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EFFECTIVENESS OF THE PHYSICAL CHARACTERISTICS OF PROJECT AS A KEY PERFORMANCE INDICATORS ON BOT PROJECTS IN NIGERIAN PRACTICE

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Abstract

This research investigates effectiveness of the physical characteristics of project as a key performance indicator on BOT projects in Nigerian practice. This research combines the use of literature review and Questionnaire survey. The research data and analyses will be triangulated from multiple sources to help improve the credibility of the findings. The study area is Abuja which is the federal capital territory FCT of Nigeria. The result of the assessment of was use to evaluate the physical characteristics. Party best allocated risks in PPP project was found to be the most significant with mean of (3.625) and ranked first in the group. Level of commitment of public sector is the second factor with the mean of (3.583). Level of Design complexity was ranked third with the mean of (3.416). Moreover, Social support for end users, Level of project technical feasibility. The recommendation was Public and private organisation involved in BOT projects in Nigeria are encouraged to measure their performance using KPIs to manage the performance and improving future BOT projects

Keyword:
Performance, BOT, indicators, Project.

Introduction

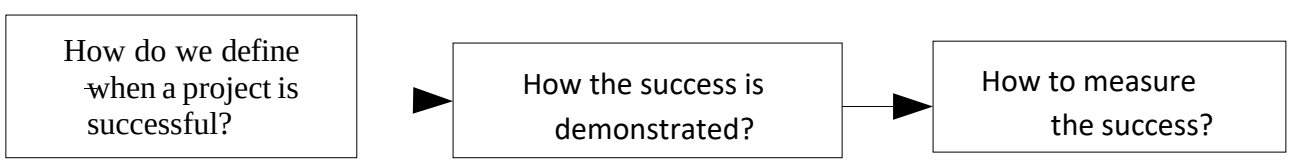
The Centre for Construction Innovation for Constructing Excellence in the North West (2006) defines KPIs based on its every single word forming the KPI terminology: "key" means how we define when a

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project is successful, "performance" means how the success is demonstrated and "indicator" means how to measure the success. This definition is illustrated in Figure 1.

Figure 1 Definition of Key performance indicator



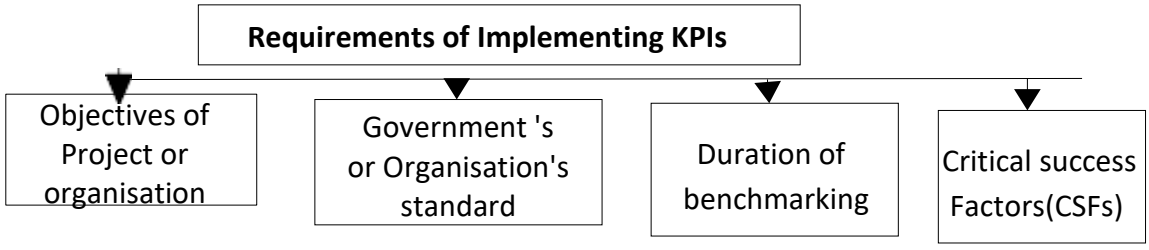
Source: Centre for construction innovation for constructing excellence 2006.

Nevertheless, as its name implies, key performance indicators (KPIs), which differ depending on the nature, goals and strategy of the project or organisation (Bauer, 2004 and Reh, 2006), are the qualitative or quantitative measurement of the activities of the project or organisation towards its objectives (BSRIA, 2003), where the activities in business perspective are best known as drivers (Parmenter, 2007 and Peterson, 2007). The measurement must be carried out within the agreed time frame marked as milestones where the end result of measurement is compared with the standard set by the government or the particular organisation.

Concepts of KPIs

Throughout the previous sections, it is highlighted that to implement KPIs, the KPIs require the agreed objectives to be reached by the organisation, the standard set by the government or the organisation to make the comparison either improvement has been taken in place or not, the determined duration of measuring the performance or the milestones of specific activity as well as the critical success factors (CSFs) which drive the organisation to achieve the KPIs. These four essential requirements of implementing KPIs are drawn in Figure 2.3.

Figure 2.3 Four requirements of KPIs implementation



Source: BSRIA 2007

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Given that KPIs are fastened to the organisation's or project's strategy, KPIs measure variables (BSRIA, 2003) such as revenue, debt, number of customers etc. It should be bore in mind that KPIs are not always the pleasing illustration of variables for example "profit per quarter year" which values the revenue gained by the organisation every four months. Instead, "number of defect per product" can also be regarded as KPI, which might help the organisation comprehends its standard of Quality Assurance and Quality Control (QAQC) in comparison with the standard established by the government or local authorities. "Number of customer complaints per week" is also an example of an obnoxious KPI, yet this indicator is targeted in reducing the figure and enhancing customer's satisfaction. As revealed, KPIs in real time are discussed thoroughly in business intelligence (BI) area to assess the performance of business within a determined duration. Among the areas top BI analyses are customer related numbers namely new customers acquired, status of existing customers and attrition of customers; turnover generated by segments of the customers; outstanding balances held by segments of customers and terms of payment; collection of bad debts within customer relationships; demographic analysis of individuals (potential customers) applying to become customers as well as the levels of approval, rejections and pending numbers; delinquency analysis of customers behind on payments; as well as the profitability of customers by demographic segments and segmentation of customers by profitability. Nonetheless, nowadays KPI has initiated to be implemented in various areas by means of BI (BSRIA Report, 2003), for instance education as "grade A students per subject", health as "number of newborn infants per month", public services as "number of customers per week", marketing as "new products launched per quarter year", banking as "accounts opened for new customers" etc. Theoretically, KPIs data are collected through questionnaire or surveys (BSRIA, 2003) spread to the employers and employees, anticipated or existing clients, concerned public and other participated stakeholders. In construction practices, the KPIs questionnaires are distributed to clients or owners, government organization as a part of owner, consultants, contractors and other services-and- building-related workers as well as end users. These have been effectively practiced by Building Services Research and Information Association Limited (BSRIA Ltd.), Royal Institute of British Architects (RIBA), Royal Institution of Chartered Surveyors (RICS), Association of Consulting Engineers (ACE), Chartered Institute of Architectural Technologists (CIAT), The

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Chartered Institute of Building (CIOB) and Chartered Institution of Building Services Engineers (CIBSE) which have carried out the online KPIs surveys of construction consultants and their clients in 2006 from 465 firms around the UK (BSRIA Report, 2003). In the past, questionnaire forms are snail-mailed or manually handed out, which consumed money, energy and time in stamping cost, waiting for the reply and response, quantifying the data to produce the end results as well as illustrating the results in the most comprehensible mode, namely graph and chart. Nonetheless, in pace with the evolved technology, questionnaires and surveys are at present undertaken online, which is proven to be cost, time and energy effective whilst easing the computation of the end results through computer programming. The responses of questionnaires and surveys are treated in strict confidence as they will be used only for the production of KPIs, where no information from a distinctive project, consultant, client or individual will be recognizable in the published KPIs. The diagram of survey's result has also been simplified through automated graphical programmes such as Microsoft Excel and Statistical Package for Social Sciences (SPSS). In addition, the instantaneous produced reports through graphical programmes can be transferred directly into office documents for instance Microsoft Word and Microsoft Power Point. These end products must be compared or benchmarked with the standards set by the government or particular organization.

CONCEPT OF BUILD-OPERATE TRANSFER PROJECTS (BOT)

Build-Operate-Transfer is a concept used to describe an aspect of public-private initiative in executing capital intensive projects. It is a process whereby public can partner with private sector in executing capital project and infrastructure. Also, this could be referred to as a form of project financing mechanism that helps a private entity to obtain a concession from public to finance, design, construct and manage a facility. On a typical BOT project, the financier looks primarily to the project as only means of loan repayment in case loan facility is accessed in the project financing; this is usually premised on the credit worthiness assessment of the project at feasibility stage. So also, it involves security assurance, security taken on a typical BOT project which is often restricted within the project portfolio. BOT mechanism is a complex structure comprising multiple, inter-dependent agreements among various parties. Some of such parties includes: government, private company (concessionaire), lenders (banks), equity investors, contractors, suppliers, operators and financial advisers. Government grants

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concession to the private sector (concessionaire), through concession agreement. The concessionaire is responsible for design, finance, construction, and operation of the facility. According to Akintoye, Hardcastle, Beck, Chinyo, and Assenova (2003), the concessionaire retains the title of ownership during the concessionary period, which is normally between 10- 50 years, after which the title of ownership is transferred back to the government". The submission states further that the following agreements subsist in a typical BOT agreement: concession agreement, loan agreement, shareholders agreement, construction contract, supply contract, off-take agreement, operation and maintenance agreement The shareholder agreement is the type that exists between the equity investors and the concessionaire. The construction contract on the other hand exists between the constructor and the concessionaire of the contract, and the contract is usually left under fixed price turnkey deal. However, supply contract could be described as an agreement between the supplier and the concessionaire, the supplier in a supply contract is often government agency that supplies raw material such as coal to power plant and oil. Similarly, a take-off agreement is the one brokered between the government and the concessionaire to purchase minimum quantity of services such as electricity, water at fixed price for fixed term.

THE PHYSICAL CHARACTERICS OF PROJECT AS A KEY PERFORMANCE INDICATORS FOR IMPROVING PPP IN NIGERIA

The Physical Characteristics of Projects (KPI 1)

In spite of wide application of PPPs in numerous fields, Bloomfield (2006) points out that local governments embarking on long-term PPP contracts must invest in specialized field with effective contract management and strong governance structures. The type of construction should be considered carefully. Furthermore, design, construction plan, and technical scheme become especially complex since PPPs have been applied to complete large scale and complicated infrastructure projects (Askar and Gab-Allah, 2002). Therefore, the issues related to these factors should be paid attention to. In some cases, both the public and private sectors may not be ready for the PPP project if it is adopted just because of the urgent need of more infrastructure facilities. For the public sector, it may be an inexperienced body lacking proper understanding of PPPs. Government may have unreasonable expectations of the private sector. On the other side, the private sector may lack people prepared for working on the PPP projects, understanding

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among the stakeholders, managerial expertise, experienced project management team, good coordination and team work with concessionaire consortium, the ability to deliver quality service for price offered, and the ability to identify and manage risks (Zhang, 2005a; Li, 2005b;). Compare to traditional construction activities, procurement in PPPs is more complicated. Efficient procurement will select the proper private sector that can undertake the project as the party best able to get contract, which has been viewed as an important factor for a successful PPP project by several researches and some case studies (Wang et al., 2000; Zhang and Kumaraswamy, 2001; Zhang et al., 2002; Li, 2005a; Kumaraswamy and Anvuur, 2008). Then, a long-term contract will be signed between the public and private sectors. Based on some case studies, lack of standardized agreement may result in slower and more expensive procurement process than non-PPP procurement so that overtime and cost overrun of the whole life-cycle will happen (CEPAL, 2005; Akintoye et al., 2003). Therefore, making procurement process more efficient can benefit the performance of the PPP projects greatly.

The promoter of a PPP project should make an adequate and sustained marketing campaign so that the citizens or general public can understand the long-term implications and benefits of the project. This kind of support is very important for procurement process, achieving success and gaining viability in the PPP projects (Salman, 2007). On the other hand, economic, legal and political environment can influence the performance of PPP projects, which have very close relationship with local community of the PPP projects. When success factors, risk factors and viability factors are considered, economic, legal and political factors are also important (Li et al, 2005a; Zhang, 2006a; Salman, 2007). Furthermore, the commitment and responsibility of both the public and private sectors are viewed as a significant successful factor in PPP projects (Li et al, 2005a; Akintoye et al., 2003). All parties should commit their best resources (financial, human, etc.) to the partnership project to achieve value for money and maintain the projects in high performance.

Technical feasibility is the key that can provide an imaginative technical solution for the PPP projects (Zhang, 2006b). Improving constructability of PPP projects is the responsibility of all project stakeholders: public sector, private sector, designers, and subcontractors. On the basis of technical feasibility and constructability, maintainability is a necessary considered factor in the operation stage of PPP projects which can improve internal value of facility and prolong facility's operation period that can provide a good condition for project transfer

(Zhang, 2006a). It is obvious that risk is a crucial issue in the PPP projects, which has been studied broadly and has been proved by lots of cases. How to allocate risks, how to share them and how to transfer them should be considered very seriously. A good risk management mechanism should be established before the implementation of the PPP projects, which could greatly act on the performance (Li et al., 2005b; Alonso-Conde et al., 2007).

RESEARCH METHODS

This research combines the use of literature review and Questionnaire survey. Therefore, this research study combines these methods to collect information and data on Build Operate and Transfer (BOT) in Nigeria. The techniques and design of the data collection process will be arranged so that the research objectives will be achieved. The research data and analyses will be triangulated from multiple sources to help improve the credibility of the findings.

The study area is Abuja which is the federal capital territory FCT of Nigeria, and is one of the cities located in the centre of Nigeria. The city has square area of 713km^2 and density of 1,088.8/km^2. It officially became Nigeria Capital on 12th Dec. 1991, with population of 776,298 (NPC 2006). Abuja being the federal capital and hosting a large proportion of public projects (Izam, et al 2010).

The professionals to be consider mainly Management staff involve in the BOT projects in Abuja. Sample frame will be based on the list obtained from Infrastructure Concession Regulatory Commission (ICRC).

The projects to be consider are:

- Maitama Amusement Park Abuja
- Wuye Market Project Abuja
- Development of Katampe District Abuja
- Development of Four District Mabushi, Kado, Gwarimpa and Durumi Abuja
- Reticulation and Upgrading of Kuje Water Works Abuja

There are Eighty (80) stakeholders in Abuja which participated in BOT projects. According to the Krejcie and Morgan (1970) table of determine sample size, a population of 80 has 66 sample. Therefore, 66 Questionnaires were distributed to the respondents.

The data collected for the research through questionnaire will be analyse using Statistical Package for Social Science (SPSS); descriptive Statistics. Tables,

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frequencies, percentages, means and Standard deviations, charts will be employed for data presentation (Ikediashi et al. 2011). Furthermore, the research will adopt the multiple attribute analytical technique in analysing the data collected from survey (Mbachu et'al, 2007) as the appropriate analytical approach to group ranking of variables in a given set. The mean rating is computed using the following equation:

$MR_j = \sum (Rp_{jk} X \%R_{jk})$..... equ.(2.0)

Where:

MRj = Mean ranking for internal factor j; Rpjk = Ranking point K (Ranking from 5-1);
%Rjk = Percentage response to ranking point K for internal factor j.

K= 1 to 5.(5 point likert scale i.e 1= strongly disagreed to 5= strongly agreed).

Table 1 Physical characteristics of projects for effectiveness of KPIs for measuring BOT projects

Physical characteristics of projects KPIs		N	Sum	Mean	Ranking	Std. Deviation
Type of Building Project		48	154.00	3.2083	6	1.18426
Level of Design complexity		48	164.00	3.4167	3	1.21748
Level of construction complexity		48	153.00	3.1875	7	1.19674
Level of technological advancement		48	152.00	3.1667	8	.75324
Number of BOT projects involved in		48	145.00	3.0208	10	.91068
Social support for End users		48	163.00	3.3958	4	1.36428
Stable political environment affecting	BOT					
		48	152.00	3.1667	8	.97486
Performance						
Level of commitment of public sector		48	172.00	3.5833	2	1.04847
Level of commitment of private sector		48	144.00	3.0000	11	.89917
Level of project technical feasibility		48	155.00	3.2292	5	.75059
Party best allocated risks in PPP project		48	174.00	3.6250	1	1.02366

Table 1 above shows the result of the assessment of use to evaluate the physical characteristics. Party best allocated risks in PPP project was found to be the most significant with mean of (3.625) and ranked first in the group. Level of

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commitment of public sector is the second factor with the mean of (3.583). Level of Design complexity was ranked third with the mean of (3.416). Moreover, Social support for end users, Level of project technical feasibility, Type of building project, Level of technological advancement were ranked 4,5,6,7 and 8 respectively. All other factors were also ranked with low mean.

In physical characteristics group most effective KPIs are Party best allocated risks in PPP projects, Level of commitment of public sector and Level of design complexity while other factors were found to be no effective such as Type of building, Level of technological advancement and level of project technical feasibility.

CONCLUSION

This research was aimed at evaluating the effectiveness of the physical characteristics of project as a key performance indicator on BOT projects in Nigerian practice. In which the physical characteristics group most effective KPIs are Party best allocated risks in PPPprojects, Level of commitment of public sector and Level of design complexity while other factors were found to be no effective such as Type of building, Level of technological advancement and level of project technical feasibility.

RECOMMENDATIONS

Public and private organisation involved in BOT projects in Nigeria are encouraged to measure their performance using KPIs to manage the performance and improving future BOT projects. Thus, the indicators are very important for ensuring both parties in the sectors to make appropriate decisions during the life cycle of the project. Measures to increase the financial viability of the private sector participation should be encouraged

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