

Enablers of Innovation Implementation within Quantity Surveying Firms in Nigeria

Ajayi A.A., Alimi W.O.

Abstract— Innovation has received significant attention in the last few years in both practice and academia. Implementation of innovation has proven to have delivered quality, product functionality, and productivity improvements in construction project delivery. Yet innovation implementation at the corporate level is low, such as within the quantity surveying firms (QSFs) in Nigeria. Hence, this study assessed the important key enablers of implementing innovation within QSFs in Lagos and Abuja, Nigeria. An explanatory research design was adopted to achieve the set objective. A comprehensive literature review was done to highlight the relevant enablers of innovation implementation. 120 and 78 questionnaires were sent out to QSFs duly registered with the Quantity Surveyors Registration Board of Nigeria (QSRBN) in Lagos and Abuja respectively. From the questionnaires administered, 96 and 59 questionnaires from Lagos and Abuja respectively were returned and used for this study. Collected data were analysed using both descriptive and inferential analytic tools. The analysed data revealed that from the list of twenty (20) enablers identified, the important enabler that could promote innovation implementation was an effective rewarding structure (incentive to innovate). The findings also revealed that there is no statistical difference between the opinions of the QSFs in Lagos and Abuja. This study implies that implementing innovation could be enabled by understanding the set of identified factors by QSFs for performance improvement of the industry.

Index Terms— Innovation, innovation implementation, quantity surveying firms, enablers, Nigerian construction industry.

I. INTRODUCTION

Construction organisations in the industry are still faced with problems related to poor performance (Niazi & Painting, 2017; Adeleke *et al.*, 2017), which is exhibited by low productivity, quality, and product functionality. According to Newton & Chileshe (2012), “inherent fragmentation, lowliness to implement new ideas and technologies” have been hydra-headed monsters disconcerting the industry for a while. For this problem, organisations are investing heavily in solving, changing, or improving the industry’s predicaments through innovation implementation. Innovation concept has been widely suggested to be a way out of the identified conundrums and possibly improve the level of professionalism in the industry (Pries & Janszen, 1995; Vakola & Rezqui, 2000; Yusof *et al.*, 2017). The concept is gaining momentum as a

device to improve the industry’s poor performance. According to the Organisation of Economic Cooperation and Development, OECD (2005), innovation is taken to be “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.” Innovation has been given the recognition of being a key source of advantage and its importance has been realised in many spheres of life. In all human endeavours, innovation has become a great tool to attain giant strides (Fernando *et al.*, 2019). This ‘new way of thinking’, is now one of the critical driving forces for improving business success and performance (Gambatese & Hollowell, 2011; Ozorhon *et al.*, 2016). Innovation drives productivity (Owusu-Manu *et al.*, 2017) and it is regarded as an important element to succeed in this modern society (Benmansour & Hogg, 2002). The concept has been treated as important like another tangible resource. Hence, many organisations are exploring the implementation of innovation field to improve and sustain their competitiveness, profitability, and getting an edge over their rivals in terms of creating market.

While, innovation implementation has been increasingly conceived as an important solution to problems of poor performance and low productivity, the uptake of this concept in Nigerian QSFs has been limited to date (Hamma-adama *et al.*, 2018; Peter *et al.*, 2019). A typical QSFs in Nigeria possesses all the features of small construction knowledge-intensive professional service firms (SCKIPSFs) described by Lu & Sexton (2006). QSFs predominantly consist of small and medium firms owned by professional individuals or partners. In the construction industry, small firms are supposed to be important agents of innovation. Interestingly, QSFs lack that explicit focus on innovation (Nwosu-Manu *et al.*, 2017). This is against the backdrop that firms of this nature should ‘be increasingly innovative’ (Benmansour & Hogg, 2002). Hence, the implementation of the innovation concept remains underexplored conceptually and practically. Thus, this could fuel the belief that the innovation concept is also one of the ‘buzzwords’ that is hard to crack in consultancy services such as QSFs. The main objective of this study is to assess various enablers of extensively implementing innovation to improve the performance of QSFs in the Nigerian construction industry. To address this knowledge gap, this study assessed the existing literature on innovation and carried out a questionnaire-based study for finding the key enablers of successful innovation implementation.

Ajayi A.A., Department of Quantity Surveying, Bells University of Technology, Ota, Nigeria

Alimi W.O., Department of Quantity Surveying, Bells University of Technology, Ota, Nigeria

II. LITERATURE REVIEW

In this section, the study explores innovation implementation development in brief and enablers of innovation implementation identified in selected peer-reviewed.

A. Innovation Development

The unification and corporation of different stakeholders, be it: research institutions; firms; governments; financial institutions; clients/customers; etc., to advance the process of collective learning is called innovation (van Mierlo *et al.*, 2010). According to Rogers (2003, p.12), "...if an idea [be it object/project/product, service, process, practice, or knowledge] is 'objectively' new to the individual, is an innovation', practice, or project that is perceived as new by an individual or other unit of adoption". The concept of innovation has garnered many definitions over the years. However, for consistency sake, this study adopted the definition given by Slaughter (1998), which described innovation to "include both the generation of a new product, process, or system and its implementation". Innovation could be introduced to the global market environment through a typical business path for usage or commercial purpose (Hardie *et al.*, 2005).

Many studies arguably suggest that innovation could be a panacea to a plethora of problems that bedevilled the construction industry (Ling *et al.*, 2007; Ozorhon *et al.*, 2016; Slaughter, 2010). As pointed out by Ozorhon & Oral (2017), implementing innovation at organization levels could better innovation policy, corporate social responsibility, leadership, technology/design trends, reward schemes, firm performance, etc. Among others, in Ghana, Owusu-Mann *et al.* (2017) evaluated the level of QSFs practices of innovation using the diffusion of innovation theory postulated by Rogers. The outcome of this study was that the firms were at an early stage of adoption of innovation. Peter *et al.* (2019) conducted also a quantitative study to assess the status quo of innovation in QSFs in Nigeria. The study concluded that the level of engagement of innovation was not encouraging and this is hindered by some constraints in which finance is the main issue. Owing to the harsh and constantly changing business environment, firms are advised to continually innovate (Owusu-Mann *et al.*, 2015) since the benefits are obvious. Although, the study of Berrett & Sexton (2006) thinks that the 'appropriate innovation' is beneficial, not just any innovation.

Since this study is limited to organisational innovations, it will be worthwhile, to state that the processes and procedures, and routines for undertaking the practice of the QS profession need digitization. Practically, most duties of the profession will be transformed digitally to help improve the use of scarce-earned resources and better performance outcomes (Reddy, 2015). For example, the migration of quantity surveying firms to a Building Information Modelling (BIM) platform could be seen as a radical innovation. The BIM revolution can change the conventional process of measuring and estimating construction works (Olatunji *et al.*, 2010). It changes the types and processes of information preparation and as well methods of retrieving information in the industry. Furtherance of innovativeness in QSFs is the renewal of the human resources management, in-firm management

information system, organisation structure, etc., to aid organisational practices for better performance. With various kinds of benefits accruable to innovation implementation, smooth and successful implementation of innovation in QSFs could be enabled.

B. Enablers of Innovation Implementation

Enabling factors affecting the implementation of innovation abound in extant literature. A comprehensive and extensive systematic literature review was carried out and the result generated the list of identified twenty (20) variables responsible for the enablement of implementing innovation. Although owing to space limitation, only the summarized list of identified enablers of innovation implementation in organisations, relevant studies/authors, and frequency of occurrence of variables were given in Table 1.

Table 1: Literature on enablers of the implementation of innovation

	Variables to innovation implementation	Authors	Freq.
1	Incentives to innovate (effective reward structure/scheme)	Gupta <i>et al.</i> (2018), Johnsson (2017), Orcutt & Alkadri (2009), Ozorhon <i>et al.</i> (2015), Slaughter (2010)	5
2	Innovation-related training of employees (education)	Gupta <i>et al.</i> (2018), Johnsson (2017), Ozorhon <i>et al.</i> (2015), Slaughter (2010), Lavikka <i>et al.</i> (2021)	5
3	Collaboration between department, suppliers, and customers)	Johnsson (2017), Ozorhon <i>et al.</i> (2015), Surprun & Stewart (2015), Lavikka <i>et al.</i> (2021)	4
4	Knowledge management	Gambatese & Hallowell (2011), Gupta <i>et al.</i> (2018), Johnsson (2017), Ozorhon <i>et al.</i> (2015)	4
5	Strong top management support	Abbasnejad <i>et al.</i> (2020), Gambatese & Hallowell (2011), Orcutt & Alkadri (2009),	3
6	Adequate innovation/research funding (economy)	Gupta <i>et al.</i> (2018), Johnsson (2017), Orcutt & Alkadri (2009)	3
7	Customer/user participation integration	Orcutt & Alkadri (2009), Ozorhon <i>et al.</i> (2014), Surprun & Stewart (2015)	3
8	Successful pilot project (awareness)	Johnsson (2017), Orcutt & Alkadri (2009),	2
9	Availability of skilled workforce (capabilities)	Gupta <i>et al.</i> (2018), Johnsson (2017)	2
10	Employee empowerment (autonomy, interdependence)	Gupta <i>et al.</i> (2018), Johnsson (2017)	2

11	Government policies to sustain innovation (regulations)	Gupta <i>et al.</i> (2018), Ryszko (2014)	2
12	Entrepreneurs traits (features of the doer that make things happens)	Gupta <i>et al.</i> (2018), Johnsson (2017)	2
13	Organisational/work environment (Climate)	Gambatese & Hallowell (2011), Johnsson (2017)	2
14	Dedication (commitment)	Johnsson (2017), Ozorhon <i>et al.</i> (2015),	2
15	Adequate deployment support	Orcutt & Alkadri (2009)	1
16	Demonstrated innovation benefit	Orcutt & Alkadri (2009)	1
17	Clear innovation objectives	Orcutt & Alkadri (2009)	1
18	Availability of scientific manpower	Gupta <i>et al.</i> (2018)	1
19	Risk-taking capabilities	Gupta <i>et al.</i> (2018)	1
20	Resources for innovation	Gupta <i>et al.</i> (2018)	1

requires head offices of QSFs to provide information. In addition, as noted in Adeleke *et al.* (2017), Lagos and Abuja are the hearts of construction work in Nigeria.

The targeted respondents in these QSFs were principal partners, partners, or senior quantity surveyors in the firms. These top management cadres were believed to be the best fit in providing relevant reliable information required for this study. The respondents were asked to rate the level of agreement with each enabler of innovation implementation applying the common five-point Likert scale of 5 – 1. Where the number value 5 represented Strongly Agree while 1 represented Strongly Disagree. This was used to calculate the mean score for each variable ranked by the respondents. Many researchers in the construction industry have used this process (Gambatese & Hallowell, 2011; Osunsanwo & Dada, 2019). For now, 120 and 78 QSFs are currently practising in Lagos State and Abuja respectively. Hence, a total of 198 QSFs served as the sampling frame for this study. But due to the manageable size of these 198 QSFs, the questionnaire designed was administered to all sampled QSFs. This implied that a census survey was adopted.

The questionnaire was pretested and reworded for clarity and relevance through a pilot study, based on feedback through quantity surveyor experts’ opinions from academics and practice before delivering to the chosen sampled respondents. The questionnaire was divided into sections. Section A records the general characteristics of the respondent firm, such, as total turnover, type of work provided by the respondent company, year of experience, membership of the professional body, and position in the organisation. While Section B has to do with the specific objective of the study, which identified the key enablers that facilitate the process of implementing innovations within QSFs in Lagos State and Abuja, Nigeria. The questionnaires were administered and completed under the supervision of the researchers involved in this study. This reduced non-response and allowed for great flexibility.

For research findings to yield reliable conclusions, it is expected that the constructs and variables emanated from literature be subjected to further analysis. For this reason, the identified variables in the questionnaire were first, tested for consistency and accuracy by applying Cronbach’s alpha model using SPSS. This is suitable for the measuring instrument used here (Bolarinwa, 2015). The overall Cronbach’s alpha test indicated 0.789 for enabler variables. This value is greater than the minimum coefficient considered to be suitable (Bolarinwa, 2015; Tavakol & Dennick, 2011).

After asserting the internal reliability and consistency of the data collected, descriptive analysis was done for the study. Hence, the Mean Score (MS) of the level of agreement or disagreement of the respondent’s choice of enabler influencing innovation implementation was measured. In obtaining the MS, the relevant enabler of innovation implementation identified from literature was rated by the respondents using the Likert scale as early discussed. The MS has ranked accordingly and this helped in cross-comparing the enablers. The Likert scale was converted into the MS for each of the variables. The MSs (ranging between 1.0-5.0) for the two groups of respondents (i.e. QSFs in Abuja and Lagos State) were determined using statistical packages for the social sciences (SPSS) version 26 software (IBM, 2020).

Although, over the years, commendable efforts have been seen in the industry towards improving the implementation level of innovation (Slaughter, 1998; Barrett *et al.*, 2008; Wolstenholme, 2009). For instance, the problems on human resources (Farmer, 2016) and commercial difficulties (Pinney *et al.*, 2017) are observed to still very much around. These require a lot more effort if the industry is to catch up in innovation with other industries. For this to be a reality, some enablers of implementing innovation in QSFs need to be assessed.

In sum, innovation in QSFs is inevitable, but, its generation and implementation are often taken as a herculean task. One of the major knowledge gaps identified and dealt with by Ling *et al.* (2007) was factors affecting innovation benefits at the project level and from the clients’ perspective. Thus, this study identified and empirically tested the enablers of innovation implementation at the organisation level.

III. RESEARCH METHOD

The quantitative method was used because the study objectives centred on exploring in-depth knowledge of innovation implementation (Bryman & Bells, 2015) as related to QSFs. This study aims to examine the key enablers that play an important role in the implementation of innovation within QSFs and accordingly, data was collected through a questionnaire survey among the QSFs in Nigeria. Only QSFs registered with QSRBN and are on the current list of active firms were considered in this present study (QSRBN, 2020). The board is the only body recognised by the law of the country to register QSs. According to the Board’s directory, three hundred and thirty-eight (338) QSFs are currently active nationwide (QSRBN, 2020). However, the scope of this study was limited to Lagos and Abuja only. These two locations are believed to house a high considerable number of QSFs’ head offices. According to Adegbenbo *et al.* (2015), Lagos and Abuja are suitable for a study that

Following the route suggested by Johns (2010), variables with MSs greater than or equal to (\geq) 3.00 range of Likert scale used are the most important variables. Hence, using Likert’s scale 1-5, any enablers of innovation implementation with MSs \geq 2.50 are current within QSFs in Nigeria. In addition, the overall weighted average (WA) MSs of the two groups of respondents were determined using the formulated stated by Chan and Kumaraswamy (1996). The enabler variables with WA greater than 3.00 were considered the most important factors in this study. Also, the study tested for agreement in the opinions of respondents from Abuja and Lagos. A commonly used Pearson’s correlation technique was employed to determine if there exists an agreement between the MSs of the respondent from two locations of the study area. This approach is common in the construction management literature (Chan & Kumaraswamy, 1996; Osunsanwo & Dada, 2019). The data were collected between the period of August 2018 to September 2019.

IV. MAIN DISCUSSION

In this section, the results of the survey were presented below for the objective of this study. The first part of the analysis in this study presented the background information

Table 2: Summary of respondent’s profile (Overall)

Work experience in years	Employee size		Educational qualification	
	Lagos & Abuja (Freq., %)	Lagos & Abuja (Freq., %)	Lagos & Abuja (Freq., %)	
0 - 5	21, 13.5	0 – 10	49, 31.6	Ph.D. 2, 1.3
5 -10	46, 29.7	10 – 20	51, 32.9	M.Sc. 58, 37.4
10 – 15	44, 28.4	20 – 30	30, 19.4	B.Sc. 48, 31.0
15 – 20	27, 17.4	30 – 40	13, 8.4	H.N.D 24, 27.7
Above 20	17, 11.0	Above 40	12, 7.7	N.D. 4, 2.6
Total	155, 100		155, 100	155, 100

A. Perceived Enablers of Innovation Implementation within QSFs in Nigeria

The identified enablers to innovation implementation were presented to the respondents in QSFs in Lagos and Abuja. The results of the statistical analysis are depicted in Table 3. Better knowledge of the enabling factors to extensive implementation of innovation within QSFs will help to promote innovative thinking in the construction industry. Understanding these factors from QSs perspective will go a long way in improving the work productivity of the cost experts in the industry

The results (see Table 3) of the surveyed contact persons in QSFs towards the enablers of innovation implementation, ranked according to their MS values. This approach is in tune with methods adopted by other studies in construction management studies (Ajayi *et al.*, 2019; Osunsanwo & Dada, 2019). Table 3 displayed the identified 20 enablers of implementing innovation within QSFs in the Nigerian construction industry, as ranked by the contact persons. The overall WA mean scores for each of the enabling factors range between 2.84 – 4.02. Most of the identified enabling variables had WA of MSs greater than 3.00 except for three variables such as: ‘availability of scientific manpower’, ‘entrepreneurs traits’; and ‘collaboration between department, suppliers and customers’ which had WA of MSs

of respondents, while the second part presented the ranking of innovation implementation enablers in the order of perceived importance to QSFs. Of the 120 questionnaires administered to QSFs in Lagos, 96 were returned duly completed. Similarly, from the 78 questionnaires sent to QSFs in Abuja, 59 were completed. These represented response rates of 80% and 76% for QSFs in Lagos and Abuja respectively. In all, 155 copies of the questionnaire were obtained and used for the analysis in this study. From Table 2, the descriptive analysis indicated that almost half (50%) of individual respondents had between 0-10years of work experience in both Lagos and Abuja. In terms of educational qualifications, over 70% of the respondents in both Lagos and Abuja had not less than a Baa bachelor’s degree, while the remaining less than 30% had Diplomas. In addition, the majority (approximately 65%) of the respondents from both locations indicated that their firms had less than or equal to 20 employees. Considering the demographic characteristics of the respondents involved, it guaranteed the good quality and reliability of the findings and conclusion emanated from this study

of 2.84, 2.98, and 2.99 respectively. The WA of the MSs of the topmost four important factors was discussed as follows:

“Incentive to innovate” was unanimously ranked first by respondents in QSFs in Lagos and Abuja with WA of MSs being 4.0. Generally, organisations largely depend on employees (i.e. quantity surveyors) and these employees contribute to the development and success of the organisations’ ideas. These employees are strongly believed to be innovative individuals (Owusu-Manu *et al.*, 2018). Coming together by these employees makes them a team. They innovate by executing innovative work for their organisations (Johnsson, 2017). Hence, these teams need to be adequately motivated to bring out a high level of innovation in them. The motivation could come in form of incentive. Although incentives may have a moderating effect on innovation (Chen *et al.*, 2012), they are largely in form of “financial and non-financial compensations” (Johnsson, 2017). In improving innovation implementation, (Orcult & AlKhadri (2009) suggested that innovator needs to be encouraged even if it is by reducing workload. Surprisingly, in the study of Gupta *et al.* (2018), an adequate rewarding scheme for innovation implementation was relegated to the background. It was among the factors with minimal significance (Gupta *et al.*, 2018). This could be that the prevailing features of project-based industries are peculiar to the construction industry alone. In addition, most of the QSFs

Table 3: Perceived enablers of innovation implementation from Qs point of view

Enabler	Lagos (n=96)			Abuja (n=59)			Overall (N=155)	
	MS	SD	Rank	MS	SD	Rank	Weighted Average MS	Rank
Incentives to innovate (effective reward structure/scheme)	4.04	1.187	1	3.98	1.106	1	4.02	1
Knowledge management	3.53	1.160	2	3.58	1.102	3	3.55	2
Organisational/work environment (Climate)	3.47	1.025	3	3.64	0.886	2	3.53	3
Adequate innovation/research funding (economy)	3.47	1.085	3	3.39	1.114	6	3.44	4
Employee empowerment (autonomy, interdependence)	3.34	1.045	6	3.56	0.987	4	3.42	5
Clear innovation objectives	3.39	1.200	5	3.42	1.177	5	3.40	6
Innovation-related training of employees (education)	3.28	1.053	7	3.36	1.030	7	3.31	7
Resources for innovation	3.18	1.196	8	3.32	1.121	8	3.23	8
Availability of skilled workforce (capabilities)	3.18	1.188	8	3.25	1.108	9	3.21	9
Dedication (commitment)	3.11	1.035	11	3.22	0.984	9	3.15	10
Demonstrated innovation benefit	3.10	1.195	12	3.22	1.052	11	3.15	10
Risk-taking capabilities	3.09	1.179	13	3.19	1.058	12	3.13	12
Adequate deployment support	3.14	1.228	10	3.02	1.252	16	3.09	13
Government policies to sustain innovation (regulations)	3.03	1.252	15	3.15	1.172	13	3.08	14
Successful pilot project (awareness)	3.01	1.051	17	3.14	1.008	14	3.06	15
Customer/user participation integration	3.02	1.345	16	3.08	1.304	15	3.04	16
Strong top management support	3.04	1.045	14	3.02	1.025	16	3.03	17
Collaboration between department, suppliers, and customers	2.98	1.076	19	3.00	0.983	18	2.99	18
Entrepreneurs traits (features of the doer that make things happens)	2.99	1.091	18	2.97	0.964	19	2.98	19
Availability of scientific manpower	2.83	1.149	20	2.85	1.172	20	2.84	20
Average	3.21			3.27			3.23	

in the part of the world are small and medium firms owned and run by a ‘one-man show’ in which employers take all.

The second-rated enabling factor influencing innovation implementation is “Knowledge management”, and this was captured by Gambatese & Hallowell (2011) as ‘*lesson learned*’ It was ranked second with WA of MSs of 3.55. Although, it was ranked 3rd (MS=3.58) by respondents in Abuja, while in Lagos was ranked 2nd (MS=3.53). This implied that Qs in Lagos gave more importance to that factor than their colleagues in Abuja. An important asset to any organisation aside from human resources is knowledge and information. When the development of the construction industry is in mind, the knowledge of human resources is significantly important. Grover & Froese (2016) and Osunsanwo & Dada (2019) opined that smart organisations will do all it takes in harnessing and re-using their employees’ wealth of knowledge in improving the organisation’s performance. Knowledge management had been emphatically reported in the extant literature as a strong enabler of innovation (Adegbenbo *et al.*, 2015; Gambatese & Hallowell, 2011). The practices of knowledge management gave strong importance to innovation implementation in this study. This finding corroborated that of Gambatese & Hallowell (2011) and Osunsanwo & Dada (2019) that knowledge management has a strong association with

innovation implementation. Gupta *et al.* (2018) suggested that leaders in organisations must “focus on a strong knowledge base” for technological advancement. No doubt, the QS profession is ‘knowledge intensive’ (Adegbenbo *et al.*, 2015).

An internal business process is a function of the “organisational/work environment” (Osunsanwo & Dada, 2019). In enhancing the innovative performance of QSFs, it was suggested that a conducive working environment should be created (Osunsanwo & Dada, 2019). Organisational/work environment was ranked overall third in this study.

The fourth top-ranked key enabler in this study is “adequate innovation/research funding”. Research into the development of innovative thinking, processes, or technologies had been tagged important tool (Gambatese & Hallowell, 2011). Hence, adequate funding of this research and development (R&D) in any firm needed to be wholesomely supported.

B. The Extent of Agreement on Enablers of Innovation Implementation between QSFs in Lagos and Abuja

In analysing the extent of agreement in the opinions of respondents in the scope of this study, that is quantity surveyors in consultancy firms in Lagos and Abuja, it was hypothesized that: the MSs of the enablers to innovation implementation of QSFs in Lagos would not be different from the MSs of their colleagues in Abuja.

Pearson's correlation analysis was adopted in testing the above-hypothesized statement. The result indicated a significant positive correlation of the MSs of the respondents from Lagos and Abuja ($r = 0.820, p \leq 0.01$). The MSs of the 20 enablers of innovation implementation of QSFs in Lagos and Abuja showed a strong positive correlation at the significance level of $p \leq 0.01$, hence, the acceptance of the null hypothesis. This finding suggested that, with regards to the enabling factors promoting innovation implementation, there exists no significant difference in the opinions of quantity surveyors in both Lagos and Abuja. This can be seen in the 'perfect' agreement in the ranking of the enablers such as 'incentives to innovate', 'clear innovation objectives', 'innovation-related training of employees', 'resources for innovation', and 'availability of scientific manpower. Importantly, there is no wide difference in the ranking of the MSs of these two groups of QSFs.

V. CONCLUSIONS AND RECOMMENDATION

The objective of this study was to assess the key enablers to innovation implementation within QSFs in Lagos and Abuja, Nigeria. Twenty enablers were identified assessed. The results emanated here showed that almost all of the identified factors were significant. The important conclusions arrived at are: firstly, QSFs need to put in place the necessary and good rewarding structure for their employees to be motivated to innovate and thus improve the performance of the firms. Secondly, using Pearson's correlation, there is no significant difference between the MSs of QSFs in the two study areas surveyed. This indicated the level of importance of the enablers of innovation implementation to the quantity surveyors in the study area is the same.

Although, the study achieved a considerable high response rate, however, the study only viewed the perception of QS professionals in Lagos and Abuja, which is not representing the whole QS professional workforce in Nigeria. For this reason, the generalisation of this study should be limited to its study scope. Notwithstanding, the study gave an insight into the perception of QSFs towards the enablers promoting the implementation of innovation in the Nigerian construction industry.

The main contribution to knowledge is the expansion of the current academic discussion about new applications and opportunities for innovation implementation. The importance of innovation implementation enablers within QSFs are stressed in this study. This implies that successfully implementing innovation within the firms could lay the appropriate foundation for required changes. This study focused on QSFs, which can be an interesting setting for innovation strategies: such as collecting project data; managing; and monitoring processes (Hardie *et al.*, 2005). Additionally, this study can provoke academic research on this topic to generate new knowledge about innovation performance results. For quantity surveyors and other professionals in the consultancy sector of the industry, this study will help in developing the necessary solutions to promote innovative practices to overcome the innovation inhibiting factors.

REFERENCES

- [1] Abbasnejad, B., Nepal, M.P., Ahankoob, A., Nasirian, A., & Drogemuller, R. (2020). Building Information Modelling (BIM) adoption and implementation enablers in AEC firms: a systematic literature review. *Architectural Engineering and Design Management*, (), 1–23. <http://doi.org/10.1080/17452007.2020.1793721>
- [2] Adegbembo, T.F., Awodele, O., & Ogunsemi, D.R. (2015). Assessment of knowledge management practices in quantity surveying firms in Lagos and Abuja, Nigeria. *Information and Knowledge Management*, 5(11), 11-19.
- [3] Adeleke, A.Q., Bahaudin, A.Y., Kamaruddeen, A.M., Ali-Khan, M.W., Yao, L., Sorooshian, S., Fernando, Y., Nawanir, G., & Salimon, M.G. (2017). The Influence of Organizational External Factors on Construction Risk Management in Nigerian Construction Companies. *Safety and Health at Work*, 9(1), 115-124. <https://doi.org/10.1016/j.shaw.2017.05.004>
- [4] Ajayi, A.A., Babalola, O. & Mafimidiwo, B. (2019). Construction project claim management process in Nigeria: Status, barriers, and impact. In: Babalola O., Olaleye, A., Folagbade, S.O., Oladokun, T.T. and Babafemi, A.J. (Eds) *Environmental Design and Management International Conference (EDMIC)*, Faculty of Environmental Design and Management, Obafemi Awolowo University, Ile-Ife, Nigeria on 20th -22nd May 2019.
- [5] Barrett, P., & Sexton, M. (2006). Innovation in Small, Project-Based Construction Firms. *British Journal of Management*, 17(4), 331–346. <http://doi.org/10.1111/j.1467-8551.2005.00461.x>
- [6] Barrett, P., Sexton, M. & Lee, A. (2008). *Innovation in Small Construction Firms*. London: Taylor and Francis
- [7] Benmansour, C. & Hogg, K. (2002). An investigation into the barriers to innovation and their relevance within the construction sector. In: Greenwood, D (Ed.), *18th Annual ARCOM Conference*, 2-4 September 2002, University of Northumbria. Association of Researchers in Construction Management, Vol. 2, 677-86.
- [8] Bolarinwa, O.A. (2015). Principles and methods of validity and reliability testing of questionnaires used in social and health science research. *Nigeria Postgraduates Medical Journal*, 22,195-201.
- [9] Bryman, A. & Bells, E. (2015). *Business research methods* 4th Edition, Oxford University Press, UK.
- [10] Chan, A.P.C., & Kumaraswamy, M.N. (1006). An evaluation of construction time performance in the building industry. *Building and Environment*, 31(6), 569-578.
- [11] Farmer, M. (2016). The farmer review of the UK construction labour model: Modernise or die. London: Construction Leadership Council.
- [12] Fernando, S., Panuwatwanich, K., & Thorpe, D. (2019). Analyzing client-led innovation enablers in Australian construction projects. *International Journal of Managing Projects in Business*, 13(2), 388-408. <http://doi.org/10.1108/IJMPB-08-2018-0150>
- [13] Gambatese, J.A., & Hallowell, M. (2011) Enabling and measuring innovation in the construction industry, *Construction Management and Economics*, 29(6), 553-567, <http://doi.org/10.1080/01446193.2011.570357>
- [14] Gupta, H., Barua, M.K., Gunasekaran, A. (2018). Modelling cause and effect relationship among enablers of innovation in SMEs. *Benchmarking: An International Journal*, 25(5), 1597-1622. <http://doi.org/10.1108/BIJ-03-2017-0050>
- [15] Grover, R. & Froese, T.M. (2016). Knowledge management in construction using a SocioBIM platform: a case study of AYO smart home project. *Procedia Engineering*, 145, 1283-1290.
- [16] Hamma-adama, M., Salman, H., & Kouider, T. (2018). Diffusion of innovations: The status of building information modelling Uptake in Nigeria. *Journal of Scientific Research and Reports*, 17(4), 1-12. <https://doi.org/10.9734/JSRR/2017/38711>
- [17] Hardie, M., Miller, G., Manley, K., & McFallan, S. (2005). The quantity surveyor's role in innovation generation, adoption, and diffusion in the Australian construction industry. QUT Research Week, Brisbane, Australia, 4-8 July.
- [18] Johns, R. (2010). Survey question bank: Methods fact sheet 1, Likert items and scales, University of Strathclyde.
- [19] Johnsson, M. (2017). Innovation enablers for innovation team – A review. *Journal of Innovation Management*, 5(3), 75-121.
- [20] Lavikka, R., Chauhan, K., Peltokorpi, A., & Seppanen, O. (2021). Value creation and capture in systemic innovation implementation: case of mechanical, electrical and plumbing prefabrication in the Finnish construction sector. *Construction Innovation*, 21(4), 837-856. <http://doi.org/10.1108/CI-05-2020-0070>
- [21] Ling, F. Y. Y., Hartmann, A., Kumaraswamy, M., & Dulaimi, M. (2007). Influences on Innovation Benefits during Implementation: Client's Perspective. *Journal of Construction Engineering and*

- Management*, 133(4), 306–315. [http://doi.org/10.1061/\(ASCE\)0733-9364\(2007\)133:4\(306\)](http://doi.org/10.1061/(ASCE)0733-9364(2007)133:4(306))
- [22] Lu, S. & Sexton, M. (2006) Innovation in small construction knowledge-intensive professional service firms: a case study of architectural practice. *Construction Management, and Economics*, 24(12), 1269–1282. <http://doi.org/10.1080/01446190600879109>
- [23] Niazi, G.A., & Painting, N. (2017). Significant Factors Causing Cost Overruns in the Construction Industry in Afghanistan. *Procedia Engineering*, 182, 510–517. <https://doi.org/10.1016/j.proeng.2017.03.145>
- [24] Newton, K. & Chileshe, N. (2012). Enablers and barriers of building information (BIM) within South Australian construction organisations. <https://bit.ly/2I9APL7>
- [25] OECD (Organization for Economic Co-operation and Development). (2005). *Oslo manual: Guidelines for collecting and interpreting innovation data*. Paris.
- [26] Osunsanwo, H.F., & Dada, J.O. (2019). Evaluating quantity surveying firms' performance: an application of balanced scorecard technique. *International Journal of Productivity and Performance Management*, 69(1), 134–152. <http://doi.org/10.1108/IJPPM-06-2018-0209>
- [27] Olatunji, A., & Sher, W. (2010). Building information modelling and quantity surveying practice. *Emirates Journal for Engineering Research*, 15(1), 67–70.
- [28] Orcutt, L.H. & AlKadri, M.Y. (2009) Barriers and Enablers of Innovation: A Pilot Survey of Transportation Professionals. Transportation Research Record.
- [29] Owusu-Manu, D.G., Antwi-Afari, P., Edwards D.J. (2018). Expanding understanding on attributes of innovation champions: firms and individual perspectives of professional quantity surveying firms. *American Journal of Civil Engineering*. 6(6), 178–184. <http://doi.org/10.11648/j.ajce.20180606.11>
- [30] Owusu-Manu, D., Torku, A., Pärn, E., Addy, M.N. & Edwards, D.J. (2017). An empirical assessment of innovation practices of quantity surveying firms in Ghana. *Journal of Construction Project Management and Innovation*, 7(1), 1843–1858.
- [31] Ozorhon, B., & Oral, K. (2017). Drivers of innovation in construction projects. *Journal of Construction Engineering and Management*, 143(4), 1–9. [http://doi.org/10.1061/\(ASCE\)CO.1943-7862.0001234](http://doi.org/10.1061/(ASCE)CO.1943-7862.0001234)
- [32] Ozorhon, B., Oral, K., & Demirkenen, S. (2016). *Investigating the Components of Innovation in Construction Projects*. *Journal of Management in Engineering*, 32(3), 04015052. [http://doi.org/10.1061/\(ASCE\)me.1943-04015052](http://doi.org/10.1061/(ASCE)me.1943-04015052)
- [33] Ozorhon, B., Abbott, C., & Aouad, G. (2014). Integration and Leadership as Enablers of Innovation in Construction: Case Study. *Journal of Management in Engineering*, 30(2), 256–263. [http://doi.org/10.1061/\(ASCE\)me.1943-5479.0000204](http://doi.org/10.1061/(ASCE)me.1943-5479.0000204)
- [34] Ozorhon, B., Oral, K., & Demirkenen, S. (2015). Investigating the Components of Innovation in Construction Projects. *Journal of Management in Engineering*, (), 04015052–. [http://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000419](http://doi.org/10.1061/(ASCE)ME.1943-5479.0000419)
- [35] Peter, O. O., Eze, E. C., & Anthony, A. A. (2019). Assessment of quantity surveying firms' process and product innovation drive in Nigeria. *SEISENSE Journal of Management*, 2(2), 22–38. <https://doi.org/10.33215/sjom.v2i2.111>
- [36] Pinney, R., Boothman, C. & Higham, A. (2017). Main Contractor Perspectives on The Drive for Increased Offsite Manufacture. In: H. Elkadi and L. Ruddock (Eds.) *Proceedings of the International Research Conference: Shaping Tomorrow's Built Environment*. 11–12 September, School of the Built Environment, University of Salford, 884–895.
- [37] Pries, F., & Janszen, F. (1995). Innovation in the construction industry: the dominant role of the environment. *Construction Management and Economics*, 13(1), 43–51. <http://doi.org/10.1080/01446199500000006>
- [38] QSRBN (Quantity Surveyors Registration Board) (2020). The directory of quantity surveyors registration board of Nigeria. <https://www.qsrbn.gov.ng/Members/firms.php?page=7> (accessed Nov. 2020).
- [39] Rogers, E.M. (2003). *Diffusion of innovations* 5th Edition. New York, Free Press.
- [40] Ryszko, A. (2014). Drivers and barriers to the implementation of eco-innovation in the steel and metal industry in Poland. METAL 2014: 23rd International Conference on Metallurgy and Materials. TANGER Ltd., Ostrava 2014. May 21st – 23rd 2014, Brno, Czech Republic, EU.
- [41] Slaughter, E.S. (1998). Models of construction innovation. *ASCE Journal of Construction Engineering and Management*, 124(3), 226–231.
- [42] Slaughter, E.S. (2010). Implementation of construction innovations. *Building Research & Information*, 28(1), 2–17. <http://doi.org/10.1080/096132100369055>
- [43] Suprun, E.V., & Stewart, R.A. (2015). Construction innovation diffusion in the Russian Federation. *Construction Innovation*, 15(3), 278–312. <http://doi.org/10.1108/CI-07-2014-0038>
- [44] Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- [45] Vakola, M., & Rezgui, Y. (2000). Organisational learning and innovation in the construction industry. *The Learning Organisation*, 7(4), 174–184. <http://doi.org/10.1080/09699470010342324>
- [46] van Mierlo, B., Leeuwis, C., Smits, R., & Woolthuis, R.K. (2010). Learning towards system innovation: Evaluating a systemic instrument. *Technological Forecasting & Social Change*, 77(2), 318–334. <http://doi.org/10.1016/j.techfore.2009.08.004>
- [47] Wolstenholme, A. (2009). Never waste a good Crisis: A review of progress since rethinking construction and thoughts for our future. London, Constructing Excellence.
- [48] Yusof, N., Lai, K.S., & Mustafa-Kamal, E. (2017). Characteristics of innovation orientations in construction companies. *Journal of Engineering, Design, and Technology*, 15(4), 436–455. <https://doi.org/10.1108/JEDT-06-2016-0037>