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CONCESSION PRACTICES AND THE TIMELINESS OF ROAD PROJECTS DELIVERY IN SOUTHWEST NIGERIA

[1]ALEDARE, O. O.; [2]OJO O. J.; & [3]ABAYOMI, M. A.

[1&2]Department of Project Management Technology, the Federal University of Technology, Akure, Nigeria
[3]Department of Securities and Investment Management Technology, the Federal University of Technology, Akure, Nigeria
Corresponding Author: aledarek@yahoo.com
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ABSTRACT

Infrastructure development, particularly road construction, plays a crucial role in promoting economic growth, regional integration, and social development. However, the delivery of road projects is often marred by delays due to financial constraints, bureaucratic bottlenecks, and inefficiencies in project management. Thus, this study examined the relationship between concession practices and the timeliness of road projects delivery in

Introduction

Infrastructure development, particularly road construction, plays a crucial role in promoting economic growth, regional integration, and social development (World Bank, 2022). However, the delivery of road projects is often marred by delays due to financial constraints, bureaucratic bottlenecks, and inefficiencies in project management Okonkwo, C., & Ezenwa, U. (2023). In response, many governments have embraced concession practices a form of public-private partnership (PPP) as a strategy to improve the timeliness and efficiency of road project delivery. Despite the growth in public-private partnerships (PPPs) agreements and other concession models, there is limited understanding of how effectively these practices are being utilized, and the factors influencing their success remain unclear (Liyanage et al., 2021; Zhang & Luo, 2023). This inefficiency continues to hinder the achievement of timely and cost-effective road projects in the region, as private and public sector collaboration often encounters barriers such as unclear

southwest Nigeria. Inferential statistics used involved Partial Least Squares Structural Equation Modeling (PLS-SEM). The results showed that clarity of responsibility (p = 0.01), impact and recommendation (p = 0.00), 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. 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: Concession practices, Timeliness, project delivery, Public-Private Partnership.

regulatory frameworks, inadequate financial resources, and misaligned incentives (Adegboyega et al., 2022).

One of the most significant factors to the implementation of concession practices in South West, Nigeria is the legal and regulatory framework. The success of a concession agreement depends on the existence of a robust legal framework that clearly defines the rights and obligations of all parties involved (Adegboyega et al., 2023). However, in Nigeria, the legal framework governing concession practices is often inadequate or unclear, leading to disputes and delays. For instance, the process of land acquisition, which is crucial for many road projects, is often fraught with legal challenges. Disputes over land ownership, compensation, and environmental concerns can delay the commencement of construction and increase the cost of projects (Adewole et al., 2023). Additionally, there is often a lack of clarity regarding the roles and responsibilities of the various government agencies involved in the concession process, leading to overlaps and inefficiencies.

Furthermore, the enforcement of concession agreements is often weak. Private entities fail to meet their obligations under the agreement, such as completing construction on time or maintaining the road to the required standards, without facing significant penalties (Bolarinwa et al., 2024). This lack of enforcement undermines the credibility of the concession model and discourages future private investment. Financial challenges are another major obstacle to the successful implementation of concession practices in South West Nigeria.

The stakeholders most affected by this problem include government agencies, private concessionaires, contractors, and, ultimately, the general public who rely on road infrastructure for economic activities and daily commuting (Kalu & Udeh, 2021). Poorly delivered road projects exacerbate traffic congestion, increase transportation costs, and hamper economic growth in Southwest, Nigeria. If these issues are not adequately addressed, the region will continue to face infrastructural decay, limited foreign investment in infrastructure development, and a lack of confidence in concession agreements to deliver high-quality, sustainable road projects (Adewole & Fadeyi, 2023).

Several studies have examined concession practices in road projects, but significant gaps remain in understanding their application and impact in the Nigerian context. For instance, Okoye et al. (2020) explored the effectiveness of concession agreements in developing countries, noting that regulatory challenges and poor risk allocation often hinder project success. They called for further research into how concession practices can be tailored to fit local contexts to look forward to improving road infrastructure delivery in Nigeria.

Conceptual Review

Concession practices refer to contractual agreements where a public authority grants a private entity the right to finance, build, operate, and maintain infrastructure assets for a specified period, often in return for user fees (e.g., tolls) or availability payments. The key forms include: Build-Operate-Transfer (BOT), Design-Build-Finance-Operate (DBFO), and Build-Own-Operate-Transfer (BOOT) (Chan et al. 2023). These models shift project risks such as financing, design flaws, and construction delays to private concessionaires, who are incentivized to deliver within time and budget. Recent studies (e.g., Zhang & Chen, 2023; Osei-Kyei & Chan, 2021) affirm that well-structured concession arrangements can reduce project delays through enhanced project planning, risk allocation, and performance-based contracting.

Timeliness in project delivery refers to completing a project within its scheduled duration. Delays in road projects are often caused by inefficient procurement processes, Delayed approvals and land acquisition, Poor contractor performance and inadequate project funding (Zhou, & Wang, (2024). Timely delivery is critical for minimizing cost overruns and ensuring infrastructure usability. According to *World Bank (2022)*, countries with effective PPP models experience fewer delays in large-scale road infrastructure compared to traditionally procured projects.

Concession agreements typically transfer significant risks such as construction and operational risks to private players. Zhou et al. (2024) argue that when risks are properly allocated, private firms adopt proactive project management practices, which enhances timely delivery.

Most concession contracts are performance-driven, with penalties for delays and bonuses for early completion. Mensah & Badu (2023) found that road projects under

DBFO models in sub-Saharan Africa had a 25% better on-time delivery rate than traditional public sector projects.

The involvement of private capital creates stronger financial oversight and discipline. Concessionaires are motivated to complete projects swiftly to begin revenue generation. Amadi & Ogunlana (2022) highlight that concession-financed road projects in Nigeria were delivered 30% faster due to better financing and procurement strategies.

Concession projects often involve third-party monitors and structured communication channels. This improves accountability and decision-making, leading to improved timeliness (Kwak et al., 2023).

Despite the benefits, some concession projects still face delays due to poorly structured contracts (Chan et al., 2023). Political interference and regulatory hurdles and Inadequate capacity of public institutions to manage PPPs. For instance, Okonkwo & Ezenwa (2023) note that some road concessions in Nigeria were delayed due to disputes over land compensation and toll policies.

Concession practices, when well-structured and supported by strong regulatory frameworks, can significantly enhance the timeliness of road project delivery. By aligning private sector incentives with project outcomes, concession models promote efficiency, risk mitigation, and performance accountability. However, success depends on the capacity of public institutions to manage contracts, enforce regulations, and foster transparency.

Property Rights Theory

Property Rights Theory, according to Filipovic (2005), posits that transferring ownership, management, and control from the public sector to the private sector through privatisation, such as road concessions, creates strong incentives for the private sector to invest in infrastructure improvements. This theory argues that without clearly defined and well-protected property rights, investors would hesitate to invest substantially in state-owned enterprises (SOEs). As De Soto (1993) explains, the absence of secure property rights in developing countries, including Nigeria, often hinders economic development. By formalising these rights, privatisation assures investors to engage in long-term infrastructure projects. Property rights become the "missing ingredient" that stimulates economic growth (De Soto, 1994; Heitger, 2003).

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 will test 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.

Empirical Review

Several empirical studies have examined the factors influencing the timeliness of road projects delivered through concession practices in Southwest Nigeria. For instance, Agbigbe (2016) investigated how the structure of concession contracts affects the timeliness of road project delivery in Nigeria. The study adopted a qualitative methodology, analyzing contracts and interviewing key stakeholders in concession projects. Agbigbe (2016) found that road projects with clearly defined timelines and enforceable penalties for delays tended to be completed on schedule. The study concluded that robust contract enforcement and governmental oversight played critical roles in maintaining project timelines. It suggested that future studies could explore how the legal frameworks governing public-private partnerships (PPPs) can be strengthened to improve timeliness.

Odeku (2020) conducted a quantitative study aimed at identifying the factors responsible for delays in road construction projects under concession agreements in Nigeria. Using a survey approach, the researcher gathered data from contractors, government officials, and project managers. The study found that inadequate project planning, bureaucratic inefficiencies, and poor resource allocation were the primary factors contributing to delays. The study concluded that these systemic issues could be mitigated through better planning and streamlined bureaucratic processes. For further study, the author recommended exploring the role of technology in addressing these delays and improving overall project delivery.

Enwerem and Ali (2016) explored environmental and logistical challenges contributing to delays in concession-based road projects in Southwest Nigeria. Through a case study approach, the researchers identified weather conditions and geographical challenges as key factors affecting project timelines. They observed that many concession agreements did not adequately account for these factors, leading to unforeseen delays. The study concluded that more comprehensive environmental assessments should be integrated into project planning phases to ensure realistic timeline projections. Further research was suggested to focus on adaptive project management practices that can respond more flexibly to environmental challenges.

Ibe and Ejem (2019) conducted a case study of the Lekki-Ikoyi Link Bridge, which was completed ahead of schedule. The objective was to understand the factors that contributed to the project's timely completion. The researchers used qualitative interviews and document analysis to collect data from key stakeholders, including government officials and private contractors. The study revealed that strong stakeholder coordination and adherence to clear contractual timelines were critical in achieving the early completion. The authors concluded that successful stakeholder engagement significantly reduces delays and recommended that future studies examine similar projects to assess whether the same factors are universally applicable.
Akhmetzhanov and Lustoy (2013) examined the role of technology in enhancing the timeliness of road construction projects delivered through concession models. The study employed a mixed-methods approach, integrating quantitative data from project timelines and qualitative data from interviews with project managers. The findings indicated that the use of project management software and digital monitoring tools greatly improved project scheduling accuracy, reducing delays by enhancing milestone tracking. The authors concluded that technology integration is essential for improving timeliness and suggested further studies should investigate the barriers to adopting advanced project management tools in developing countries like Nigeria.
Finally, Gwilliam (2013) evaluated the impact of regulatory frameworks on the timeliness of road projects in PPP models. This study utilized a comparative analysis of different regulatory environments across Nigeria, identifying regulatory compliance and oversight as critical elements in mitigating delays. Gwilliam (2013) concluded that stronger, more transparent regulatory mechanisms could lead to more timely project delivery. The study recommended future research to explore how regulatory compliance could be standardized across states to improve consistency in project delivery outcomes.
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. By understanding the factors that influence the success or failure of concession practices, stakeholders can better structure agreements that meet the unique needs of the region while ensuring timely, cost-effective, and sustainable road project delivery (Adewole et al., 2023). Overall, the growing importance of concession practices in road infrastructure delivery necessitates a deeper investigation into the dynamics that affect their success, particularly in developing countries like Nigeria.

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 the timely and successful delivery of road projects in Southwest region of Nigeria. Only through a thorough examination of current practices and a rigorous review of their effectiveness can the shortcomings be identified that would enable the formulation of strategic recommendations aimed at ensuring improved outcomes in the future. 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.

Conceptual Framework

The conceptual framework in figure 2.1 illustrates the link between Concession practices and the road project delivery that will be investigated in this study.

Dependent Variable

The study considers road project delivery as dependent variable which will be measured by time schedule, quality and cost efficiency. Previous empirical research has used different measures of road project delivery-based criteria. For instance stakeholders satisfaction (Rad, 2003; Jha and Iyer, 2007), end users satisfaction, (Toor and Ogunlana, 2010), project team members satisfaction (Jha and Iyer, 2007); contractor's profit (Sanvid,et al., 1992; Atkinson, 1999), safety (Ahadzie et al., 2009; Toor and Ogunlana, 2010), environmental impact (Ahadzie et al., 2008), Marketability of the final product (Sanvido et al., 1992), absence of dispute or legal claim (Jha and iyer, 2007; Toor and Ogunlan, 2010), and aesthetic appearance of the project (Sanvido et al., 1992; Pheng and Chuan, 2006). Although, there is no agreed consensus on which proxy is the best, however, there is need to identify the criteria that can be used to measure road project delivery.

Independent Variable

The study identifies concession practices as independent variable which includes; revenue generation and sharing, operational control, maintenance, financing, risk managementnt and concession duration. In previous studies, the variables identified were used by (Divakar & Subramanian, 2009; Lambe et al., 2011;Manitshana, 2012)to examine the relationship between concession practices and construction projects. The results showed that the practices are relevant to conceptual framework as influencing factors which is supported by the organisational theory.

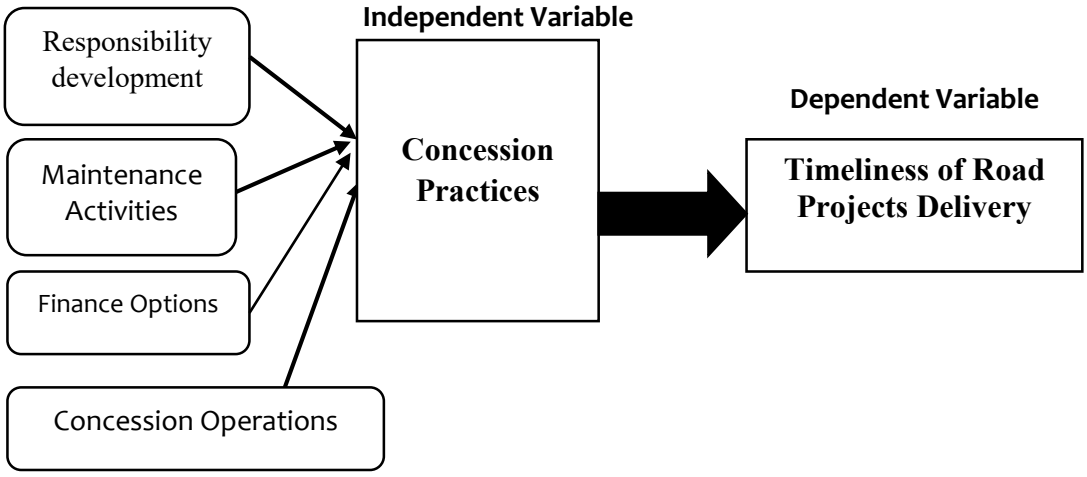

Figure 1: Conceptual Framework of the Concession Practices and Timeliness of Road Project Delivery in Southwest, Nigeria

Source: Adapted from: Gupta and Singh (2023); Rossi and Zoboli (2024)

METHODOLOGY

This paper employed a survey research design. The study area is the Southwest of Nigeria in Figure 2 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. The study area provided a representative sample of concession practices in a diverse and economically important part of Nigeria, allowing for a comprehensive analysis of the subject matter. 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:

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

Where,

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 timeliness as dependent variable. This relationship was represented as follows:

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

Where: TRPD stands for timeliness of road project delivery, RD represents responsibility Development, MAIN represents maintenance Activity, FIN stands for financing options, OPC stands for concession operations, α_0, $\alpha_1 ... \alpha_4$ 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.

Concession Practices and Timeliness 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 timeliness of road project delivery in the study area. This represents the second model on how concession practices (responsibility development, maintenance activities, finance options and concession operations) individually affect the timeliness of road project delivery in the study area.

Responsibility Development and Timeliness of Road Project Delivery in Southwest Nigeria

In the case of how responsibility development affects timeliness of road project delivery, the bootstrapping outcome in figure 2 showed a 0.44 (or 44%) of predictive power of the independent the variables (capacity and training, execution and accountability, clarity of responsibility and impact and recommendations). The pairwise correlation of each of the independent variables and the dependent variable range from 0.00 (impact and recommendations) to 0.90 (execution and accountability). Hence, only execution and accountability have strong positive relationship with timeliness of road project delivery.

Table 1 showed that all the four explanatory variables significantly affect timeliness of road project delivery capacity and training (P = 0.02), execution and accountability (P = 0.00), clarity of responsibility (P = 0.00), impact and recommendations (P = 0.00). Of these four, three indicated negative effect while one (clarity of responsibility) shows positive effect. One (1) standard deviation increase in capacity and training will reduce timeliness of road project delivery by 0.047 standard deviation. Similarly, one

(1) standard deviation increase in execution and accountability will reduce timeliness of road project delivery by 0.02 standard deviation while a 1 standard deviation in impact and recommendation will reduce timeliness of road project delivery by 0.5 standard deviation. Hence, timeliness of road project delivery at the period of this study was found to be highly sensitive to changes in the standard deviation of impact and recommendations while sluggishly responded to capacity and training. The explanatory variables are able to explain about 43% of variations in the standard deviation of timeliness of road project delivery. This implies that as much as 57% of total variation in the standard deviation of timeliness of road project delivery are not explained by the regressor.

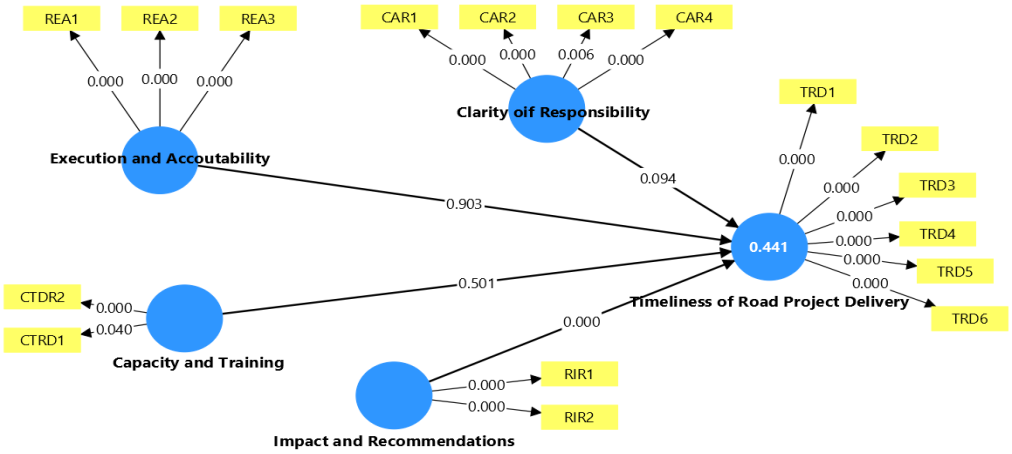

Figure 2: Bootstrapping Outcome for responsibility development and Timeliness of road project delivery

Source: Authors Computation (2025)

Table 1: Path Coefficients Bootstrapping showing the effect of responsibility development on Timeliness of road project delivery

Construct	Coefficient	Std Error	T statistics	P values
Capacity and Training -> Timeliness of Road Project Delivery	-0.047	0.019	-2.452	0.024
Clarity of Responsibility -> Timeliness of Road Project Delivery	0.131	0.021	6.230	0.000
Execution and Accountability -> Timeliness of Road Project Delivery	-0.012	0.003	-3.665	0.001
Impact and Recommendations -> Timeliness of Road Project Delivery	-0.513	0.058	-8.885	0.000
R-square	0.44			
R-square adjusted	0.43			

Source: Authors Computation (2025)

Maintenance Activities and Timeliness of Road Project Delivery in Southwest Nigeria

Effects of maintenance activities on timeliness of road project delivery was shown in Figure 3 in terms of association and in Table 2 in terms of effect. The predictive power of the regressors was 50%. Strong association exists between the use of modern technology and timeliness of road project delivery (0.88), while weakest relationship

exists between road project delivery and high-quality materials standards (0.02). All the association are positive, indicating that each of the regressors move in same direction with the change in the timeliness of road project delivery.

In terms of direction of effects in Table 4, the result showed a significant positive effect of advanced communication protocol, high-quality materials and standards, performance monitoring and safety first on the timeliness of road project delivery respectively (P = 0.04;0.02;0.07 and0.05). a 1 standard dev1iation increase in advanced communication protocol will engender approximately 0.2 increase in the standard deviation of timeliness of road project delivery. In the same manner, materials and standards makes an impact of approximately 0.3 standard deviation increase following a 1 standard deviation increase in the variable. Timeliness of road project delivery will respond to the tune of 0.12 standard deviation if there is a 1 standard deviation increase in performance monitoring. Further, increase in safety first approach engenders increase timeliness of road project delivery.

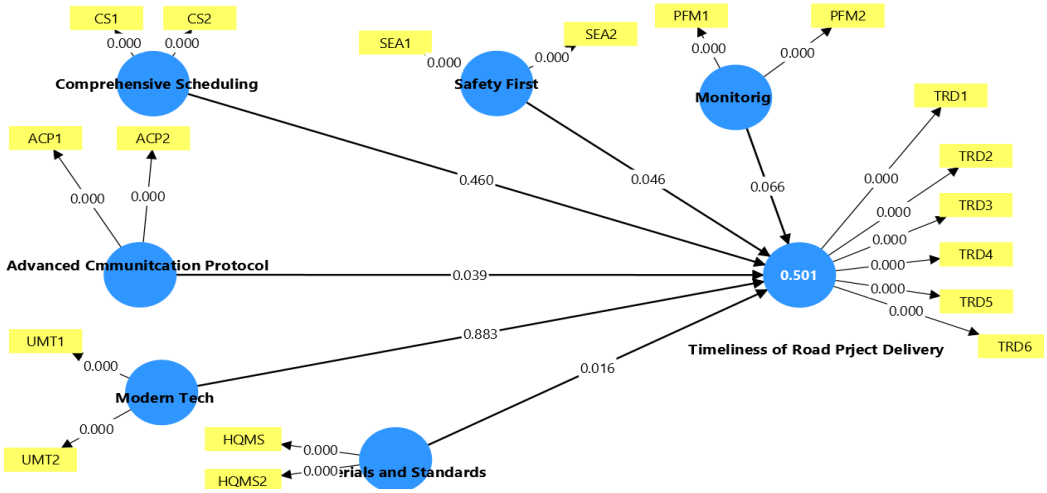

Figure 3: Effect of Maintenance Activities on Timeliness of Road Project Delivery
Source: Authors Computation (2025)

Table 2: Path Coefficients Bootstrapping showing the effect of maintenance activities on timeliness of road project delivery

Latent Variable	Coef f	Std. error	T statistics	P values
Advanced Communication Protocol -> Timeliness of Road Project Delivery	0.19	0.09	2.06	0.04
Comprehensive Scheduling -> Timeliness of Road Project Delivery	0.06	0.09	0.74	0.46
Materials and Standards -> Timeliness of Road Project Delivery	0.25	0.10	2.41	0.02
Modern Tech -> Timeliness of Road Project Delivery	-0.01	0.08	0.15	0.88
Monitoring -> Timeliness of Road Project Delivery	0.12	0.06	1.84	0.07
Safety First -> Timeliness of Road Project Delivery	0.16	0.08	2.00	0.05
R-square	0.50			
R-square adjusted	0.49			

Source: Authors Computation (2025)

Finance Options and Timeliness of Road Project Delivery in Southwest Nigeria

Investigating how financing options affects timeliness of road project delivery, Figure 4 indicated a positive, but weak association between each of the financing options and timeliness of road project delivery. The result showed that government financing does not have any association while private financing showed extremely weak association with timeliness of road project delivery. Only multilateral financing indicated a relatively strong (0.51) association. Consequently, of all the financing options, multilateral financing (0.56) appears to have important role to play in the timeliness of road project delivery. The overall predictive power is around 0.54.

Table 3 showed that alternative financing (P = 0.00), government financing (P = 0.00), and project-based financing (P = 0.01), have significant effect on the timeliness of road project delivery. Specifically, alternative financing positively impacted a 0.23 standard deviation increase of timeliness of road project delivery if the variable increases by 1 standard deviation point. Also, there will be 0.26 standard deviation increase in the timeliness of road project delivery if government financing increase by 1 standard deviation point. It is also the case that the standard deviation of timeliness of road project delivery will increase by approximately 0.2 if the standard deviation of project-based financing increases by 1.

Clearly, government financing may not have any association with timeliness, but it has a moderate significant effect, even more than any other financing option. Hence, government financing option is critical to timeliness of road project delivery in the Southwest region of Nigeria. Next is the alternative financing while private financing has the least effect on timeliness of road project delivery among the options highlighted in this study.

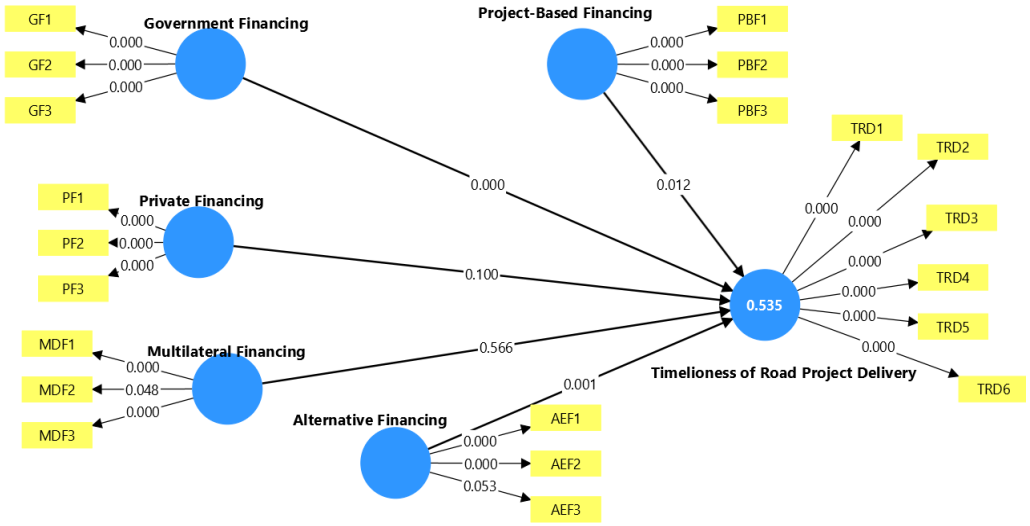

Figure 4: Effect of financing options on Timeliness of Road Project Delivery

Source: Authors Computation (2025)

Table 3: Path Coefficients Bootstrapping showing the effect of financing options on Timeliness of road project delivery

Latent Variable	Coef f.	std Error	T stat.	P values
Alternative Financing -> Timeliness of Road Project Delivery	0.23	0.07	3.24	0.00
Government Financing -> Timeliness of Road Project Delivery	0.26	0.07	3.59	0.00
Multilateral Financing -> Timeliness of Road Project Delivery	0.05	0.08	0.57	0.57
Private Financing -> Timeliness of Road Project Delivery	0.12	0.07	1.64	0.10
Project-Based Financing -> Timeliness of Road Project Delivery	0.19	0.07	2.51	0.01
R-square	0.54			
R-square adjusted	0.53			

Source: Authors Computation (2025)

Concession Operation and Timeliness of Road Project Delivery in Southwest Nigeria

Figure 5 showed that Sustainability & innovation, and operation challenges do not have any association with timeliness of road project delivery. Flexibility provision has mild association (0.004) just like economic viability (0.002) with timeliness of road project delivery. Risk allocation showed a strong association (0.84) with timeliness of road project delivery. Also, public interest safeguards (0.78) and lifecycle management (0.65) have relatively strong association with timeliness of road project delivery. Consequently, risk allocation, asset lifecycle management and public interest safeguards are strongly associated with timeliness of road project delivery.

Table 4 revealed that economic viability (P = 0.00), flexibility provisions (P = 0.00), operational challenges (P = 0.00), sustainability and innovation (P = 0.00), have positive and significant effect on the timeliness of road project delivery. Asset lifecycle management public interest safeguards and risk allocation have no significant effect while the first two variables showed negative effect. In terms of magnitude of effect, flexibility of provisions (0.29) and sustainability and innovation (0.27) have the largest positive and significant effect. Risk allocation has the least, albeit insignificant effect. The seven measures of concession operation can explain approximately 70% of total variation in the timeliness of road project delivery.

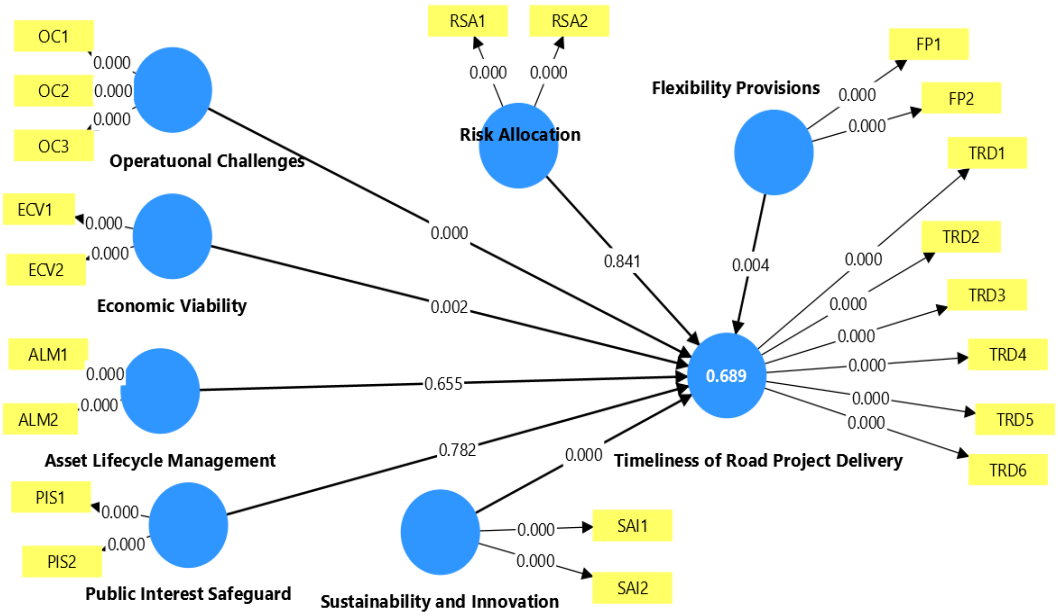

Figure 5: Effect of Concession Operations on Timeliness of Road Project Delivery
Source: Authors Computation (2025)

Table 4: Path Coefficients Bootstrapping showing the effect of Concession Operations on timeliness of road project delivery

Latent Variable	Coeff	Std Error	T statistics	P values
Asset Lifecycle Management -> Timeliness of Road Project Delivery	-0.03	0.06	0.45	0.66
Economic Viability -> Timeliness of Road Project Delivery	0.16	0.05	3.10	0.00
Flexibility Provisions -> Timeliness of Road Project Delivery	0.29	0.10	2.86	0.00
Operational Challenges -> Timeliness of Road Project Delivery	0.27	0.06	4.49	0.00
Public Interest Safeguard -> Timeliness of Road Project Delivery	-0.02	0.07	0.28	0.78
Risk Allocation -> Timeliness of Road Project Delivery	0.01	0.07	0.20	0.84
Sustainability and Innovation -> Timeliness of Road Project Delivery	0.27	0.06	4.44	0.00
R-square	0.69			0.00
R-square adjusted	0.68			0.00

Source: Authors Computation (2025)

Conclusion

This study investigated the important drivers of road project delivery in Southwest Nigeria. There are three models per four indicators to examine the effect of concession practices on the timeliness of road project delivery. These were measured by responsibility development, maintenance, financing and concession operations on

the timeliness of project delivery. Results on responsibility development showed a negative and significant effect of capacity training, clarity of responsibility, execution and accountability and impact and recommendation on timeliness of road project delivery. Maintenance activities on timeliness of road project delivery were positively and significantly affected by advanced communication protocol, comprehensive scheduling, materials and standards, performance monitoring and safety-first approach. Only the use of modern technology indicated positive but insignificant effect.

The effect on timeliness was positive but only alternative and government finance have significant effect. In similar manner on the concession operation, economic viability, flexibility provision, operational challenges, and sustainability & innovation have positive and significant effect of timeliness of road project delivery while asset lifecycle and public interest safeguard do not have any significant effect on timeliness of road project delivery.

Recommendations

Sequel to the outcome of the study, the followings recommendations were made;

- The study recommends that construction professionals should be trained on relevant and latest technological approaches to ensure timeliness of road project.
- Comprehensive scheduling and performance monitoring should be actively promoted among construction team.
- Alternative and government finance should be harnessed as a financing options to road project construction to lessen the timeliness of road project delivery.

References

Adegboyega, A., Ojo, O., & Adewale, T. (2022). **Barriers to public-private partnership projects in Nigeria: Evidence from road infrastructure delivery.** *Journal of Construction and Development Studies, 34*(2), 123-135.

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.

Amadi, A. & Ogunlana, O. (2022). Concession financing and road infrastructure development in Nigeria. *African Journal of Infrastructure Development, 7(1), 45-59.*

Ammar, T., Abdel-Monem, M., & El-Dash, K. (2022). Risk factors causing cost overruns in road networks. *Ain Shams Engineering Journal*. sciencedirect.com

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

Bakker, E., & van der Meer, A. (2022). Public-Private Partnerships in Infrastructure Development: A Comprehensive Review. *Journal of Infrastructure Systems, 28*(1), 50-62. https://doi.org/10.1061/(ASCE)IS.1943-555X.0000731

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

Chan, A. P. C. (2023). Public-private partnerships in transport infrastructure: Critical success factors. *Journal of Construction Economics and Building, 23(2), 11–28.*

Chongo S. M (2024). Essential Elements of a PPP Concession Agreement: Force Majeure Provisions

Chikelu, C. R. (2021). Experiences of Public-Private Partnership Concession Uncertainties in the Federal Capital Territory Administration of Nigeria. waldenu.edu

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 1Africa: 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

Kwak, Y. H., Chih, Y. Y., & Ibbs, C. W. (2023). Towards successful project delivery through concession monitoring. *International Journal of Project Management, 41(3),412-424.*

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.

Mensah, F. & Badu, E. (2023). Performance-based PPPs and infrastructure delivery in Africa. *Journal of African Infrastructure Policy, 9(2), 65–78.*

Oke, A., Olanrewaju, B., & Fashola, K. (2021). **Financial structures and road concession project success in Nigeria.** *Journal of Infrastructure Finance, 10*(2), 143-159.

Okonkwo, C., & Ezenwa, U. (2023). Challenges of road concession projects in Nigeria: A policy analysis. *Nigerian Journal of Development Studies, 18(1), 30–44.*

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.

Osei-Kyei, R., & Chan, A. P. C. (2021). Review of performance metrics in road PPP projects. *Built Environment Project and Asset Management, 11(4), 721–740.*

Gupta, R., & Singh, S. (2023). Innovations in Concession Agreements for Infrastructure Projects: Lessons from Emerging Economies. *Construction Management and Economics, 41*(2), 215-233. https://doi.org/10.1080/01446193.2023.2101324

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

Ng, A. W., & Liu, Y. (2021). Influences of Regulatory and Financial Factors on Public-Private Partnerships: A Case Study Analysis. *Journal of Financial Management of Property and Construction,* 26(1), 34-49. https://doi.org/10.1108/JFM-05-2020-0094

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

Lee, S., & Kim, S. (2023). The Moderating Role of Regulatory Frameworks in Concession Agreements. *Public Administration Review, 83*(1), 89-105. https://doi.org/10.1111/puar.13380

Miller, S., & Thompson, R. (2022). 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

Jiang, W., & Wong, K.-F. (2021). Financial Resources as a Mediator in Public-Private Partnership Projects: Insights from the Road Sector. *Journal of Infrastructure Finance, 10*(4), 143-159. https://doi.org/10.1016/j.jif.2021.10.003

Smith, N., & Green, A. (2024). The Role of Financial Management in Enhancing Concession Project Outcomes. *International Journal of Financial Management, 21*(2), 67-82. https://doi.org/10.1108/IJFM-12-2023-0060

Sherzod, Y, Andrew, S. & Jean-Christophe, T (2022) Competitive tendering, ownership and cost efficiency in road maintenance services in Sweden: ELSEVIER Journal of transportation research policy A panel data analysis. 136(1),194-204.

Nwangwu, G. (2022). Overcoming Failure in the Design and Implementation of Public-Private Partnership Projects: Lessons from the Lekki Toll Road Concession. Journal of Sustainable Development Law and Policy (The), 13(2), 167-197.

Nwambuko, T. C., Njoku, C. C., Funmilayo, O., & Chiana, I. I. (2024). Public-Private Partnership in Project Development and Implementation: A Prolusion to Socio-Economic Development in Nigeria. Indiana Journal of Humanities and Social Sciences, 5(5), 5-16. indianapublications.com

Temitope, O. (2014). Infrastructure finance in Africa through the Public Private Partnership (PPP): Is the Lekki-Epe Toll Road (Nigeria) economically sustainable?.[PDF]

World Bank (2022). *Global Infrastructure Outlook Report*. Washington, DC.

Yannis, G. & Chaziris, A. (2022). Transport system and infrastructure. Transportation research procedia. sciencedirect.com

Zhou, Y., Li, H., & Wang, J. (2024). Timely delivery in PPP road projects: Evidence from China. *Journal of Infrastructure Systems, 30(1), 04023034.*

Zhang, L. & Chen, Z. (2023). Risk allocation and project performance in infrastructure PPPs. Construction Management and Economics, 41(1), 12–25.

Zhang, X., & Luo, F. (2023). **Public-private partnerships in developing economies: Understanding the risk factors.** *International Journal of Project Management, 41*(2), 221-235.