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Concession Practices and the Cost of Road Projects Delivery in Southwest Nigeria

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Abstract **Original Research Article**

Implementing road concession practices has faced several challenges, resulting in delays, cost overruns, and substandard project outcomes in developing world. Thus, this study examined the relationship between concession practices and road projects delivery in southwest Nigeria. The study employed a survey research design to collect quantitative data from stakeholders involved in road infrastructure projects within the study area. Inferential statistics used involved Partial Least Squares Structural Equation Modeling (PLS-SEM). The results showed that clarity of responsibility (p = 0.01), execution and accountability (P = 0.00), communication protocol (p = 0.00), sustainability and innovation (P = 0.00) alternative financing (P = 0.00), government financing (P = 0.00), and performance monitoring (P = 0.02) have positive and significant effect on cost of road projects delivery in the study area. However, Private financing (0.00) has negative and significant effect on cost of road project delivery. This is an indication that a one standard deviation increase in Private financing will reduce cost of road project delivery by 0.28 standard deviation. The study concludes that the effect of the indicators of responsibility development, maintenance activities, financing options and concession operation were diverse for cost of road project delivery in the study area. The study recommends that alternative and government finance are critical financing options to cost of road project delivery while multilateral and private finance lessens the cost of road project delivery in the study area.

Keywords: Cost, Concession Practices, Road Project Delivery.

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1. INTRODUCTION

The growing demand for successful project delivery and infrastructure development in developing countries has led to increased reliance on concession practices as a viable means of delivering large-scale projects (Nwangwu, 2022). Concession practices refer to contractual agreements in which a government or public authority grants a private entity the right to finance, develop, operate, and maintain a public asset or service for a specified period. Infrastructures in which concessions are always granted include, but not limited to; roads, airports, seaports, railways, waterways, energy infrastructure and telecommunications, among others.

Globally, concession practices are recognized for their ability to mobilize private sector investment in public projects. Models such as Build-Operate-Transfer (BOT), Design-Build-Finance-Operate (DBFO), and various Public Private Partnerships PPP frameworks have been successfully implemented in countries like China, India, and Brazil, leading to significant improvements in road network expansion and maintenance (Zhang & Luo, 2023). These models often include mechanisms such as tolling, user fees, and financial guarantees that ensure the sustainability of the projects and returns on investment for private investors (Liyanage et al., 2021). However, successful implementation depends on a robust regulatory framework, effective financial management, and clear risk-sharing mechanisms between stakeholders.

In Nigeria the concession model, a form of public-private partnership (PPP), has been increasingly adopted in Southwest for road project delivery. Under this model, the government grants private companies the rights to design, finance, construct, operate, and maintain road networks (Ojo et al., 2020). Concession agreements, usually long-term, relieve the government of the financial burden associated with road development and introduce competition, which fosters

innovation and accountability. These partnerships allow the optimal allocation of resources and the sharing of risks between the public and private sectors, creating an efficient and sustainable framework for road development.

A critical component of these concession arrangements is the self-sustainability model, which ensures the long-term success of road projects by establishing clear contractual agreements and performance-based metrics (Kumar,2021). This approach incentivises private sector participation while safeguarding public interests, particularly regarding financial viability, social and environmental sustainability. By diversifying funding sources and fostering collaboration, concession methods have become an effective alternative to government-funded infrastructure projects.

This adoption of concession practices in road projects has grown over the last two decades, particularly following the introduction of PPP policies aimed at reducing the government's infrastructural funding burden. Several road projects across Nigeria have been delivered using concession frameworks, including high-profile projects in Lagos, Ogun, and Oyo states. These concession agreements have been seen as a solution to the deteriorating road infrastructure in the country, which has negatively impacted economic activities, trade, and transportation efficiency (Agbaje & Oluwaseun, 2022).

Despite the potential benefits, the success of concession practices in Nigeria faces several challenges, including regulatory bottlenecks, inadequate financial resources, and weak institutional frameworks. Previous studies have highlighted issues related to unclear policy guidelines, delays in project execution, and disputes between public and private entities regarding risk allocation (Eze et al., 2023). Moreover, the lack of standardization in concession agreements and difficulties in securing financing for such large-scale projects have often led to delays and inflated project costs (Oke et al., 2021).

In Southwest Nigeria, a region with some of the highest road traffic and economic activities in the country, the effective implementation of concession practices could significantly improve road infrastructure (Agbaje et.al., 2022). The region's strategic importance, including its position as a hub for trade and industry, makes it essential to explore how concession models can be optimized for better project delivery outcomes. However, the harsh reality remains that roads concession contracts, despite their noble intentions, do not consistently produce the desired outcomes (Temitope, 2014; Chikelu, 2021; Bolarinwa et al., 2024).

This realization serves as a driving force behind the intense focus of this study, which aims to extensively analyze and evaluate concession practices, with specific emphasis on their effect on cost and successful delivery of road projects in Southwest region of Nigeria. This study, therefore, seeks to contribute to the body of knowledge on the application of concession practices in road projects, with a specific focus on Southwest, Nigeria, where infrastructural needs are critical to supporting economic development.

2. LITERATURE REVIEW

Concession practices in the context of road projects involve a contractual agreement between a public authority and a private entity (Ebekozien & Samsurijan, 2022). The private entity, often a consortium of companies, is granted the right to operate, maintain, and sometimes construct a public road or highway for a specified period. In return, the private entity is allowed to collect tolls or other forms of revenue from the users of the road. At the end of the concession period, the road is typically transferred back to the public authority. According to Kassa (2020), the key elements of a concession agreement include: Concession Period, Revenue Model, Investment Obligations and Performance Standards. The agreement typically includes specific performance standards that the private entity must meet. These standards are designed to ensure that the road is maintained in good condition and that the service provided to users is of high quality.

Concession practices offer several potential benefits, they can lead to improved efficiency in the management of road projects, as private entities are often better equipped to deliver projects on time and within budget (Humtsoe, 2020). Additionally, concession agreements can help to alleviate the financial burden on the public sector by leveraging private investment. However, these benefits can only be realized if the concession agreements are well-designed and effectively implemented.

Concession of Road Projects in Southwest Nigeria

To understand the effect of concession practices on road project delivery in Southwest Nigeria, it is essential to examine specific case studies. The following sections as explained by Ariyo et al. (2020) provides an overview of Ogun State among other major concession road projects in the region.

Ogun State Road Concessions

Ogun State has also implemented several road concession projects, particularly in areas with significant industrial and commercial activities. The state's proximity to Lagos and its strategic location along major trade routes makes it an important region for road infrastructure development. One notable project is the concession of the Lagos-Sango-Ota-Abeokuta Expressway, a major road linking Lagos with Ogun State. The concession agreement involved the rehabilitation and expansion of the road, with the private entity responsible for its operation and maintenance for a period of 20 years. The project aimed to reduce travel times and improve safety on the road, which is heavily used by commercial vehicles. The project has had mixed results. While some sections of the road have been completed and are in good condition, other parts have faced delays and challenges, particularly in securing the necessary financing. Additionally, the project has faced criticism from road users who argue that the tolls are too high, given the state of the road in some areas.

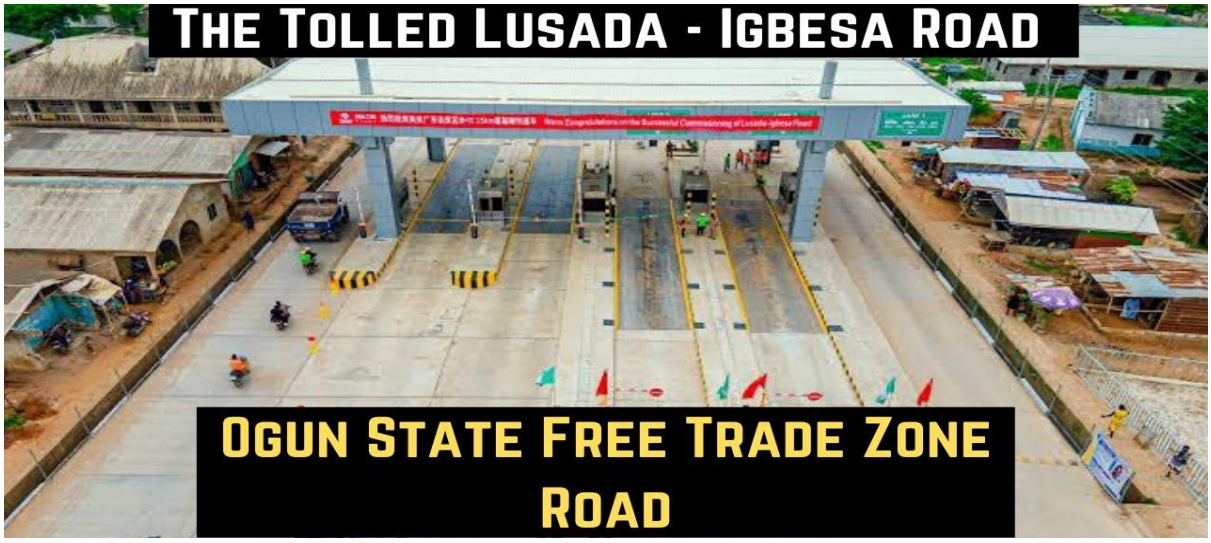

Figure 1. Road concession of Ogun State Free Trade Zone Road
Source: News Agency of Nigeria (NAN), 2021

Figure 2: Road concession of Epe-Ijebu Ode road
Source: News Agency of Nigeria (NAN), 2021

2.2 Theoretical Review

2.2.1 Principal-Agent Theory

Principal-agent theory highlights the challenges that arise from the separation of ownership and control in SOEs. Two key issues are "managerial perquisite consumption" (the use of company resources for personal benefit) and "entrenchment" (the protection of managers from external oversight), both of which can erode efficiency and profitability. In contrast, privatisation introduces greater accountability and control mechanisms, minimising these agency problems and improving overall outcomes (Cavaliere &Scab-Rosetti, 2008; Sappington & Stiglitz, 1987). This study tests the proposition that transferring property rights from the public to the private sector through concession agreements incentivises private entities to invest in infrastructure improvements, enhance efficiency and productivity thereby contributing to economic growth.

In the context of road infrastructure in Nigeria, privatisation via concessions aims to close the infrastructure gap by incentivising private firms to invest in road development, maintenance, and traffic management. The resulting improvements in road capacity, quality, and accessibility are expected to foster economic growth by reducing transportation costs, increasing trade efficiency, and enhancing connectivity between urban and rural areas.

2.3.1 Empirical Review

Marques et al., (2021) assessed the cost-efficiency of road projects delivered through Public-Private Partnerships

(PPPs) in Nigeria, with a specific focus on Southwest Nigeria. The objective was to evaluate how private sector involvement affects financial management and project execution. The researchers employed a comparative analysis of PPP road projects using secondary data. The findings showed that the involvement of private investors resulted in reduced project costs, better resource allocation, and enhanced financial outcomes. The study concluded that private participation in infrastructure delivery fosters greater cost-efficiency, particularly in managing budgets and meeting timelines. The authors recommended further research to explore how specific sectors within PPP projects, such as transport, can enhance private sector contributions.

Dansoh et al. (2020) compared public and private financing models in road infrastructure delivery, focusing on cost-efficiency in Nigeria. Through a comparative analysis, the authors found that private investors were more effective in managing project costs, as private financing arrangements allowed for greater flexibility in managing unforeseen delays and cost overruns. The study concluded that private financing models offer strategic benefits in road infrastructure delivery and recommended further exploration of hybrid models that combine both public and private funding.

Elebiju and Ilesanmi (2020) assessed the impact of contractual frameworks on the cost-efficiency of road concession projects in Nigeria. Through a qualitative analysis of concession agreements and project performance reports, the study found that well-structured contracts, which outlined detailed financial obligations and incentives, enhanced budget control and accountability. The findings highlighted that clearly defined contracts contribute significantly to reducing project costs and improving outcomes for both public and private stakeholders. The authors concluded that the design of concession agreements is a critical factor in ensuring cost-efficiency.

Ibe and Ejem (2019) aimed to assess the role of stakeholder involvement in improving the cost-efficiency of road concession projects. Through case studies of road projects in Southwest Nigeria, the study found that projects with active stakeholder engagement were able to identify potential issues early, leading to mitigated risks and controlled costs. The authors concluded that continuous engagement with stakeholders is critical for maintaining project cost-efficiency and recommended further studies to explore the impact of different stakeholder groups on project outcomes.

Opawole and Jagboro (2017) explored the influence of the regulatory environment on cost-efficiency in road concession projects in Nigeria. Using qualitative methods, the researchers analysed the role of government regulations in improving accountability and reducing corruption in concession practices. The findings indicated that clearer regulations and active oversight significantly contributed to cost-efficiency by promoting transparency and fair competition. The study concluded that a robust regulatory framework is essential for the success of concession projects and recommended further studies into the role of government institutions in regulating concession agreements.

2.4 Conceptual Framework

The conceptual framework in figure 3 illustrates the link between Concession practices and the road project delivery that will be investigated in this study. The study considers road project delivery as dependent variable which was measured by cost efficiency as found in Tor and Ogunlana, (2010). The study identifies concession practices as independent variable which includes; responsivity development and sharing, operational control, maintenance, financing, and concession operation as found in Manitshana, (2012).

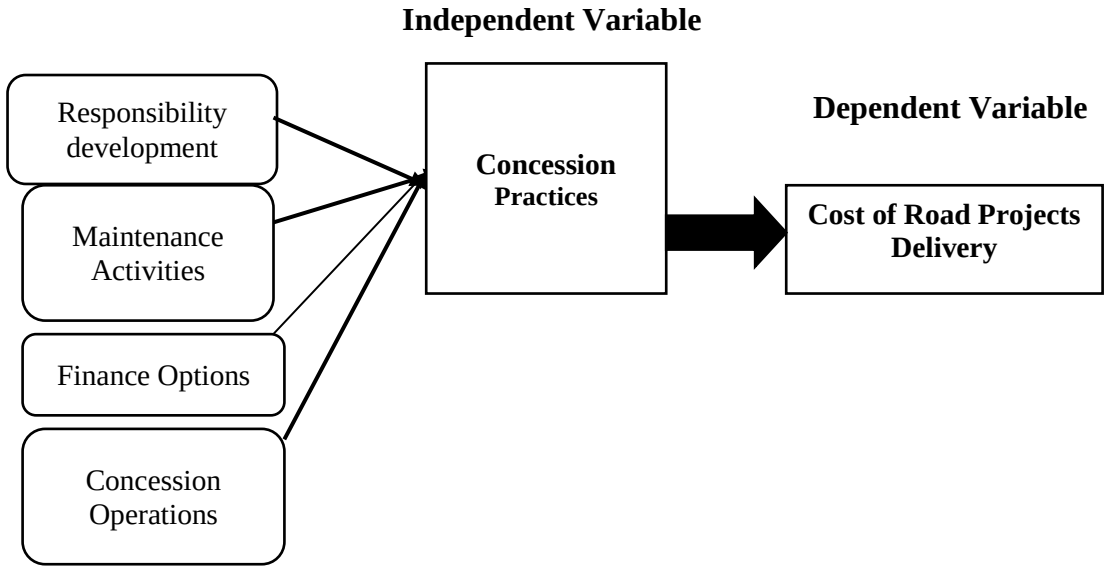

Figure 3: Conceptual Framework of the Concession Practices and Road Project Delivery in Southwest, Nigeria

Source: Adapted from: Rossi and Zoboli (2024); Smith and Green (2024)

3.0 METHODOLOGY

This paper employed a survey research design. The study area was the Southwest of Nigeria in Figure 4 which comprised of six states namely; Ekiti, Lagos, Ogun, Ondo, Osun and Oyo states, Nigeria. Southwest, Nigeria was selected due to its significant infrastructure development projects and the implementation of various concession agreements for road construction and maintenance.

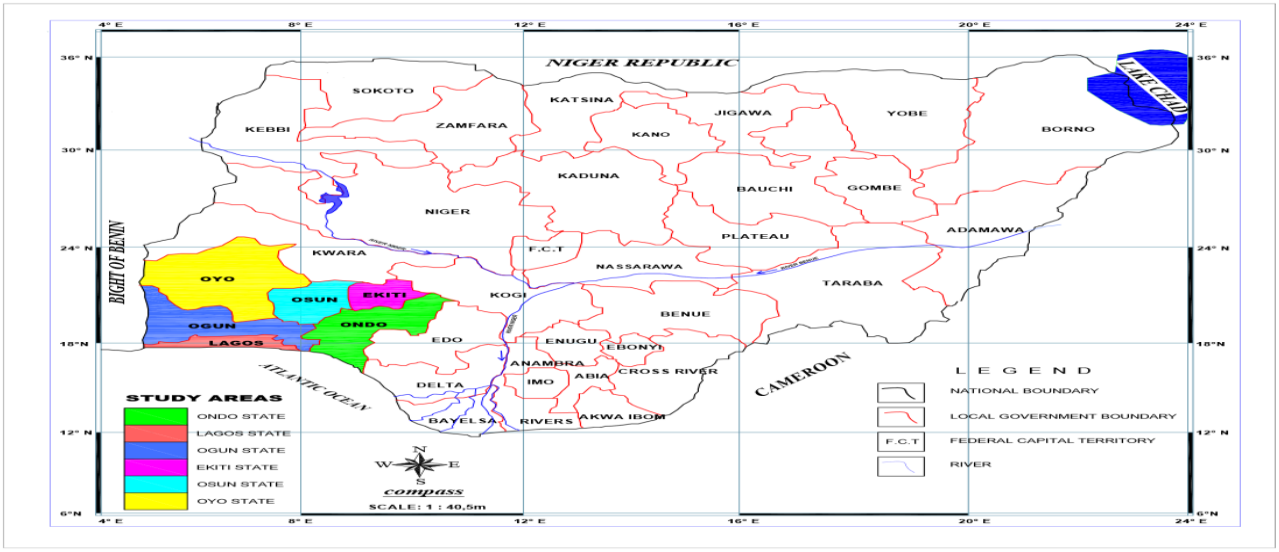

Figure 4: Map of Nigeria showing the Study Area

Source: CESRA GIS Laboratory, Federal University of Technology Akure, 2024

The target population was specifically those directly involved in or affected by concession practices on road project delivery in the Southwest geopolitical zone in Nigeria. This study used the Cochran's Formula (1963) for infinite or unknown population to determine the appropriate sample size from the selected states. Mathematically, the formula was given as:

$$n_0 = \frac{z^2 pq}{e^2} \quad (1)$$

n_0= sample size, z= the selected critical value of desired confidence level, p = the estimated proportion of an attribute that is present in the population, q = 1− p and e = the desired level of precision (probability of error). To calculate the sample size of unknown population, assuming the maximum variability is equal to 50% (p =0.5), and taking 95% confidence level with ±5% precision, the calculation for required sample size will be as follows: p = 0.5 and hence q =1-0.5 = 0.5; e = 0.05; z =1.96 So,

$$n_0 = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2} = 384.16$$

The sampling was done using multi-stage sampling procedure. The first stage involved the purposive selection of projects in the states with largest concessions of road projects. At the second stage, stratified sampling of 384 respondents from among government officials, project managers, professionals who worked or are working on concessioned road projects. Concession practices were proxied by responsibility development, maintenance activity, financing options and concession operations. The road project delivery was proxied with the cost efficiency.

The paper predominantly employed primary data with the use of structured questionnaires. The model focused on the effect of concession on the cost of road project delivery in the study area. Concession practices (proxied by by responsibility development, maintenance activity, financing options and concession operations) were used as the independent variables while the road project delivery was proxied with the cost efficiency as dependent variable. This relationship was represented as follows:

$$CRPDi = \alpha_0 + \alpha_1 RDi + \alpha_2 MAINi + \alpha_3 FINi + \alpha_4 OPCi + \varepsilon_1 \quad (2)$$

Where: CRPD stands for cost of road project delivery, RD represents responsibility Development, MAIN represents maintenance Activity, FIN stands for financing options, OPC stands for concession operations, α_0, α_1...α_4 are parameters to be estimated and ε is the error term. Data analysis was conducted using both descriptive and inferential statistics. Inferential statistics involved the use of Partial Least Squares Structural Equation Modelling (PLS-SEM). This method was suitable for examining complex relationships between variables and testing the hypothesized models.

4.0 RESULTS AND DISCUSSION

Table 1 showed the response rate of questionnaires distributed. A total of three hundred and eighty (380) copies of the structured questionnaire were printed and distributed to respondents. However, three hundred and forty-seven (347) representing 91% of total questionnaire distributed were returned. Thus, subsequent analysis was based on the information provided by the 347 respondents. Recovering more than 90% of questionnaire distributed was an indication of interest the respondents had in road project issue and this actually enriched the achievement of the objectives of the study.

Table 1: Response Rate

Questionnaire	Frequency	Percentage
Returned	347	91
Not Returned	33	9
Total	380	100

Source: Field Survey, (2025)

4.1 Background Information of respondents

The socioeconomic characteristics of the respondents were presented in Table 2. Out of the 347 respondents, 203, representing 59% were male while about 41% were female. This implied that there are more male in the road project delivery as stakeholders than female. In particular, 60% stakeholders in the road project in the Southwest of Nigeria are male.

Observably, the age distribution of respondents between31-40 and 41-40 constituted the highest percentage, posting 87 (25%) respectively. This was followed by respondents whose age are between 21 and 30 years, posting 76 or 22%. Therefore, those in the road project activities in the Southwest of Nigeria can be considered as productive energetic set of people. Specifically, if people of age 21 and 40 are considered highly productive, then about 47% of stakeholders in the road project activities in Southwest of Nigeria are productive. Added to this was another 25% who can be considered as highly experienced and not too old people. Given this age distribution, it was expected that their perceptions regarding the questions posed on road project delivery were reliable.

The educational status showed that most respondents own first degree or higher diploma with 98 respondents representing approximately 28%. Additional 76, constituting about 22% of respondents possess educational degree higher than first degree. Generally, as much as 85% of respondents possessed educational status above basic secondary school certificate. Given the pattern of the educational status, it was clear that most stakeholders in the road project delivery are educated.

From the professional status point of view, 81 respondents, representing 23% are building engineer while 79 representing approximately 22.8% of respondents are road engineer . Further, about 19%, that was 67 respondents are consultant while 18% or 63 are contractors. Expectedly, building and road engineers constituted around 46% of stakeholders in the road project delivery. With this size of respondents coupled with age and educational distribution, there was no doubt that these respondents are not only matured educated people, they are experienced and effective professionals in the road project activities

The experience of respondents in road project activities indicated that 121 or about 34.9% of respondents have between 6 and 10 years while additional 84 or 19.9% had between 11 and 20 years' experience in the road project activities. Those with more than 40 years' experienced posted 34 or about 10% while those with less than 5 years' experience posted 39 or 11%. Therefore, as much as 308, representing about 89% of respondents have not less than 6 years of experience in road project delivery. To be more specific, about 50%, that is 173 respondents possessed at least 11 years and at most 40 years of experience in road project.

Most of the respondents are private contractors followed by government workers (working in the ministry and agency). Specifically, as much as 129 representing 37% of respondents are private contractors while 72 or 21% are workers in the government ministry and agencies. Additional 71 or 20% worked in consultancy firms while 61 or about 17.6% worked in the national and international donor agency. Only 14 or 4% represent other organization such as religious organization, lone engineers, and freelance. Observably, there was a complete and adequate representation of respondents across various stakeholders in the road project activities.

Table 2: Socioeconomic Characteristics of Respondents

Socioeconomic Characteristics	Description	Freq.	%
Gender	Male	203	58.5
	Female	144	41.5
	Total	**347**	**100**
	Less than 20 Years	43	12

	21-30 Years	76	22
Age Bracket	31-40 Years	87	25
	41-50 Years	87	25
	Over 50 Years	54	16
	Total	**347**	**100**
	FSLC	41	11.82
	SSCE	50	14.4
	NCE/OND	51	14.7
Highest Level of Education Attained	B.Sc /HND	98	28.24
	PGD /MSc	76	21.9
	PhD	31	8.93
	Total	**347**	**100**
	Building Engineer	81	23.34
	Consultant	67	19.31
Professional Qualification	Contractor	63	18.16
	Road Engineer	79	22.77
	Others	57	16.43
	Total	**347**	**100**
	Ekiti	41	11.82
Respondents State of Residence	Lagos	87	25.07
	Ogun	78	22.48
	Ondo	71	20.46
	Osun	54	15.56
	Oyo	16	4.61
	Total	**347**	**100**
	Less than 5 years	39	11.24
	6-10 Years	121	34.87
Respondents on years of Experience	11-20 Years	84	24.21
	21-40	89	19.88
	More than 40 Years	34	9.8
	Total	**347**	**100**
	Government Agency	72	20.75
	Contractor (Private)	129	37.18
Respondents Organisation	Consultancy firm	71	20.46
	Donor Agency	61	17.58
	Others	14	4.03
	Total	**347**	**100**

Source: Field Survey, 2025

4.3 Concession Practices and Cost of Road Project Delivery in Southwest Nigeria

The concession practices in this session were examined in terms of responsibility development, maintenance activities, finance options and concession operations on the cost of road project delivery in the study area. The technique employed to compute the results was the partial least square bootstrapping. The reason for employing the technique was to obtain the magnitude of coefficient and also establish how significant such coefficient affects the variables. Since there are three measures representing the dependent variables and four measures indicators of independent variables each having at least four variables, thus; path coefficients were estimated, indicator by indicator as independent variable and also indicator by indicator of dependent variable. The first model showed how concession practices proxied by responsibility development, maintenance activities, finance options and concession operations individually affect cost of road project delivery in the study area.

4.3.1 Responsibility Development and Cost of Road Project Delivery in Southwest Nigeria

The structural equation model (SEM) result in figure 5 showed that only 40% of total variations in cost of road project delivery can be explained by the explanatory variables, namely clarity of responsibility, execution of accountability, capacity and training, impact and recommendation. The correlation between each of the dependent variables and independent variable (cost of project delivery) range between 0.00 (clarity of responsibility, capacity and training, impact and recommendation; execution and accountability) to 0.234.

Capacity and training have a coefficient of determination of 0.09.

Table 3 showed that capacity and training (p = 0.09) clarity of responsibility (p = 0.01), impact and recommendation (p = 0.00) all have significant effect on the cost of road project delivery. This in line with Marques et al., (2021) that concession participation in infrastructure delivery fosters greater cost-efficiency, particularly in managing budgets and meeting timelines. Execution and accountability do not have any significant path effect. Observably, all measures of responsibility development have positive effect on cost of road project delivery.

A one standard deviation increase in capacity and training will significantly lead to 0.13 standard deviation increase in cost of road project delivery. This is an unexpected result because capacity training should reduce cost of project delivery. However, in the short run, it may increase it because there will be cost incurred in cause of capacity training. A 1 standard deviation increase in clarity of responsibility will also raise cost of project delivery by 0.2 standard deviation.

Execution and accountability would have reduced cost of project delivery by 0.2 standard deviation for a 1 standard deviation increase, but the variable does not have any significant effect on cost of road project delivery. Impact and recommendation, like other variables showed positive and significant effect. The R-squared and R-square adjusted posted 75% and 74.6% power of explanatory variables in explaining the variation in the cost of road project delivery.

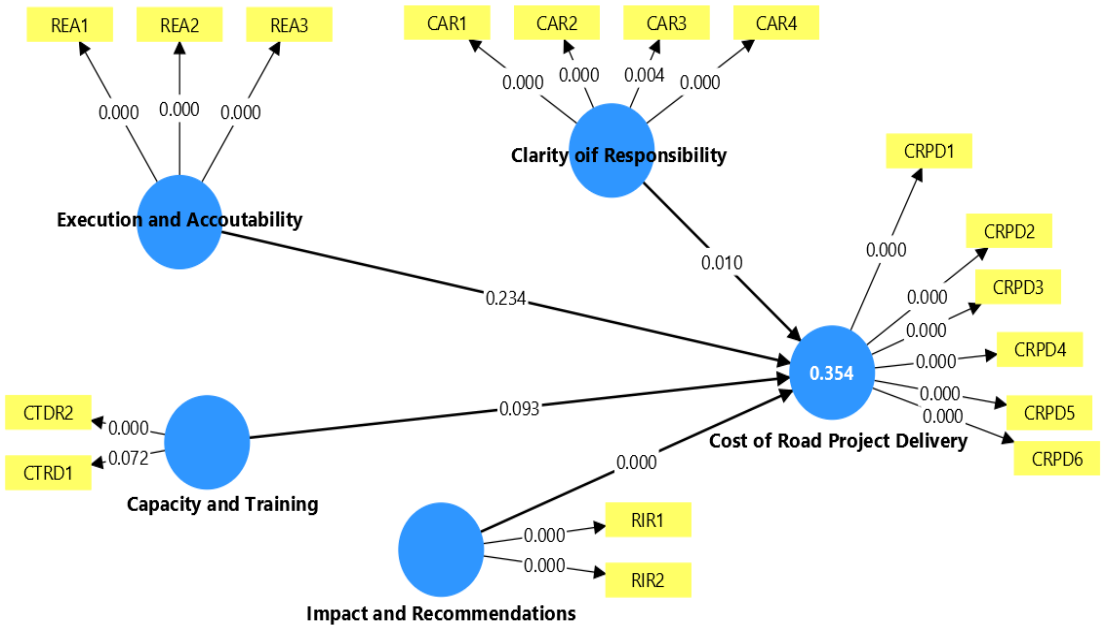

Figure 5: Bootstrapping Outcome for responsibility development and cost of road project delivery
Source: Authors Computation (2025)

Table 3: Path Coefficients Bootstrapping showing the effect of responsibility development on Cost of road project delivery

Constructs	Beta	Standard Error)	T statistics	P values
Capacity and Training -> Cost of Road Project Delivery	0.131	0.078	1.682	0.093
Clarity of Responsibility -> Cost of Road Project Delivery	0.228	0.088	2.579	0.010
Execution and Accountability -> Cost of Road Project Delivery	-0.123	0.103	1.189	0.234
Impact and Recommendations -> Cost of Road Project Delivery	0.402	0.079	5.062	0.000

R-square	0.754
R-square adjusted	0.746

Source: Authors Computation (2025)

4.3.2 Maintenance Activities and Cost of Road Project Delivery in Southwest Nigeria

The impact of maintenance activities on road project delivery measured by comprehensive scheduling, advance communication protocol, materials and Standards, use of modern technology, safety first approach and monitoring. Figure 6 showed the path of relationship between each of the latent variables of maintenance activities and cost of road project delivery. The explanatory power in the path association was found to be weak, posting approximately 0.4. The pairwise association range between 0.00 (performance monitoring) and 0.68 (high-quality materials and standards). The coefficient of association between comprehensive scheduling and cost of road project delivery was 0.56 while the association with advanced communication protocols was 0.01. Observably, high quality materials and standards have strong positive relationship with cost of road project delivery.

Table 4 showed that three out of the six explanatory variables significantly affect cost of road project delivery in this regard. The advanced communication protocol (p = 0.00), performance monitoring (P = 0.02) and safety first (P = 0.05). In terms of direction of effect, advanced communication protocol, materials and standards, modern technology, performance monitoring and safety first have negative effect while comprehensive scheduling has positive effect. This indicates that, a 1 standard deviation increase in advanced communication protocol, performance monitoring and safety first will significantly yield a 0.31, 0.18 and 0.17 decrease in cost of road project delivery. Invariably, advanced communication tends to be a strong maintenance indicator that reduces cost of road project delivery more than any other maintenance activities measure.

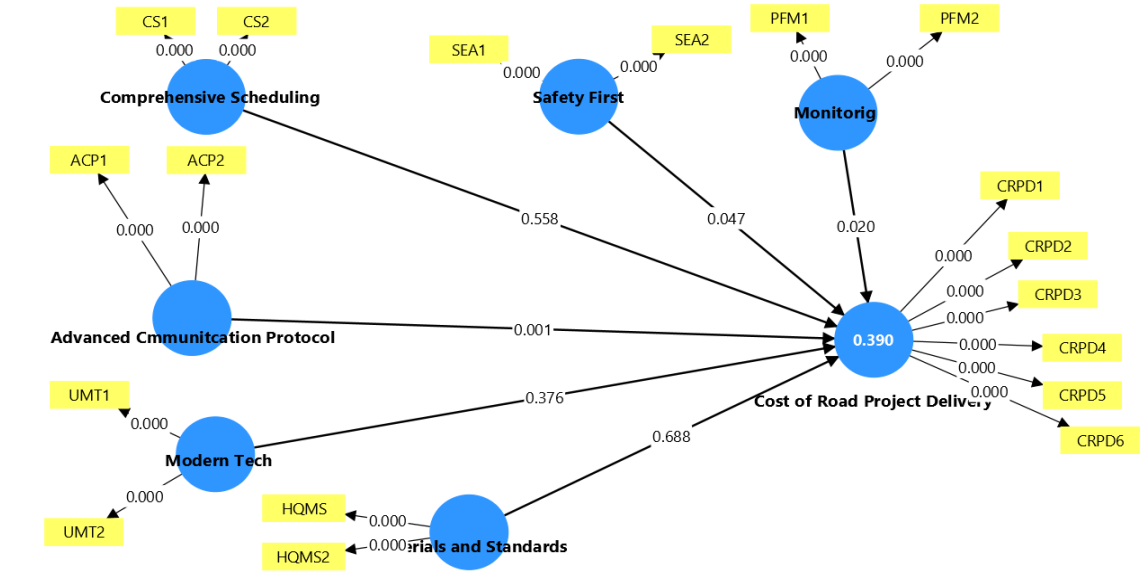

Figure 6: Bootstrapping Outcome for Maintenance activities and Cost of Road Project Delivery

Source: Authors Computation (2025)

Table 4: Path Coefficients Bootstrapping showing the effect of maintenance activities on cost of road project delivery

Latent Variables	Coeff.	Std. Error	T statistics	P values
Advanced Communication Protocol -> Cost of Road Project Delivery	-0.31	0.09	-3.48	0.00
Comprehensive Scheduling -> Cost of Road Project Delivery	0.05	0.09	0.59	0.56
Materials and Standards -> Cost of Road Project Delivery	-0.04	0.11	-0.40	0.69
Modern Tech -> Cost of Road Project Delivery	-0.07	0.08	0.88	0.38
Monitoring -> Cost of Road Project Delivery	-0.18	0.08	-2.33	0.02
Safety First -> Cost of Road Project Delivery	-0.17	0.09	-1.99	0.05
R-square	0.39			
R-square adjusted	0.38			

Source: Authors Computation (2025)

4.3.3 Finance options and Cost of Road Project Delivery in Southwest Nigeria

The impact of financing options on the cost of road delivery project in the study area was measured by public (government), private, project-based, multilateral and alternative financing. Figure 7 showed a positive association in each of the financing options with cost of road project delivery. However, these association were extremely weak especially for private financing (0.00), multilateral (0.02) and alternative financing (0.01) with cost of road project delivery. Meanwhile, the predictive power of these explanatory variables was moderately strong, posting a r-square of around 0.54. This is an indication that 54% of variation in the cost of road project delivery can be predicted by the financing options identified in the study.

Table 5 showed that a 1 standard deviation increase in alternative financing will significantly reduce the standard deviation of road project delivery by 0.17. Similarly, the standard deviation of road project delivery will fall by 0.13 for a 1 standard deviation increase in government financing. Also, if the standard deviation of multilateral financing rises by 1, then that of cost of road project delivery will fall by 0.14. Private financing like other financing options have negative and significant effect on cost of road project delivery (P = 0.00). In this regard, a 1 standard deviation increase in private financing will engender 0.28 decrease in the cost of road project delivery. However, project-based financing has no significant effect on cost of road project delivery (P = 0.16) but showed a sign of positive influence. The r-square and r-square adjusted were more than 0.5. Specifically, the regressors, that is, alternative financing, government financing, multilateral financing, private financing and project-based financing can explain over 50% of variation in the cost of road project delivery

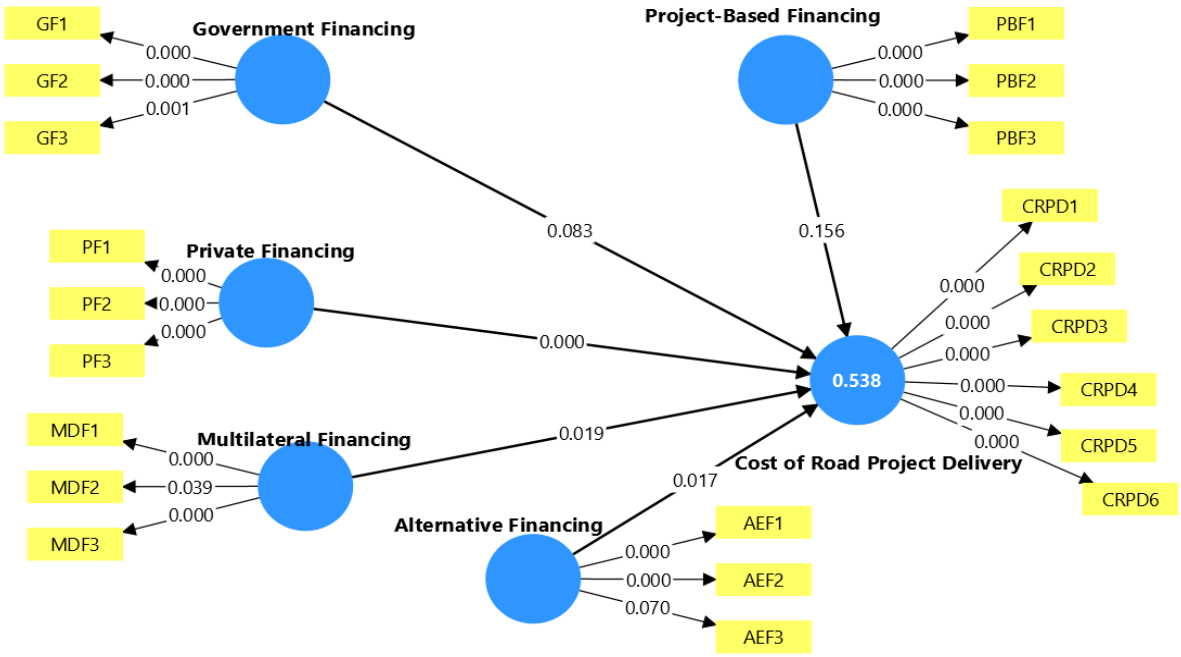

Figure 7: Effect of financing options on Cost of Road Project Delivery

Source: Authors Computation (2025)

Table 5: Path Coefficients Bootstrapping showing the effect of financing options on Cost of road project delivery

Lattent Variables	Coeff	Std Error	T statistics	P values
Alternative Financing -> Cost of Road Project Delivery	-0.17	0.07	-2.38	0.02
Government Financing -> Cost of Road Project Delivery	-0.13	0.08	-1.73	0.08
Multilateral Financing -> Cost of Road Project Delivery	-0.14	0.06	-2.35	0.02
Private Financing -> Cost of Road Project Delivery	-0.28	0.07	-3.83	0.00
Project-Based Financing -> Cost of Road Project Delivery	0.11	0.07	1.42	0.16
R-square	0.54			0.00
R-square adjusted	0.53			0.00

Source: Authors Computation (2025)

4.3.4 Concession Operations and Cost of Road Project Delivery in Southwest Nigeria

The impact of concession operations on the cost of road delivery project in the study area was measured by operation challenges, economic viability, asset lifecycle management, public interest safeguard, sustainability and innovation, risk allocation and flexibility provision. The predictive power of these variables as shown in figure 8 with respect to cost of road project delivery was 0.7, indicating that the measure of concession operations has the predictive power of 70% to explain the variation in cost of project delivery. The figure showed a weak association between cost of road project delivery and flexibility provision (0.05), risk allocation (0.07), and public interest safeguard (0.06). A moderately strong association exists between asset lifecycle management and cost of road project delivery (0.52).

Table 6 showed that out of the seven measures of concession operations developed, six have significant effect on cost of road project delivery operation challenges (P = 0.00), economic viability (P = 0.01), asset lifecycle management (P = 0.85), public interest safeguard (P= 0.03), sustainability and innovation (P = 0.00), risk allocation (P = 0.08) and flexibility provision (P = 0.04). In terms of direction of effect, all the variables except risk allocation have positive effect. These is an indication that a 1 deviation increase in risk allocation will reduce cost of project delivery by 0.13.

Economic viability will increase cost of road project delivery by 0.16 for a 1 standard deviation increase. Economic viability will also raise cost of project delivery by approximately 0.2, same magnitude of effect of flexibility provisions (0.21). Operation challenges and public interest safeguard will respectively affect cost of road project delivery by 0.23 and 0.14 standard deviation. Sustainability and innovation affect cost of road project delivery to the tune of 0.4 for a 1 standard deviation increase.

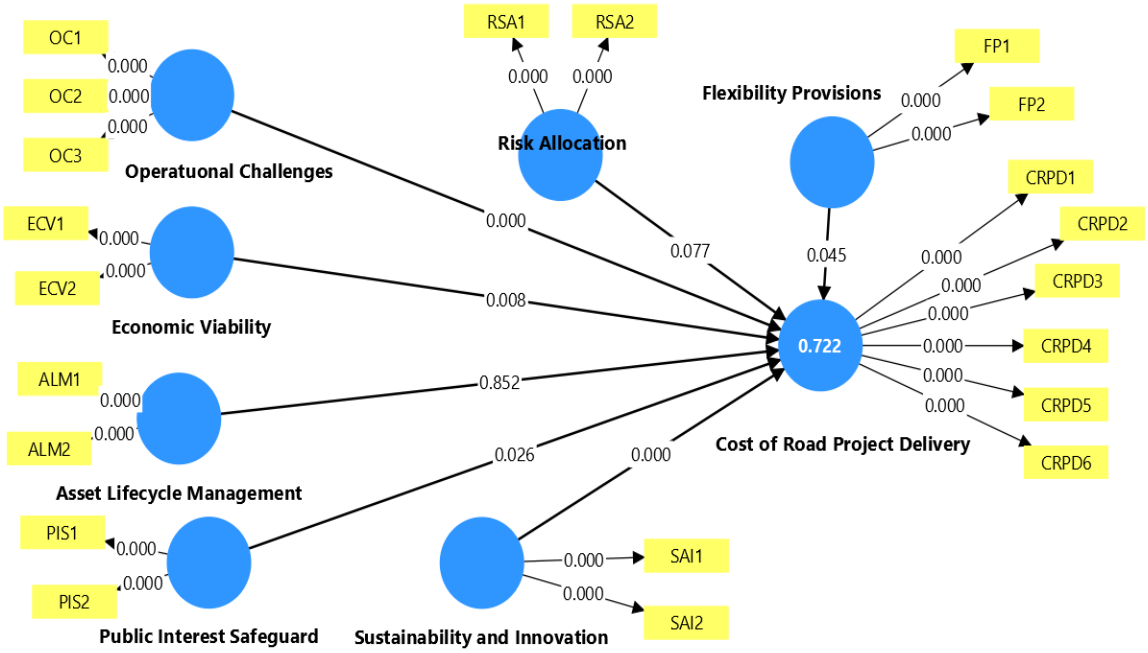

Figure 8: Effect of Concession Operations on Cost of Road Project Delivery

Source: Authors Computation (2025)

Table 6: Path Coefficients Bootstrapping showing the effect of Concession Operations on cost of road project delivery

Latent Variables	Coeff	Std Error	T statistics	**P values**
Asset Lifecycle Management -> Cost of Road Project Delivery	0.01	0.08	0.19	0.85
Economic Viability -> Cost of Road Project Delivery	0.16	0.06	2.64	0.01
Flexibility Provisions -> Cost of Road Project Delivery	0.21	0.10	2.01	0.04
Operational Challenges -> Cost of Road Project	0.23	0.06	4.07	0.00

Delivery				
Public Interest Safeguard -> Cost of Road Project Delivery	0.14	0.06	2.23	0.03
Risk Allocation -> Cost of Road Project Delivery	-0.13	0.07	1.77	0.08
Sustainability and Innovation -> Cost of Road Project Delivery	0.36	0.09	4.25	0.00
R-square	0.72			
R-square adjusted	0.72			

Source: Authors Computation (2025)

5.0 CONCLUSION

This study investigated the important drivers of road project delivery in Southwest Nigeria. Results on maintenance activities indicated that advanced communication protocol, materials & standards, use of modern technology, performance monitoring and safety-first approach have negative impact on cost of road project delivery while comprehensive scheduling have positive albeit insignificant effect. Results on financing options showed that alternative finance, government finance, multilateral finance and private finance have negative and significant effect on cost of road project delivery while project-based finance indicate positive and significant effect. Results on concession operations indicated that asset lifecycle, economic viability, flexibility provision, operational challenges, public interest safeguard, and sustainability & innovation have positive effect and only asset lifecycle does not have a significant effect on cost of project delivery.

The study concluded that the effect of the indicators of responsibility development, maintenance activities, financing options and concession operation were diverse for cost in the study area. Therefore, concluded that responsibility development has a diverse effect on the measures of road project delivery but clarity of responsibility has overall positive effect. Comprehensive scheduling has overall positive effect while performance monitoring has negative effect on cost of road project delivery. The financing option that are critical to road project delivery are alternative finance, and government finance. Further, multilateral and private finance reduces cost of road project delivery. Flexibility provision and operational challenges improves quality and timeliness of road project delivery but worsens cost of road project delivery. Sustainability and innovation also dragged cost of road project delivery but enhanced timeliness of delivery.

The study recommends that the cost of road project was mostly affected by measures of responsibility development. Comprehensive scheduling is supportive while performance monitoring is averse to cost of road project delivery. Alternative and government finance are critical financing options to road project delivery while multilateral and private finance lessens the cost of road project delivery.

REFERENCES

Adewole, A., & Fadeyi, T. (2023). Evaluating the effectiveness of concession agreements in Nigeria's road sector**.***International Journal of Infrastructure Development, 12*(1), 45-60.

Agbaje, O. A., & Oluwaseun, S. I. (2022). The impact of financial structures on concession-based infrastructure projects in Nigeria**.***African Infrastructure Review, 6*(3), 78-94.

Ariyo, A., Alphonsus, F. F., Oyedepo, O. J., & Adewale Olutaiwo, A. (2020). Comparative analysis of Users Perception for road concessioning and tolling using multinomial regression and Artificial Neural Network

Bolarinwa, O. K., Johnson, M., & Femi, A. (2024). Challenges in road project delivery under concession agreements: A Nigerian perspective**.***Journal of Project Management and Delivery, 5*(2), 101-118

Cavaliere N & Scab-Rosetti, (2008) Essential elements of a PPP concession agreement: Force Majeure Provisions

Ebekozien, A. &Samsurijan, M. S. (2022). Concession of public infrastructure: pitfalls and solutions from construction consultants' perspective. Asian Journal of Civil Engineering. researchgate.net

Eze, C. A., Nwachukwu, N., & Akpan, E. (2023). Public-private partnerships and infrastructure development in sub-Saharan Africa: A critical analysis.*African Development Review, 45*(4), 203-222.

Kalu, C. O., & Udeh, J. E. (2021). Risk allocation and its impact on the success of PPP projects in Nigeria**.***Journal of African Business, 22*(4), 412-431.

Kassa, Y. F. (2020). Determinants of infrastructure project delays and cost escalations: The cases of federal road and railway construction projects in Ethiopia. American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS), 63(1), 102-136. core.ac.uk

Liyanage, C. P., Zhang, X., & Luo, F. (2021). Public-private partnerships for infrastructure

development in emerging markets: Challenges and prospects**.***International Journal of Construction Economics and Management, 17*(1), 55-69.

Oke, A., Olanrewaju, B., & Fashola, K. (2021). Financial structures and road concession

project success in Nigeri**a.***Journal of Infrastructure Finance, 10*(2), 143-159.

Olanrewaju, B., & Fashola, M. (2023). Factors influencing road project delivery in Nigeria:

A concession model approach.*Journal of African Infrastructure Studies, 9*(1), 22-37.

Okolie, E. L., Daniel, E. I., Oloke, D., & Moses, T. (2022). Towards a sustainable framework

for road infrastructure management and maintenance scheme in south East Nigeria.

Okoye, C. N., Chukwuemeka, U. N., & Nwabueze, K. (2020). Effectiveness of concession

agreements in infrastructure delivery in developing countries**.***Journal of Public Policy and Administration, 15*(3), 78-94.

Kumaraswamy, M. M., & Zhang, X. (2020). Factors Affecting the Success of Concession

Projects: A Comparative Study. *International Journal of Project Management, 38*(6), 379-393. https://doi.org/10.1016/j.ijproman.2020.03.004

Rossi, C., &Zoboli, R. (2024). Impact of Concession Agreements on Infrastructure

Performance: Evidence from Road Projects. *Transport Policy, 32*(4), 112-126. https://doi.org/10.1016/j.tranpol.2023.11.002

Humtsoe, T. Y. (2020). From pathways to roadways: Issues and challenges of road transport

in Nagaland. Growth and Change. academia.edu

Hwang, B.-G., & Zhao, X. (2022). Evaluating the effectiveness of concession practices in

road infrastructure projects. *Engineering, Construction and Architectural Management, 29*(3), 516-532. https://doi.org/10.1108/ECAM-10-2020-0937

Liyanage , & Kim, S. (2021). Moderating role of regulatory frameworks in concession

Agreements. *Public Administration Review, 83*(1), 89-105.

https://doi.org/10.1111/puar.13380

Marques, S., & Thompson, R. (2021). Regulatory Impact on Concession-Based Infrastructure

Projects: A Comparative Analysis. *Journal of Public Policy, 18*(2), 225-240. https://doi.org/10.1016/j.jpol.2022.03.009

Temitope, O. (2014). Infrastructure finance in Africa through the Public Private Partnership

(PPP): Is the Lekki-Epe Toll Road (Nigeria) economically sustainable?.

Zhang, X., & Luo, F. (2023). Public-private partnerships in developing economies:

Understanding the risk factors**.** *International Journal of Project Management, 41*(2), 221-235.