

STAKEHOLDERS' PERCEPTION OF KEY PERFORMANCE INDICATORS (KPIs) OF PUBLIC-PRIVATE PARTNERSHIP (PPP) PROJECTS

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ABSTRACT

The study investigates key performance indicators (KPIs) that could improve performance of public-private partnership (PPP) projects in Nigeria. The study objectives include a comparison of stakeholders' perception on KPIs and to investigate if significant difference exists between stakeholders' perceptions on most KPIs. A structured questionnaire was used to collect information from various respondents who were recently involved in PPP projects. Random sampling technique was used to select forty-five (45) respondents out of which thirty-one (31) responses were used for the data analysis. The results indicate that top KPIs for performance improvement are levels of design complexity and technological advancement, and return on investment. Stakeholders agree on most of the rankings of the KPIs. The general perception of stakeholders was similar on most KPIs except for a few divergent opinions. The study findings have an implication for policy and decision making such that stakeholders could pay special attention to the KPIs identified, that could improve construction project performance. Finally the study recommends further research to explore KPIs for other procurement options.

KEYWORDS: Key Performance Indicator (KPI), Improvement, Public-Private-Partnership (PPP), Construction Projects, Nigeria.

INTRODUCTION

Attempts to improve the infrastructure deficit in Nigeria have made governments both State and Federal to consider using public-private partnership (PPP) as procurement options for their infrastructural developments. PPP has demonstrated advantages of increased efficiency in: project delivery, operation and management; availability of additional resources to meet the growing needs of investment, and access to advanced technology (Economic and Social Commission for Asia and the Pacific - ESCAP, 2011). These inherent advantages of PPP have been attractive to governments in Nigeria and other developing countries. PPP enhances the supply of much needed infrastructure services as this may not require any immediate financial commitment on the part of governments; provides relief from the burden of costs of design and construction; allows transfer of many project risks to the private sector; and promotes better project design, choice of technology, construction, operation and service delivery. PPP procurement arrangements have been used to deliver several infrastructure projects in Nigeria. Babatunde et al. (2012) lists some projects executed using the PPP model by the Lagos state government in Nigeria to include: Bus Rapid Transit Scheme (BRT), Diagnostic centres, Mortuary services and Lekki toll road project. Other states in Nigeria such as Cross-Rivers State, developed Akampa toll road project and the Tinapa free trade zone. River State is developing the Greater Port Harcourt housing scheme, and Benue State, the Teragro Benfruit plant using PPP arrangement (Nigeria PPP Review, 2012).

The Federal Government of Nigeria plans to execute several PPP projects like the rehabilitation and upgrade of Murtala Mohammed Airport road in Lagos, Second Niger Bridge Project and Hydro Power Plant projects. For PPP projects already completed and operational and also for those in the pipeline, there is a need to investigate the key performance indicators that will enhance their performance in Nigeria. Most of the completed PPP projects in Nigeria and in other developing economies have been described as successful, but the question is how effective or how good these projects are? Do they meet their performance requirements? How valuable are these projects to stakeholders? How are PPP project performance evaluated, in terms of project characteristics, financial and marketing, innovation and learning, stakeholders and process indicators? Performance indicators have been described as potential effectiveness attributes to measure overall effectiveness of PPP system (Yuan et al., 2008). Previous researches on PPP have concentrated on procurement, success management and risk management but very little attention has been paid to the process factors that can strongly influence the performance of PPP projects. Attempts to improve process and performance management in PPP projects involve the use of performance objectives and key performance indicators to improve PPP outcomes. Key performance indicators can be used to identify the strength and weakness of PPP projects and they are useful tools for effective project performance management. Key performance indicators that can improve effectiveness of PPP projects are investigated in this study to give insights into how well some of these projects have met their performance requirements.

The aim of study is to investigate key performance indicators that will improve performance of PPP projects in Nigeria. The study compares the perception of stakeholders on the various KPIs for PPP projects and investigates if significant difference exists between stakeholders' perceptions. The study is significant as it provides current knowledge on key performance indicators in PPP projects. It also contributes to performance management literature on PPP. Awareness is created through this to both government and the private sector on the key performance indicators that could be used to improve PPP projects. This study can also serve as a springboard for future research on KPIs in PPP projects in developing countries where PPP is being considered for their infrastructure development.

CONCEPT OF PPP FOR INFRASTRUCTURE DEVELOPMENT

Public Private Partnership (PPP) is increasing in popularity and is being used widely for infrastructure development in the global construction market. According to Cheung (2009) PPP is a procurement approach where the public and private sector join forces to deliver a public service or facility. Expertise and resources are contributed by partners to the project and risks involved are share amongst them. Egbewole (2011) explains that the private sector partner becomes involved in the development, financing, ownership and or operation of a public facility or service.

Kulasingam (2012) indicates that PPP arrangements are now a panacea to government's inability to finance the construction of major infrastructure. Use of PPP for infrastructure procurement has been adopted by the Nigerian government, as well as other developing economies, such as Pakistan, India, Nepal, Latin America and some African countries like Ghana, Mauritius, Mozambique, South Africa, and Egypt. Developed countries like UK, Australia, Canada, USA, Germany and China have also utilised the PPP arrangement to bridge their infrastructure deficits.

PPP arrangements come in many forms but two categories are in use, that are identified as institutionalised and contracting arrangements (Gunnigan & Rajput, 2010). Variants of PPP or other similar arrangements used for existing services and facilities procurement include: Design-Build (DB), Design-Build Maintain (DBM), Design-Build-Operate (DBO) or Build-Transfer Operate (BTO), Design-Build-Operate-Maintain (DBOM) also known as Build-Operate-Transfer (BOT). Some models such as Service contracts, Management contracts, Lease, Concession and Divestiture are also in use for infrastructure procurement. In Nigeria, PPP arrangements such as DB, BOO, BOT, DBOM, Joint ventures, Lease, Divestiture have also been used on projects.

KPIs FOR IMPROVEMENTS OF PPP PROJECTS

KPIs are also referred to as key success indicators (KSI) and are helpful to organisations to define and measure their progress towards achieving set organization goals (Reh, 2013). Performance indicators are used virtually in all industries such as construction, software development, hospital, mining, logistics, manufacturing and fleet maintenance. Performance indicators are associated with performance improvement initiatives. Holman (2009) states that a performance measurement compares actual returns against a pre-specific benchmark. Key performance indicators include benchmarks, targets, milestone, dates, numbers, percentages, variances, distribution, rates, time, cost, indexes, ratios, survey data and reports that are used to evaluate a phenomenon.

KPIs have served as useful tools in evaluating PPP projects. Yuan et al. (2008) undertook a study on the management of the performance of PPP projects to achieve value for money where some of the performance indicators were selected. This study provides insight into performance management for managing the process of PPP as to improve the output of PPP projects. Yuan et al's study indicates that these KPIs are useful tools for assessing the strength and weakness of PPP projects. KPIs are used by management to evaluate the performance by comparing actual and estimated performance in terms of effectiveness, efficiency, quality and workmanship. Yuan et al. (2008) established a conceptual model of KPIs that is built on stakeholders requirements that could influence performance of projects. The performance indicator system used in their research, comprise three parts. First, being the characteristics and features of the PPP projects which will affect performance of projects at the beginning stage. These indicators will influence concessionaire selection, agreement between private and public sectors, risk allocation and the extent at which the projects will achieve success under the influence of economic, legal and political environments. Second indicators are made up of financial and marketing indicators, innovation and learning indicators as well as stakeholders' indicators. These indicators reflect economic, innovation, culture and benefits of the stakeholders' indicators.

The third indicators include factors that affect construction, operation, maintenance, transfer and post-transfer processes. Yuan et al had emphasized that the second and third indicators must be dynamic and measurable to evaluate efficiency, customer satisfaction, business success, product requirement and future potentials of PPP projects. Therefore performance improvements are measured using these three indicators. Similarly, the current study draws on Yuan et al. (2008) developed KPIs by using physical characteristics of projects, financing and marketing, innovation and learning, stakeholders, as well as process indicators for the investigations. Data obtained represents the perspectives of stakeholders to PPP projects in Nigeria.

RESEARCH METHOD

A review of literature was first undertaken to determine issues around the PPP concept for infrastructure development. The review also allowed a collation of key performance indicators (KPIs) that could be used for measuring performance of PPP projects. The intent of the research study is to use the result for the purpose of improving PPP project performance in Nigeria. A research questionnaire instrument was designed to collect data from key parties who have been involved in the execution of PPP projects either during the initial, construction, maintenance and operational stages of PPP projects. Respondents for the study include Architects, Builders, Quantity Surveyors, Project Owners and Banking Officials who have been involved in PPP projects. This study took place in Lagos State, Nigeria and is a survey research.

The sample for the study was selected by random sampling technique. Initially, interviews were conducted with some professionals to identify and locate completed PPP projects as well as identifying the parties involved in the projects. Based on the fact-finding, sixty (60) projects were identified and one participant on each of the project was also identified to provide the necessary information. Sixty (60) respondents constituted the original population of the study but upon further scrutiny was reduced to forty-five (45) because fifteen (15) of the projects were inaccessible to the researcher. The sample size of forty-five (45) respondents consisted of 12 Project Owners, 15 Consultants, 13 Contractors and 5 Financiers. Forty-five (45) questionnaires were sent through trained field enumerators to deliver these questionnaires to the respondents. Altogether thirty-one (31) responses were retrieved, consisting of 9 Project Owners, 11 Consultants, 9 Contractors and 2 Financiers. The data analysis was based on this number.

Tables are used for presenting the descriptive results. Mean scores are used for analysis of the study as most of the variables were measured on nominal scale while few of the variables were measured on ordinal scale. Kendall W test of Concordance between ranks was used to compute the agreements between respondents perception on their rankings of KPIs on PPP projects. Also the Kruskal Wallis test was used to compare the perception of the three stakeholders on their rankings of KPIs of PPP projects. Most of the data for this comparison tests were measured on ordinal scale. Results of Kruskal Wallis tests are expressed in Chi-Square statistic which gives an indication of significant differences between the perceptions of respondents.

RESULTS AND DISCUSSIONS

This section presents the results emanating from the study. The findings are discussed descriptively and inferentially based on the tools of analysis used by the study.

Comparisons of Perception of Stakeholders on the Rankings of KPIs of PPP Projects

Perceptions of the respondents (PPP stakeholders: project owners, consultants and contractors) on the different types of KPIs applicable to PPP projects are compared. The five main types of KPIs of PPP projects for which perceptions of stakeholders were sought include: physical characteristics of project indicators, financial and marketing indicators, innovation and learning indicators, stakeholders indicators and process indicators. Mean scores of these KPIs were computed and a rank agreement analysis was undertaken between

Table 1: Stakeholders' Rankings of KPIs of PPP Projects

Key Performance Indicators	Clients		Consultants		Contractors		Aggregate		Top Ten KPIs
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	
A Physical characteristics of projects KPIs									
Type of building project	1.00	8	1.50	8	1.38	9	1.26	28 th	
Level of Design complexity	2.63	1	2.75	1	2.88	1	2.56	14 th	
Level of construction complexity	1.50	5	2.63	2	2.38	2	2.16	17 th	
Level of technological advancement	2.63	1	2.25	3	2.00	4	2.26	15 th	
Number of PPP projects involved in	1.63	4	1.63	7	1.25	10	1.39	24 th	
Social support for End users	0.88	11	1.25	9	1.50	8	1.32	26 th	
Stable political environment affect PPP performance	1.00	8	1.00	11	1.13	11	1.16	29 th	
Level of commitment of public sector	1.25	7	2.13	4	2.13	3	2.03	19 th	
Level of commitment of private sector	1.00	8	1.13	10	1.75	6	1.29	27 th	
Level of project technical feasibility best	2.25	3	1.75	6	2.00	4	1.84	21 st	
Party allocated risks in PPP projects	1.38	6	2.00	5	1.63	7	1.74	22 nd	
B Financing and Marketing KPIs									
PPP increase marketability of projects	1.00	7	1.13	7	1.13	7	1.13	30 th	6 th 7 th 9 th 1 st
Equity/Debt ratio	3.50	2	3.88	4	3.63	2	3.45	6 th	
Tariff/toll	2.88	3	4.00	3	3.25	4	3.42	7 th	
Unit price of projects	2.75	4	3.88	4	3.38	3	3.26	9 th	
Return on investments	3.63	1	4.50	2	4.00	1	3.97	1 st	
Indication of public about toll/tariff	2.00	6	2.13	6	2.25	6	2.03	19 th	
Contractors all risk insurance cover	0.63	9	1.13	7	0.50	9	0.68	34 th	
Collateral warranty cover	0.63	9	1.13	7	0.38	10	0.74	33 rd	
Fire insurance cover	0.25	11	0.50	12	0.00	12	0.26	39 th	
Third party insurance cover	0.13	12	0.63	11	0.13	11	0.26	39 th	
Construction period for PPP projects	1.00	7	1.00	10	1.13	7	1.03	31 st	4 th
Concession period for PPP projects	2.63	5	5.00	1	3.00	5	3.55	4 th	
C Innovation and learning KPIs									
Investment in R & D of new technology	0.42	4	0.50	4	0.38	4	0.43	37 th	
Establishment of learning organization	1.13	3	1.50	3	1.38	3	1.42	23 rd	
Employee/staff training	2.00	1	3.38	1	2.38	1	2.74	13 th	
Level of Technology innovation	1.88	2	2.63	2	1.88	2	2.19	16 th	
Technology transfer (Design, Construction)	0.42	4	0.48	5	0.29	5	0.41	38 th	
D Stakeholders KPIs									
Satisfaction of clients with PPP projects	3.25	3	3.38	5	3.50	1	3.29	8 th	8 th 2 nd 5 th 10 th
Satisfaction of End users with PPP projects	3.25	3	3.13	6	2.88	4	2.90	12 th	
Satisfaction of project teams with PPP projects	3.75	1	4.25	1	3.38	2	3.74	2 nd	
Satisfaction of financiers with PPP projects	3.25	3	3.75	3	3.38	2	3.52	5 th	
Relationship between concessionaire, sub-contractors	3.75	1	3.75	3	2.75	5	3.10	10 th	
Relationship in project team	2.75	6	3.88	2	2.18	6	3.06	11 th	
E Process KPIs									
Testing of construction materials as quality control	3.63	1	4.00	1	3.25	1	3.65	3 rd	3 rd
Prominent technical management and skills	0.42	6	0.58	6	0.33	6	0.46	36 th	
Safety management in PPP projects	0.75	4	0.97	4	0.88	4	0.85	32 rd	
Health control measures in PPP projects	0.48	5	0.82	5	0.54	5	0.58	35 th	
Type of facilities management in place	1.00	3	1.25	3	1.50	3	1.35	25 th	
Contract management in PPP projects	1.95	2	2.27	2	2.18	2	2.08	18 th	
Conflict management in PPP project	0.19	7	0.34	7	0.21	7	0.26	29 th	

respondents' views, using Kendall W test of concordance between ranks (W). Kendall's W represents agreement, where 0 means no agreement at all between the groups and 1 represents perfect agreement between the groups. The higher the Kendall 'W' value, the higher the agreement between the three groups of respondents identified by the study (StatsToDo, 2013). Table 1 presents the results of the rankings of KPIs of PPP projects by the respondents. The table shows a comparison of stakeholders' perceptions on the KPIs.

Physical characteristics of projects KPIs

From the results presented in Table 1, the first set of KPIs on physical characteristics of projects yields interesting results. Client organisations had ranked both the levels of design complexity and technological advancements (MS = 2.63), 1st, while social support for end users in PPP projects is ranked the least (11th). Consultants also ranked level of design complexity 1st with MS = 2.75, but stable political environment affecting PPPs was ranked the least (11th with an MS = 1.00). Contractors equally ranked the level of design complexity as the most important KPI (1st with MS = 2.88), while stable political environment affecting PPPs was also ranked 11th of the KPIs relating to physical characteristics of projects. These results suggest that the most important physical characteristics of KPIs of PPP projects are the levels of design complexity and technological advancement. Level of design complexity can enhance PPP projects as well as the level of technological advancement which influences workmanship, delivery period and quality of work on PPP projects.

A further test was conducted to determine the level of agreement between the opinions (rankings) of the stakeholders. The Kendall W Test of Concordance or in simpler terms an agreement analysis of study participants was determined by the test. The results obtained from the Kendall 'W' test is presented in Table 2. Therefore for stakeholders' rankings of KPIs relating to physical characteristics of projects, a 'W' value of 0.815 is obtained, which reflects a significantly good agreement between the clients, consultants and contractors. A high value of 0.815 indicates a high level of agreement between the stakeholders' perception of these KPIs in PPP projects.

Financing and Marketing KPIs

The next set of KPIs on Table 1 relate to financing and marketing. Clients ranked return on investment as the most important KPI (1st with MS = 3.63), while third party insurance cover was ranked the least important (12th with MS = 0.13). Consultants ranked concession period for PPP projects, 1st with MS value of 5.00, while fire insurance cover was ranked 12th with MS value of 0.05. Finally, contractors ranked return on investment as the most important KPI (1st with MS = 4.00), while third party insurance cover is ranked 12th (MS = 0.13), meaning that this group of respondents consider it the least important KPI. Inference that can be made from these result, is that for financial and marketing indicators the most important KPIs for improving the performance of PPP projects are return on investment and the concession period for PPPs. According to Yuan et al. (2008) return on investment is a key factor that encourages the private sector to want to operate PPP projects more efficiently. The public sector partner takes full advantage of this also, and would monitor performance on PPP projects because of its economic benefits. On the same note, the concession period of a PPP is significant and affects project performance. If the concession period is short, the total project cost to the public partner will be low but would result in higher operational risks to private partners (Yuan et al., 2008). However if the concession period is long it results in high total

cost for the project owner and but low operational risk for the concessioner. Both returns on investment and concession period are KPIs that could enhance performance on PPP projects.

Further analysis on stakeholders' rankings is presented in Table 2. The agreement analysis for financing and marketing KPIs realised a 'W' value is 0.938, which demonstrates almost perfect agreement between the clients, consultants and contractors on their rankings of the financial and marketing indicators of PPP projects.

Table 2: Kendall W Test of concordance between stakeholders' rankings of KPIs of PPP projects

	Key Performance Indicators	Kendall 'W'	$\chi^2_{cal.}$	Df	χ^2_{tab}	P-value	Sig.
A	Physical characteristics projects	0.815	24.45	10	20.48	0.00	S*
B	Financing and marketing KPIs	0.938	30.96	11	21.92	0.00	S*
C	Innovation and learning KPIs	0.938	-	-	-	0.01	S*
D	Stakeholders KPIs	0.377	-	-	-	0.06	NS
E	Process KPIs	1.00	-	-	-	0.05	S*

Innovation and learning KPIs

On the ranking of innovation and learning KPIs that was presented in Table 1, the result show that clients, ranked employee/staff training (MS = 2.00) as the most important KPI. Both investment in R & D on new technology and technology transfer (MS = 0.42) were ranked fourth and least important KPI by clients. Consultants also ranked employee/staff training (MS = 3.38) as the most important KPI, while technology transfer (MS=0.48) is ranked fifth and the least important KPI. Contractors ranked employee/staff training (MS = 2.38) as the most important KPI, with technology transfer ranked fifth, and the least important KPI. The results indicate that the most important KPI for innovation and learning are employee/staff training and level of technology innovation. These KPIs are expected to improve the performance of PPP projects. According to Yuan et al. (2008), staff training is important for improving performance of PPP projects whereby staff are exposed to new knowledge during training. Similarly, the level of technology innovation can assist the PPP participants to apply new knowledge/techniques in their strategic planning, design and construction activities, which ultimately improves performance of PPP projects.

Further analysis (test of concordance/agreement analysis) on the data yields results presented in Table 2. Therefore on the agreement analysis for innovation and learning KPIs, the Kendall's W value obtained is 0.998. This value gives and an almost perfect agreement between the clients, consultants and contractors on their ranking of the innovation and learning indicators on PPP projects.

Stakeholders KPIs

With respect to stakeholders' KPIs on PPP projects, the result is presented in Table 1. Clients ranked, both satisfaction of project teams and relationship between concessionaires, sub-contractors and suppliers (MS = 3.75), first and most important stakeholders KPI. However, the clients ranked team relationships as the least important stakeholder KPI (MS = 2.75). Consultants ranked, satisfaction with project team (MS= 4.25) the most important KPI while both satisfaction of financiers and relationship between concessionaire, sub-contractors and

suppliers (MS = 3.75) were ranked third and least important. However Contractors ranked satisfaction of clients (MS = 3.50) as the most important KPI, with relationship between concessionaire, sub-contractors and suppliers (MS = 2.75) as the fifth and least important KPI.

From these results it can be inferred that the most important stakeholders' KPIs are satisfaction of project teams and satisfaction of clients with PPP projects. Both KPIs are important issues from both the clients and the project teams for driving the performance of PPP projects. Stakeholder's non-commitment or lack of satisfaction could lead to poor performance on PPP projects and in worst cases, project.

The result of further analysis of the data is presented in Table 2. The test to determine the agreement analysis across the respondents for stakeholders' indicators yields a Kendall's W value of 0.377. This value indicates a very weak and non-significant agreement between the clients, consultants and contractors on their rankings of the stakeholders' indicators of PPP projects.

Process KPIs

Finally, Table 1 gives rankings of process KPIs of PPP projects by the respondents. Clients ranked the testing of construction materials for quality control (MS = 3.63) as most important process KPI, while conflict management in PPP projects (MS = 0.19) was ranked seventh (the least important process KPI). Consultants also ranked testing of construction materials for quality control (MS = 4.00) as the most important process KPI, but ranked, conflict management in PPP projects (MS = 0.34) as the least important. In the same light, Contractors ranked testing of construction materials for quality control (MS = 3.25) as most important and conflict management in PPP projects (MS = 0.21) as the least important process KPI. The result therefore shows that there was an agreement amongst clients, consultants and contractors that the testing of construction materials for quality control is the most important process KPI. Other important process KPIs are contract management and facilities management in place. According to Yuan et al. (2008) process indicators enable clients and other agencies adopting PPP procurement, to track the capabilities of processes in PPP projects whereby the strength and weakness of these processes can be identified.

Regular testing of construction materials as a measure of quality control is essential in PPP projects to ensure that the end product are of good value, especially when those products (assets) are transferred back to the public owner. Contract management is equally important for effective administration of PPP contracts, especially where issues of planning, claims, variations and disputes are adequately dealt with in a manner that it does not affect performance on the PPP project. Effective conflict management could provide a good working environment for all stakeholders' because issues emanating from PPP projects are dealt with decisively.

Further analysis on the data obtained is undertaken to determine the agreement analysis using Kendall's W test. The results are presented in Table 2. A Kendall's W value of 1.00 was obtained and this indicates a perfect and significant agreement between the clients, consultants and contractors on their rankings of the process indicators of PPP projects.

The foregoing discussions on perception of clients, consultants and contractors on the rankings of KPIs in PPP projects indicate the respective ‘most important rankings’ of KPIs. It could be concluded that for enhanced performance of PPP projects in Nigeria, the most important KPIs are: levels of design complexity and technological advancement; return on investment; concession period; employee/staff training; level of technology innovation; satisfaction of project teams; satisfaction of client with PPP projects; testing of construction materials as quality control; contract management and facilities management and place. On the agreement analysis between the rankings of clients, consultants and contractors good agreements were achieved for most of the KPIs except for stakeholders’ indicators where the agreement was low.

Kruskal Wallis Tests for Comparing Perception of Stakeholders of KPIs in PPP Projects

In order to compare the perception of clients, consultants and contractors of KPIs in PPP projects in Nigeria a research hypothesis was developed. The hypothesis enables inferential decisions about KPIs of PPP projects to be undertaken. The null hypothesis (H_0) states that there is no significant difference between the perception of clients, consultants and contractors on the most important KPIs for improving performance of PPP projects. The level of significance of the Kruskal Wallis test conducted was set at 5%. The results of the Kruskal Wallis tests for comparing the perception of stakeholders’ on KPIs in PPP projects are presented in Table 3.

On physical characteristics of projects’ KPIs, the calculated chi-square values are quite lower than the tabulated values ($\chi^2 = 7.37$) hence all the results are not significant. These all support the null hypothesis and hence it is accepted. This infers that there is no significant difference between the perception of clients, consultants and contractors on the physical characteristics of projects KPIs for improving performance of PPP projects. Clients, consultants and contractors perceive these KPIs as the same and hence they are not different from each other.

Further, for financing and marketing KPIs, most of the calculated chi-square values (χ^2_{cal}) are lower than the tabulated values ($\chi^2_{tab} = 7.37$) hence the results are not significant. They also support the null hypothesis which is accepted. This infers that there is no significant difference between the perception of clients, consultants and contractors on these financial and marketing indicators. Stakeholders hold the same views about these KPIs. However, for ‘concession period of PPP projects’ the calculated chi-square value ($\chi^2_{cal} = 11.42$) is higher than the tabulated value ($\chi^2_{tab} = 7.37$) hence the result is significant. This does not support the null hypothesis and hence the alternative hypothesis is accepted. This infers that there is significant difference between the perception of clients, consultants and contractors on the KPI on ‘concession period of PPP projects’. This difference in perception can be explained from the results in Table 1 as consultants perceive the concession period as contributing more to performance of PPP projects than clients and contractors.

Table 3 also gives the values of calculated chi-square values (χ^2_{cal}) for ‘innovation and learning’ and ‘stakeholders’ KPIs. The values are lower than the tabulated values ($\chi^2_{tab} = 7.37$) hence all the results are not significant. It infers accepting the null hypothesis which means that there is no significant difference between the perception of clients, consultants and contractors on these KPIs.

Table 3: Kruskal Wallis test results for comparing perception of stakeholders' of KPIs of PPP projects

	Key Performance Indicators	χ^2_{cal}	D.F	χ^2_{tab}	P-value	Sig.
A	Physical characteristics of projects KPIs					
	Type of Building Project	5.02	2	7.37	0.08	NS
	Level of Design complexity	0.58	2	7.37	0.74	NS
	Level of construction complexity	3.42	2	7.37	0.18	NS
	Level of technological advancement	1.73	2	7.37	0.42	NS
	Number of PPP projects involved in	1.99	2	7.37	0.37	NS
	Social support for End users	6.05	2	7.37	0.04	NS
	Stable political environment affecting PPP performance	2.00	2	7.37	0.36	NS
	Level of commitment of public sector	5.19	2	7.37	0.07	NS
	Level of commitment of private sector	4.45	2	7.37	0.10	NS
	Level of project technical feasibility	0.96	2	7.37	0.61	NS
	Party best allocated risks in PPP project	6.82	2	7.37	0.03	NS
B	Financing and Marketing KPIs					
	PPP increase marketability of projects	1.30	2	7.37	0.52	NS
	Equity/Debt ratio	2.25	2	7.37	0.32	NS
	Tariff/Toll	5.25	2	7.37	0.07	NS
	Unit price of projects	4.96	2	7.37	0.08	NS
	Return on investments	4.78	2	7.37	0.09	NS
	Indication of public about Toll./Tariff	0.15	2	7.37	0.92	NS
	Contractors all risk insurance cover	6.06	2	7.37	0.04	NS
	Collateral warranty cover	1.54	2	7.37	0.46	NS
	Fire insurance cover	5.11	2	7.37	0.07	NS
	Third party insurance cover	6.18	2	7.37	0.04	NS
	Construction period of PPP projects	0.64	2	7.37	0.72	NS
	Concession period of PPP projects	11.42	2	7.37	0.00	S*
C	Innovation and Learning KPIs					
	Investment in R & D of new technology	2.37	2	7.37	0.30	NS
	Establishment of learning organizations	2.51	2	7.37	0.28	NS
	Employee/staff Training	6.28	2	7.37	0.04	NS
	Level of technology innovation	4.99	2	7.37	0.08	NS
	Technology transfer (Design, construction, management)	3.37	2	7.37	0.18	NS
D	Stakeholders KPIS					
	Satisfaction of clients with PPP projects	0.47	2	7.37	0.78	NS
	Satisfaction of End Users with PPP projects	1.57	2	7.37	0.45	NS
	Satisfaction of Project Teams with PPP projects	1.91	2	7.37	0.38	NS
	Satisfaction of Financiers with PPP projects	2.75	2	7.37	0.25	NS
	Relationship between concessionaire, sub-contractors	4.48	2	7.37	0.08	NS
	Relationship in Project Team	5.16	2	7.37	0.07	NS
E	Process KPIs					
	Testing of construction materials for quality control	5.20	2	7.37	0.07	NS
	Prominent Technical management and skills	4.02	2	7.37	0.13	NS
	Safety management in PPP projects	9.03	2	7.37	0.01	S*
	Health control measures in PPP project	7.00	2	7.37	0.03	NS
	Type of facilities management in place	5.11	2	7.37	0.07	NS
	Contract management in PPP project	9.07	2	7.37	0.01	S*
	Conflict management in PPP project	4.25	2	7.37	0.12	NS

In respect of process KPIs, most of the calculated chi-square values are lower than the tabulated values ($\chi^2_{tab} = 7.37$) hence the results are not significant. The null hypothesis is also accepted. Therefore there is no significant difference between the perception of clients, consultants and contractors on these process KPIs of PPP projects. However, for 'safety' and 'contract' management in PPP projects the calculated chi-square values are higher than the tabulated values, hence the results are both significant. Thus the alternative hypothesis is accepted meaning that there is significant difference between the perception of clients, consultants and contractors on these KPIs in PPP projects as process indicators. This difference in perception can also be explained from the results in Table 1 as consultants perceive both KPIs as contributing more to PPP performance, different from the views of clients and contractors who perceive them as contributing less to performance of PPP projects.

From the foregoing comparisons of perception of different project partners on KPIs of PPP projects, it could be inferred that for physical characteristics of projects KPIs the perception of stakeholders are the same. All physical characteristics of project KPIs are perceived to have the same contributions to PPP projects. Also, some financial and marketing KPIs are perceived to have the same contribution to PPP performance except for concession period where consultants perceived this as contributing more to PPP performance. All innovation and learning KPIs as well as stakeholders KPIs are perceived by clients, consultants and contractors to have the same contributions to PPP project performance. Some process indicators are perceived by stakeholders to have equal contribution to PPP performance except for safety and contract management where consultants feel that these two indicators contribute more to PPP performance. However, these results suggest that concession period, safety and contract management KPIs can significantly influence PPP project performance in Nigeria.

IMPLICATIONS OF THE STUDY FOR POLICY, THEORY AND PRACTICE

Implications of this study for policy makers in government and for the private sector participants in PPP projects is that this study compared perception of stakeholders on KPIs and also investigated differences in perception of stakeholders on these KPIs and findings of the study revealed that no difference in opinions on most of the KPIs except for concession period, safety and contract management. Concession period, safety and contract management are strong performance factors to be leveraged upon for successful implementation of PPP projects. No significant difference in perception of stakeholders on physical characteristics of projects indicators implies that projects were executed on the same economic, legal and political frameworks. No significant difference in perception for financial and marketing, innovation and learning and stakeholders indicators implies that economic, innovation, culture and benefits of these projects are the same. No significant difference in perception for process indicators implies that construction, operation, maintenance, transfer and post-transfer of most projects are the same. Significant differences in perception for concession period, safety and contract management emanating from consultants, implies that these are performance factors that must be considered for improving performance of PPP projects.

CONCLUSION

From the findings of this study it can be concluded that there are several key performance indicators investigated that will improve performance of PPP projects in Nigeria. Stakeholders had very good agreements on their rankings of the key performance indicators in PPP projects and they perceive most of these key performance indicators as contributing equally to performance of PPP projects. Consultants differ in their opinions to other stakeholders on issues of concession period, safety and contract management of projects and state that these variables have superior contributions to performance of PPP projects. This study recommends all the proposed KPIs for use of all stakeholders and practitioners for improving their future PPP projects execution while any concessionaire that proposes good concession period and also displays good previous safety and contract management records should be considered for future PPP project. More research studies should be undertaken on other procurement options to explore their KPIs for measuring project performance.

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