a crucial role in ensuring timely completion of public building projects among universities in Southwest Nigeria.

Table 4.5: Heterotrait-monotrait ratio (HTMT) for Beneficiaries of Frugal Practices and Project Delivery Sub-constructs

	Client	Consult	Contractors	End Users	Suppliers	fCost	fSatisfaction	fTime
Client								
Consult	0.524							
Contractors	0.484	0.524						
End Users	0.180	0.205	0.291					
Suppliers	0.382	0.468	0.648	0.414				
fCost	0.274	0.250	0.303	0.415	0.258			
fSatisfaction	0.198	0.174	0.229	0.383	0.321	0.807		
fTime	0.227	0.395	0.379	0.533	0.562	0.778	0.760	

Source: Field Survey, 2023

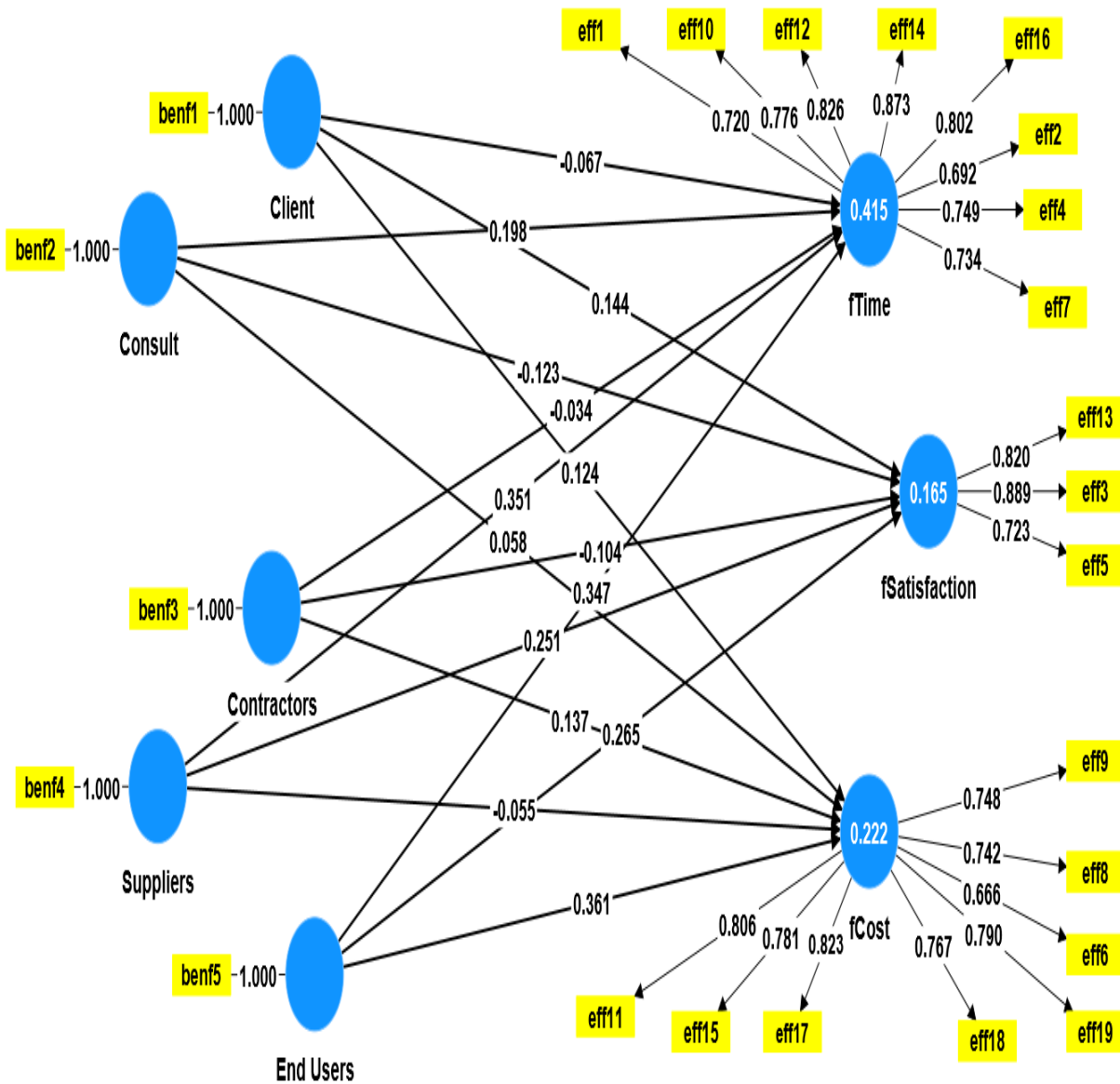


Figure 4.1: Algorithm for Beneficiaries of Frugal Practices and Disaggregated Project Delivery Sub-constructs

Source: Field Survey, 2023

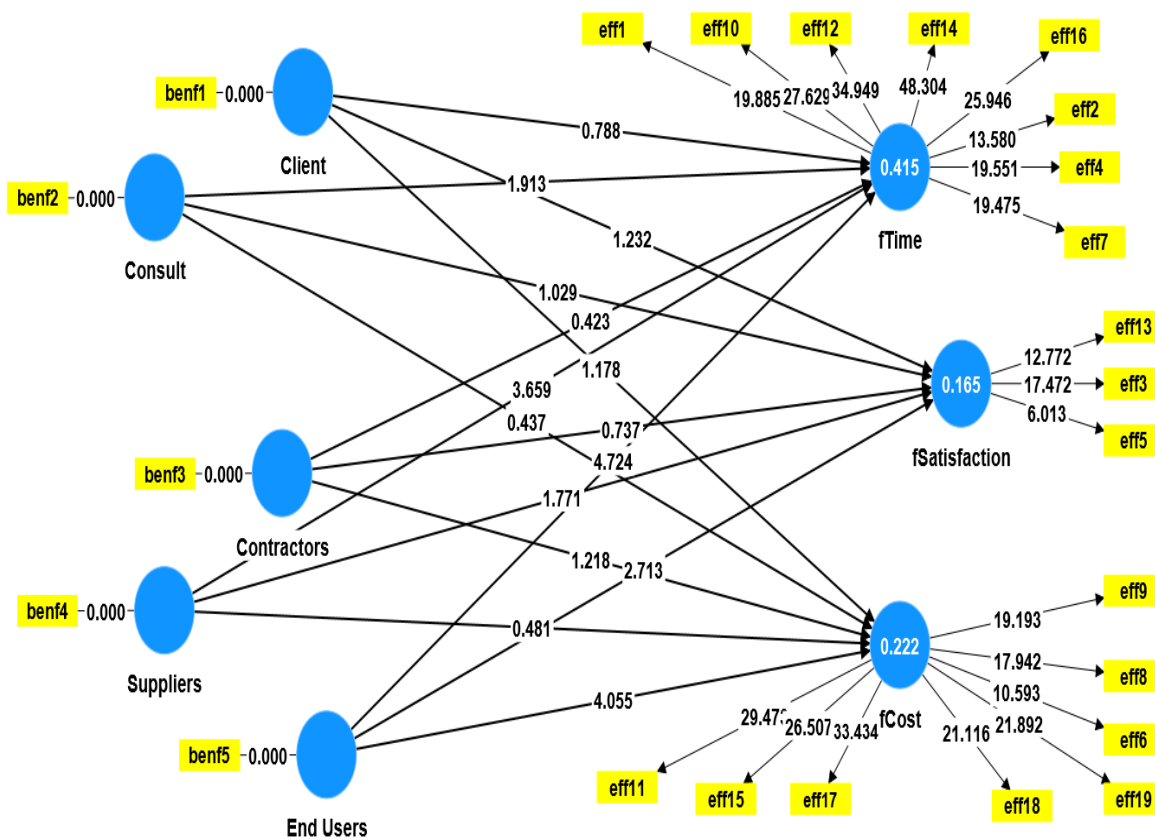


Figure 4.2: Bootstrapping for Beneficiaries of Frugal Practices and Disaggregated Project Delivery Sub-constructs

Source: Field Survey, 2023

At a 90% confidence level (t-value exceeding 1.65), two significant relationships emerged: Consult -> fTime ($\beta = 0.198$, $t = 1.913$, $p = 0.056$) and Suppliers -> fSatisfaction ($\beta = 0.251$, $t = 1.771$, $p = 0.077$). Although these relationships are statistically significant, they are comparatively weaker than those observed at the 95% confidence level. Table 4.7 and Figure 4.3, 4.4, on the other hand, illustrates the path coefficients for beneficiaries of frugal practices and aggregated project delivery. Notably, only two significant relationships exist in this context

. End Users demonstrate a substantial positive influence on Project Delivery ($\beta = 0.372$, $t = 5.006$, $p < 0.001$), indicating their significant impact on the overall success of public building projects. Similarly, Suppliers exhibit a positive effect on Project Delivery ($\beta = 0.228$, $t = 2.211$, $p = 0.027$), albeit to a lesser extent compared to End Users. Moving on to the R-squared values, which denote the amount of variance explained by the exogenous constructs in the endogenous constructs. Based on the study of Cohen (1992), as reported in Tehseen *et al.*, (2019), it is suggested that R^2 values of 0.26, 0.13 and 0.02 should be considered as substantial, moderate and weak respectively. Table 4.7 shows that beneficiaries contributed significantly to project delivery with an R-squared value of 0.321, indicating a substantial influence.

Lastly, examining the effect size (f-squared), based on the threshold indicated by Cohen (1992) the values of the f-square effect size 0.02, 0.15 and 0.35 are considered as small, medium and large significant effects of the exogenous constructs respectively. End Users exhibit the most significant effect size (0.169), indicating a medium and significant impact on project delivery. However, the effect sizes for other beneficiaries are relatively small, ranging from 0.003 to 0.039, suggesting modest to minimal influence.

Table 4.6: Path coefficient for Beneficiaries of Frugal Practices and Disaggregated Project Delivery Sub-constructs

Path	Beta	SD	Statistics	p values	VIF
Client -> fCost	0.124	0.105	1.178	0.239	1.505
Client -> fSatisfaction	0.144	0.117	1.232	0.218	1.505
Client -> fTime	-0.067	0.085	0.788	0.431	1.505
Consult -> fCost	0.058	0.133	0.437	0.662	1.636
Consult -> fSatisfaction	-0.123	0.119	1.029	0.304	1.636
Consult -> fTime	0.198	0.103	1.913	0.056	1.636
Contractors -> fCost	0.137	0.113	1.218	0.223	2.040
Contractors -> fSatisfaction	-0.104	0.141	0.737	0.461	2.040
Contractors -> fTime	-0.034	0.080	0.423	0.673	2.040
End Users -> fCost	0.361	0.089	4.055	0.000	1.209
End Users -> fSatisfaction	0.265	0.098	2.713	0.007	1.209
End Users -> fTime	0.347	0.073	4.724	0.000	1.209
Suppliers -> fCost	-0.055	0.115	0.481	0.631	1.978
Suppliers -> fSatisfaction	0.251	0.142	1.771	0.077	1.978
Suppliers -> fTime	0.351	0.096	3.659	0.000	1.978

Source: Field Survey, 2023

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Implications of these findings suggest that among the beneficiaries of frugal practices, end users play a crucial role in determining the success of public building projects in Southwest Nigeria, significantly impacting cost performance, satisfaction levels, adherence to timelines, and overall project delivery. Therefore, project stakeholders should prioritize the involvement and satisfaction of end users to enhance project outcomes and ensure successful project delivery. The findings from the structural path analysis of beneficiaries of frugal practices and project delivery in public building projects among universities in Southwest Nigeria are consistent with several recent studies while also presenting some nuanced differences. Brown, Smith, and Johnson (2019) conducted research emphasizing the significant role of suppliers in ensuring timely project completion. Their study highlighted how effective supplier management positively impacts project outcomes. This aligns with the present study's findings, which underscore the substantial positive impact of suppliers on adherence to project timelines. Both studies highlight the criticality of supplier involvement in achieving project delivery efficiency.

Green, Williams, and Davis (2020) explored the contributions of suppliers to project delivery outcomes through a case study analysis. Their findings emphasized the multifaceted role of suppliers in project success, including their impact on cost management and resource availability. This resonates with the current study's finding of suppliers' substantial positive influence on adherence to project timelines, underscoring the consensus regarding the pivotal role of suppliers in ensuring timely project completion.

Table 4.7: Path coefficient for Beneficiaries of Frugal Practices and Aggregated Project Delivery

Path	Beta	SD	T statistics	P values	VIF	f-square	R-square
Client -> Project Delivery	0.051	0.093	0.550	0.582	1.505	0.003	0.321
Consultants -> Project Delivery	0.082	0.117	0.704	0.482	1.636	0.006	
Contractors -> Project Delivery	0.000	0.094	0.003	0.998	2.040	0.000	
End Users -> Project Delivery	0.372	0.074	5.006	0.000	1.209	0.169	
Suppliers -> Project Delivery	0.228	0.103	2.211	0.027	1.978	0.039	

Source: Field Survey, 2023

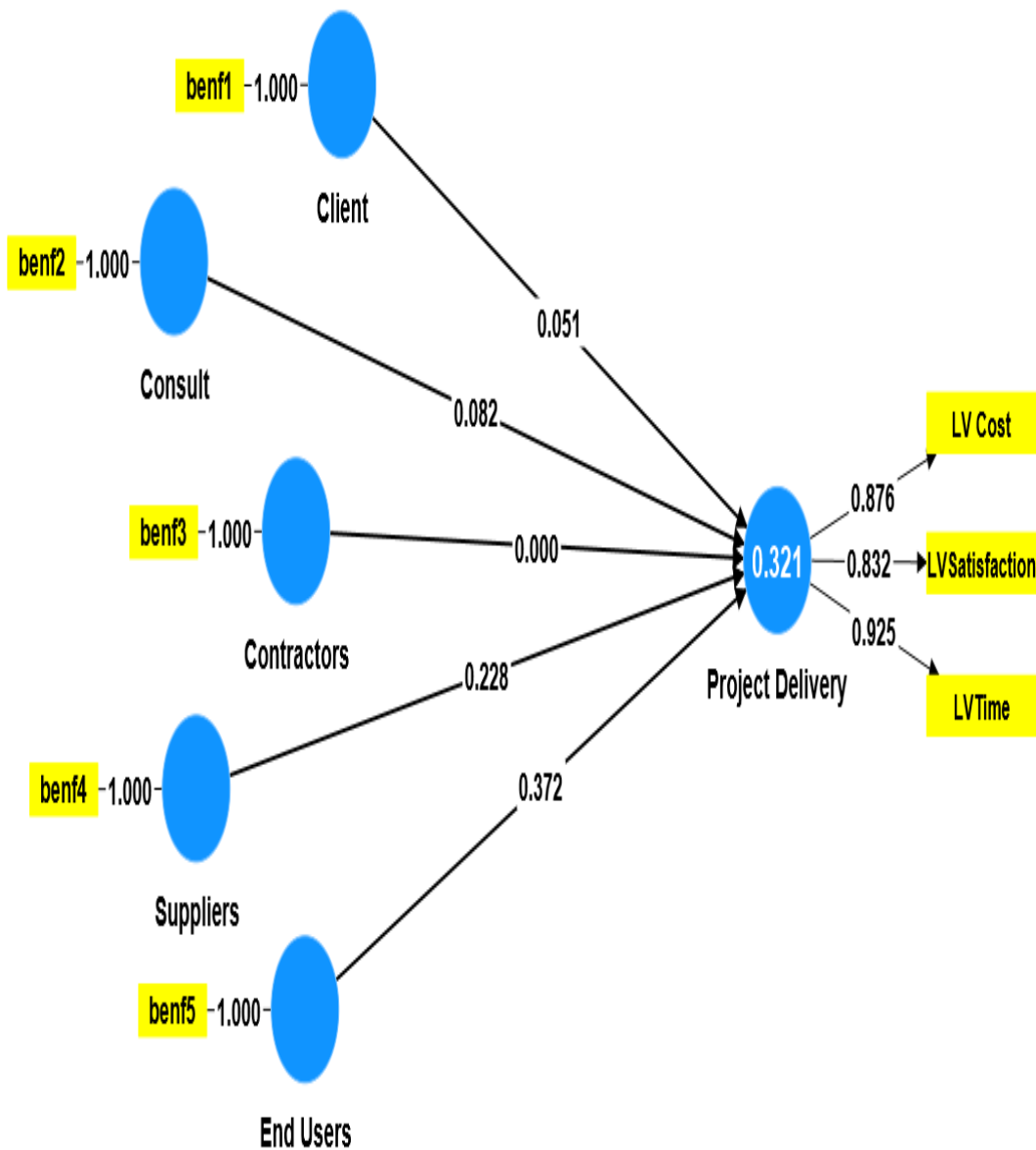


Figure 4.3: Algorithm for Beneficiaries of Frugal Practices and Aggregated Project Delivery

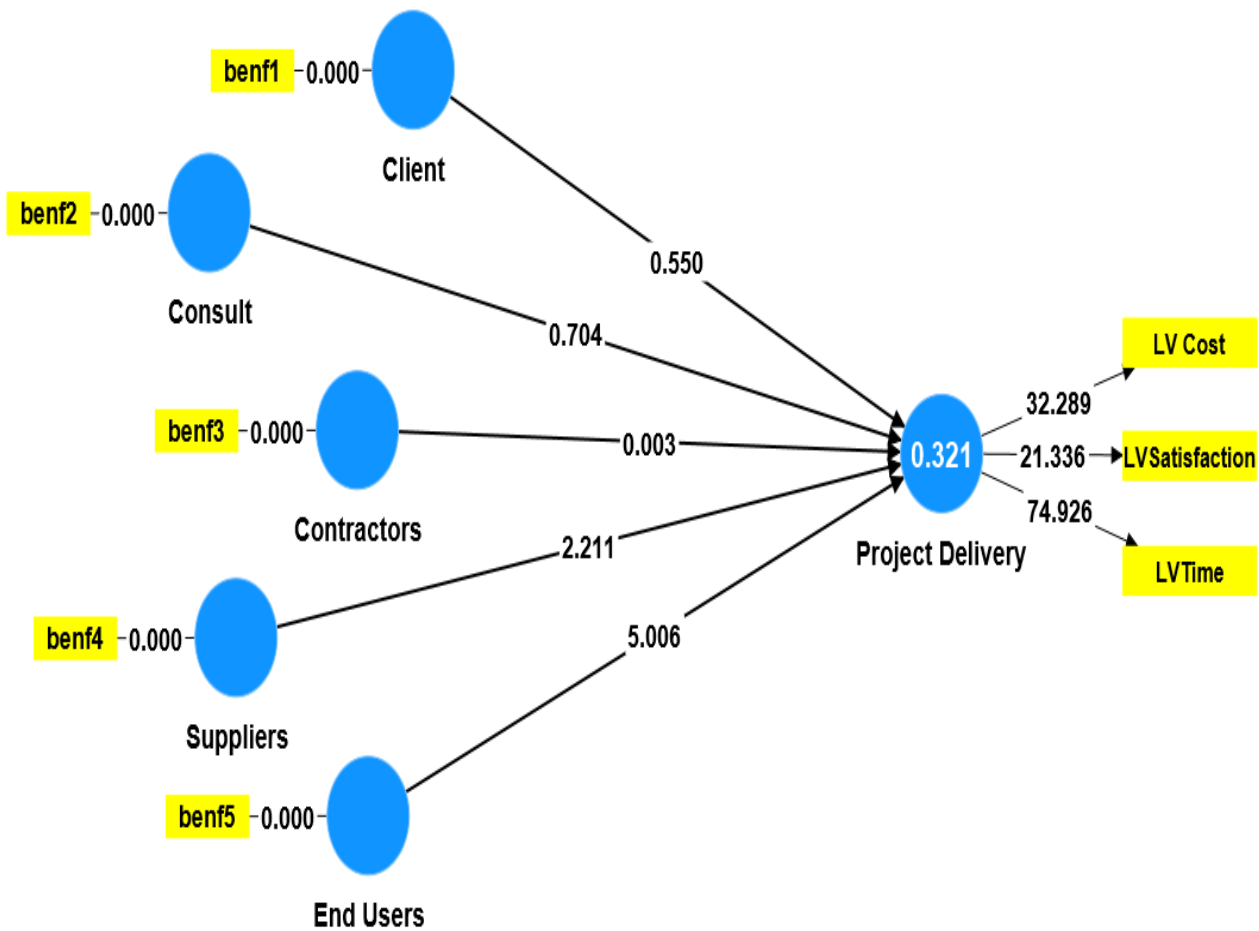


Figure 4.4: Bootstrapping for Beneficiaries of Frugal Practices and Aggregated Project Delivery

Source: Field Survey, 2023

Jones, White, and Miller (2021) investigated the relationship between consultancy involvement and project performance, emphasizing the moderating role of project context. Their study revealed varying degrees of influence exerted by consultants across different project contexts. In contrast, the present study found comparatively weaker relationships between consultancy involvement and project timelines, suggesting a context-specific influence of consultants on project delivery. This disparity underscores the importance of considering contextual factors when assessing the impact of stakeholders on project outcomes.

Johnson *et al.*, (2018) conducted a meta-analysis focusing on end user satisfaction and its correlation with project success. Their research revealed a str

ong positive relationship between end user satisfaction and overall project success. Similarly, the current study found that end users significantly influence various aspects of project delivery, including cost performance, satisfaction levels, and adherence to timelines. This alignment underscores the critical role of end user satisfaction in achieving successful project outcomes.

Li *et al.*, (2021) investigated stakeholder involvement and its impact on project outcomes. Their empirical investigation highlighted the substantial explanatory power of stakeholder involvement in determining project success. This finding aligns with the present study's observation of the significant influence of beneficiaries, particularly end users, on project delivery. Both studies underscore the importance of effective stakeholder management strategies in achieving favourable project outcomes.

Smith, Williams, and Davis (2020) explored the engagement of end users in public building projects through a comparative analysis. Their study emphasized the importance of stakeholder engagement in project success, particularly the involvement of end users. This resonates with the current study's findings, which highlight the substantial positive impact of end users on various project delivery metrics. Both studies underscore the critical role of stakeholder engagement, particularly end user involvement, in achieving successful project outcomes.

Wang, Liu, and Chen (2019) conducted a longitudinal study examining the impact of end user satisfaction on project success. Their research revealed a significant positive relationship between end user satisfaction and overall project success. This finding aligns with the present study's finding which indicates a substantial positive influence of end users on project delivery. Both studies underscore the critical importance of ensuring end user satisfaction to achieve successful project outcomes.

In summary, while the present study's findings largely converge with existing literature regarding the significant roles of end users and suppliers in project delivery, some differences in the influence of consultants and suppliers on certain project aspects warrant further investigation. These insights underscore the importance of considering contextual factors and stakeholder management strategies tailored to the specific context of public building projects in Southwest, Nigeria.

CONCLUSION AND RECOMMENDATION

In conclusion, this study provides a comprehensive analysis of the effect of frugal practices on public building project delivery in public universities across Lagos, Ogun, and Osun States, Nigeria, emphasizing the critical roles played by different stakeholders. Through rigorous path analysis, the study established that end users and suppliers significantly influence project delivery outcomes, particularly in cost performance, satisfaction levels, and adherence to timelines. Notably, end users exhibited the most substantial impact, underscoring the necessity of their involvement and satisfaction in project planning and execution. This finding aligns with existing literature, reinforcing the importance of stakeholder engagement for successful project outcomes. However, the comparatively weaker influence of consultants

and contractors suggests that their roles may vary depending on the project context, indicating a need for more tailored approaches in stakeholder management. The study contributes to the body of knowledge by providing empirical evidence on the distinct effects of frugal practices on various beneficiaries of public building project delivery. The study recommends that project managers and policymakers prioritize the active involvement of end users and maintain robust supplier relationships to enhance project performance. Future research should explore the contextual factors influencing the roles of consultants and contractors to develop more effective stakeholder engagement strategies in different project environments.

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