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Identification of the Inhibiting Factors Affecting Implementation of PPP Models using Lean Technology in Construction

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***Abstract*: Public Private Partnership (PPP) model has the characteristics and features that play a complementary role to the conventional procurement method in the provision of infrastructure facilities in many countries of the world. PPP transaction attracts private sector participation in the development and provision of infrastructure by providing finance, expertise and technology, the resources that seem to be waning in the public sector. However, the successful implementation of the PPP models is being impacted by many inhibiting factors which are left unattended to that ultimately cause loss of quality and profits in quantitative or qualitative terms to infrastructure projects. Lean Technology is hereby applied towards identifying these inhibiting factors and by adopting the same philosophy in eliminating the inhibiting factors.**

This research paper is based on the concept of infrastructure development through PPP models in Nigeria which involved a critical study carried out by the researchers in assessing the effectiveness and efficiency of the conceptual PPP framework in Nigeria. The research reviewed literature on the general implementation of PPP models in the development and provision of infrastructure facilities in order to identify the potential and inhibiting factors affecting the implementation of PPP models. Empirical survey was carried out through the administration of questionnaires on both the public and private sectors involved in PPP transaction. The study reveals that PPP has been widely implemented in many countries of the world for development and provision of infrastructure because PPP seeks better solution for problems like risk allocation; financial crunch; need for timely delivery of infrastructure project; lack of expertise; and quality requirements. Hence the inhibiting factors affecting the successful implementation of PPP models in the development and provision of infrastructure facilities.

***Keywords: Infrastructure Facilities, Development, Public-Private Partnership, Inhibiting Factors, Lean Construction*.**

INTRODUCTION

Public-Private Partnership (PPP) was first introduced as part of the Private Finance Initiative (PFI) in the United Kingdom in early 1990s. Adamu, (2016) noted that Public-Private Partnerships (PPPs) have come into wider implementation around the world by the public sector in the development and provision of both social and economic infrastructures. Regan, (2010) cited in Adamu, (2016) therefore described PPP model as method of infrastructure procurement that employs a combination of private sector capital and management to deliver infrastructure facilities to, or on behalf of public sector. In a related development Regan *et al*. (2015) further, described PPP as a specialised form of procurement that changes the responsibilities of the public sector from being the owner and manager of infrastructure to a buyer of infrastructure services from the private sector. Hence the inhibiting factors affecting the PPP successful implementation.

However, the introduction of Lean Construction Technology concept in infrastructure development serves as a way of identifying and addressing the potential and inhibiting factors affecting PPP models in the construction industry which bothers on the understanding of both the conceptual and theoretical concept of lean technology and the objective of the project in question.

Sanyal & Bhattacharya (2014) opined that Lean Construction is concerned with holistic approach of concurrent and continuous improvements in all dimensions of both the built and natural environment which involve design, construction, development financing, maintenance, salvaging, recycling and evaluation. This is an attempt to manage and improve project development processes and activities with minimum cost and maximum value by considering the eventual infrastructure performance in relation to customer or end users' needs (Koskela *et al*. 2002). The term "Lean Construction" was formed by the International Group for Lean Construction in its first meeting in 1993 to address construction challenges (Dhivyamenaga. 2014). According to Gleeson et al. (2007) lean construction is a philosophy which was based on the concepts of lean manufacturing aimed at managing and improving construction process to profitably deliver customers' or end users' needs in line with project objectives. Adamu *et al*. (2015) opined that lean construction is a new paradigm in construction planning and process that uses lean concepts that aimed at value for money (VfM) rather than overall cost, efficiency and schedule. The best way to achieving value for money (VfM) in infrastructure development is to incorporate lean in early project preparation and planning process before the project is finally approved for execution.
The four major components of PPP framework which include; PPP enabling environment, PPP project

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preparation management, PPP bankable feasibility study, and PPP balanced risk allocation were the main focus in this study. The research is proposed to fulfill the purpose of identifying and assessing the inhibiting factors affecting PPP by soliciting an expert opinion from both public and private sectors on the effects of these inhibiting factors in the successful development and delivery of infrastructure facilities in Nigeria.

AIM AND OBJECTIVES OF THE STUDY

This research paper is aimed at identifying the inhibiting factors affecting PPP implementation while the objectives include;

- Assessing both the public and private sector's responsibilities in the provision of PPP enabling environment, project preparation process and management in relation to Lean Technology.
- To examine the effectiveness and impact of bankable feasibility study of infrastructure development; and
- To evaluate both the public and private sector's opinion on the effectiveness of conceptual PPP framework in the area of risk allocation and management.

RESEARCH METHODOLOGY

In order to achieve the aim and objectives of the study, a questionnaire was developed and administered on both the public and private investors so as to obtain expert opinion on the overall effectiveness and efficiency of conceptual PPP framework by assessing the impact of the framework on infrastructure development and delivery. The valid questionnaires were quantified and ranked using Relative Importance Index (RII) method while the remedial and control measures of the inhibiting stands at 60%. Table 1 depicts the questionnaire distribution within the study area while the valid questionnaires are depicted in table 2.

Table 1: Questionnaire Distribution within the Study Area

Distribution within State	Number Distributed	Percentage Distributed
Abuja (FCT)	20	36%
Kogi State	11	20%
Nassarawa State	7	13%
Niger State	6	11%
Plateau State	5	9%
Kwara State	6	11%
Total	**55**	**100%**

Table 2: Valid Questionnaires from Respondents

Respondents	FCT	Kogi	Nasarawa	Niger	Plateau	Kwara	Total
Public Agencies-MDAs	6	2	2	1	1	1	13
Concessionaires	4	2	2	1	1	1	11
Banks-Lenders/Sponsors	2	1	-	1	1	1	6
Architects	1	-	-	-	-	-	1
Engineers	2	2	1	1	1	-	7
Quantity Surveyors	2	2	1	-	1	1	7
Total	**17**	**9**	**6**	**4**	**5**	**4**	**45**

RELATIVE IMPORTANCE INDEX (RII)

The Relative Importance Index (RII) is a method used in identifying relative importance of each factors and parameters included in a survey. This tool is widely accepted for the identification and ranking of factors in research work. It is also employed by experts and organizations for the identification of priority factors in a survey.

Data collected are processed in tabular form and the sum of weights of each identified factor is divided by product of highest point of 5 in the case of this study and number of participating respondents in the survey.

In this study, a five-point Larker Scale was adopted as follows:

- Not Significant 1
- Slightly Significant 2
- Significant 3
- Very Significant 4
- Highly Significant

$$RII = \frac{\sum W}{A*N} (0 \leq RII \leq 1) \quad \ldots\ldots\ldots\ldots 1$$

where W = weights ranked each factor by the respondents which ranges between 1 and 5 where '1' is poor and '5' is excellent.
A = highest weight (i.e. 5 in this case), and N = total number of respondents.

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DATA COLLECTION AND ANALYSIS

The study employed a convenience sampling method in selecting 55 respondents who have at one time or the other been involved in PPP transaction for infrastructure development and also with little knowledge about Lean Construction. However, only 45 out of the 55 distributed questionnaires were found to be valid and suitable for analysis in the research work.

Questionnaire was administered on the selected respondents in the empirical survey. Every question in the questionnaire were ranked or rated by the respondents to give their expert opinion in the range between 1-5 points. The data collected were subsequently analyzed with RII. Table 3 depicted the analysis of the collected data in the study. See figure 1 for the graphic representation of the research findings.

TABLE 3: DATA COLLECTED AND ANALYSIS

Sr. No	Description	Scores					Total	R.I.I	Rank
		1	2	3	4	5			
1	Transparency & Corrupt Practices	1	5	7	12	20	180	0.8	4
2	Institutional Structure	0	2	8	5	30	198	0.88	1
3	Legal and Regulatory Structure	0	0	9	12	23	190	0.84	2
4	Access to Finance	1	3	15	18	8	164	0.73	5
5	Experience and Cross-Functional Team	0	2	8	16	19	187	0.83	3
6	Local Industry Development	1	13	21	6	4	134	0.6	12
7	Communication and Information	0	15	18	8	4	136	0.6	10
8	Leveraging Preparation Facilities	1	22	17	2	3	119	0.53	20
9	High level Leadership	3	17	12	9	4	129	0.57	15
10	Commercial Viability	10	12	8	7	8	126	0.56	16
11	Clear Governance Structure	5	6	10	12	12	155	0.69	6
12	Proactive Stakeholders Engagement	11	12	16	3	3	110	0.49	22
13	Bankability Test	10	13	9	7	6	121	0.54	18
14	Risk Identification and Allocation	0	23	8	8	6	132	0.59	14
15	Securing Preparation Fund	2	12	11	12	8	147	0.65	7
16	Quality Regulation	1	18	22	3	1	120	0.53	19
17	Adequate Regulation	21	11	4	6	4	99	0.44	24
18	Defined Project Output	11	12	9	8	5	119	0.53	20
19	Life-cycle Contract Models	8	22	11	3	1	102	0.45	23
20	Intervention Options for Dispute Resolution	2	15	13	11	4	135	0.6	11
21	Project Management Techniques	2	10	16	8	9	147	0.65	7
22	Demand Forecasting	3	11	15	9	7	141	0.63	9
23	Competitive Bidding Process	5	13	17	9	1	123	0.55	17
24	Legal and Environmental Impact	3	17	11	7	7	133	0.59	13

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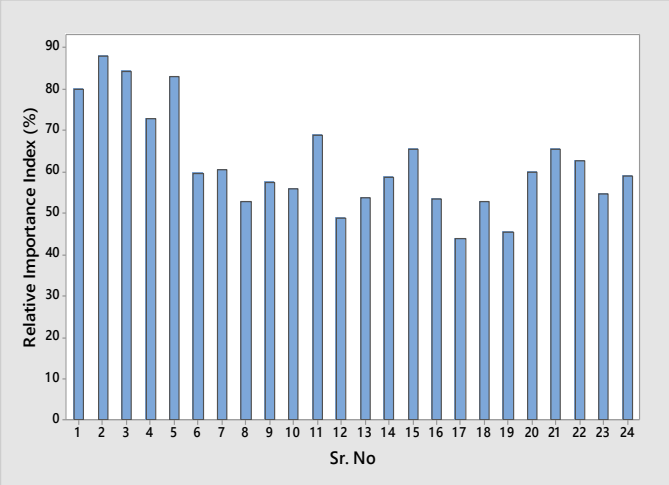

FIGURE 1: GRAPHICAL ILLUSTRATION OF ANALYZED RII

CONCLUSSION

This research paper analyzed the different perceptions and or opinions of both the private and public sectors on the effects of the inhibiting factors affecting PPP models in infrastructure development as identified through Lean Construction Technology tool. Relative Importance Index was employed in determining the weight of each identified inhibiting factors impact on the effectiveness of Public-Private Partnership framework for infrastructure development. The findings of the research revealed that the major four inhibiting factors that impacted heavily on the successful implementation of PPP model includes; institutional structure, legal and regulatory structure, in-experience and cross-functional team followed by the effect of corrupt practice and transparency in PPP transaction. The research also conducted a complete review of public sector's responsibilities in the provision of an enabling environment which involve adequate legal regulatory and institutional structures. The research therefore recommends that a sustainable PPP project preparation process and management strategy be put in place in the areas of experience and cross-functional team, high level leadership, project management techniques and planning.

REFERENCES

[1] Adamu, M., Lowe, J. & Manase, D. "Public-Private Financed Road Infrastructure Development in north-central region of Nigeria" Journal of Management and Sustainability, 5(4), pp.58-67. 2015

[2] Adamu, M. "Infrastructure Development: A Public-Private Partnership Option in the Attainment of Value for Money, Journal of Mechanical and Civil Engineering, 13(2) pp. 05-13. 2016

[3] Sanyal, A.P. & Bhattacharya, S.P. "Lean Production Theory and Its Application in Construction Industry", AISECT University Journal, 2014.

[4] Abhigna, D. Maharshi, S. "Value Stream Mapping as a Lean Construction Tool- A Case Study", IJERT Vol.3, Issue 12, 2014.

[5] Ballard G. "Lean Project Delivery Sytem", LCI White Paper-8, Lean Construction Institute, 2000.

[6] Dhivyamenaga T. 'Study on Application of Lean Construction - Quality Rating Model to Construction Companies', International Journal of Advanced Research in Civil, Structural, Environmental and Infrastructure Engineering and Developing Volume 1, 2014.

[7] Koskela L, 'Lean production in construction', Technical Research Centre of Finland, Laboratory for Urban Planning and Building Design.

[8] Regan, M. & Smith, J. "Infrastructure Procurement: Learning from Private-Public Partnership Experiences (Down Under)". Journal of Environment and Planning, 29, pp.363-378. 2011.

[9] Regan, M., Smith, J. & Love, E.D. "Project Finance for Public-Private Partnerships: Evidence from Australia" Proceedings of the 2ne International Conference on Public-Private Partnerships, Austin, Texas, U.S.A. 2015.

[10] Terry, A. & Smith, S. "Build Lean: Transforming Construction using Lean Thinking" London: CIRIA, 2011.