LEADERSOFTOMORROW

LEADERS OF TOMORROW: STATUS AND OUTLOOK OF BIM IMPLEMENTATION AMONG YOUNG QUANTITY SURVEYORS

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Studies on BIM have taken the front burner in the construction industry globally. However, studies have shown that the global south is behind in the adoption level. Most previous studies on BIM focused on varied populations as respondents in the global south. To this end, this study set out exclusively to investigate the BIM consciousness among young quantity surveyors (YQS). The data collection instrument was shared online on all young quantity surveyors forum (YQSF) platforms to gain access and administer the research instrument to all young quantity surveyors. The result revealed a high level of consciousness among the YQS. The popular BIM tool among respondents is Revit; other softwares are Naviswork, Tekla structure, Exactal CostX and Buildsoft cubit. However, respondents can only operate Revit, Navisworks and Mb3. If the current trend prevails, the future of the Quantity surveying profession in the digital age is promising. The study recommends a systematic introduction of BIM in the school curriculum adoption of BIM by QS firms, among others. Other stakeholders like the NIQS must intentionally support the young QS to be adequately prepared for the technological revolution currently being experienced in the construction industry globally.

Keywords: BIM consciousness, Building information modelling, Construction digitization, Quantity surveyors, Young quantity surveyors.

1 INTRODUCTION

Digitizing the construction process to achieve more innovative and effective construction is a trendy discussion in the construction industry. Stakeholders, irrespective of location, are striving to implement digitization tools to avoid being left behind in the fourth industrial revolution. The fourth industrial revolution (industry 4.0) consists of technologies, internet services and value chain organization. This includes cyber-physical systems, the Internet of Things (IoT), the Internet of Services (IoS), emerging technologies such as cloud technology, big data, predictive analysis, artificial intelligence, augmented reality, agile and collaborative robots, 3D printing, wearable technologies, BIM and additive manufacturing (Adekunle *et al.* 2021). Digitization is changing many industries, processes and products, and the construction industry is no exception (Aghimien *et al*. 2018). Thus, comprehensive adoption and implementation of digitization is imperative in the construction industry. The inherent potential in the construction industry can only be achieved

through digitization and not through the traditional approach (Gerbert *et al.* 2016) as it is currently mostly practiced.

However, studies have observed different levels of technology adoption across stakeholders and countries. Although, this is not surprising as the construction industry is regarded as a late adopter of technology (Gerbert *et al.* 2016). Nonetheless, varying response within the industry exists across professionals and countries. In Nigeria, BIM adoption in the construction industry is low (Hamma-adama *et al.* 2018). According to Alufohai (2012), Architects are the only professionals adopting some BIM tools; however, they use them majorly for aesthetic purposes. Erstwhile publications on BIM in the Nigerian construction industry mostly focused on awareness and adoption challenges (Olapade and Ekemode 2018, Adekunle *et al.* 2020). These studies focused on the entire industry, and there was no delineation in terms of demography and its relationship with BIM adoption.

Consequently, it is imperative to look at the prospects of the Nigerian construction industry beyond the present challenges but in terms of its young population. According to Smith (2014), the younger generations are more amenable to digital technologies while the older generations struggle with change. A study from the Center for Research and Education on Aging and Technology Enhancement (CREATE) by Czaja *et al.* (2006) posited that older adults were less likely than younger adults to use technology in general. A similar study carried out by Vaportzis *et al.* (2017) opined that the older generation is eager to adopt technology but apprehensive. The older generations are rigid and stiff to technological adoption as they find it challenging to learn, adjust and prefer sticking to the status quo. Thus, one of the major critical success factors for digitization in the construction industry is a vibrant younger population.

Although other studies have countered this perspective, of particular interest is a study to test the theory of planned behavior using demographic variables (gender and age) as the major variables conducted in Saudi Arabia. White Baker *et al.* (2007) carried out the study to investigate the effect of gender and age on the implementation of new technology in developing countries using Saudi Arabia as the case study. The study's result showed no significant effect of these factors on technological implementation. However, this was attributed to the prevalent strong deference to authority and desire for social conformity inherent in the Saudi Arabian society. However, another study by Aubert *et al.* (2005) opined that a technologically dynamic organization favors younger ones than older workers as the younger generations are more adaptable to technological changes and implementation. Meyer (2008a, 2008b) also supported this position when he opined that age distribution significantly affects the adoption of new technology. He opined a high propensity to adopt and introduce new technologies by firms with a young workforce. Thus, a young population is crucial to achieving a good technology adoption rate. In extension, having a technologically savvy and aware population is a pointer to a technologically encouraging future for any industry. Therefore, to determine the digitization adoption prospect of the Nigerian construction industry, an assessment of the awareness level of the young population is imperative. This study was embarked upon to investigate the BIM consciousness of young quantity surveyors in the Nigerian construction industry.

2 THE YOUNG QUANTITY SURVEYORS IN NIGERIA

The young quantity surveyors forum (YQSF) was established by an act of the quantity surveyors parent body, Nigerian Institute of Quantity Surveyors (NIQS) constitution of 2004 amended, March 2015 (NIQS 2015). The YQSF was established to encourage the active participation of students studying quantity surveying in Nigeria; also young QSs (graduates, probationers and corporate members below 35 years. In 2018, it had 693 probationer, 158 corporate and 155 student members.

3   RESEARCH METHOD

This study was embarked upon to investigate the BIM consciousness among the young quantity surveyors in Nigeria. This intends to understand the BIM awareness among young quantity surveyors and to project the technology adoption of the Nigerian construction industry using the young QSs. Primary data was sourced through a structured questionnaire designed and distributed to obtain responses from young quantity surveyors through online questionnaire platforms- Google Form. The online survey method was adopted because it is time-efficient, convenient (Chang and Vowles 2013, Regmi *et al.* 2016) and provides a centralized, well-monitored (Lai 2018) and organized data collection process. Furthermore, the online platform is instrumental in achieving a wider reach to all geopolitical zones of Nigeria. This helped the study to overcome the challenge of the inability to reach some respondents due to locations. The questionnaire was rigorously and consistently shared for four months, and constant reminders were sent to achieve a good response rate. To avoid multiple responses identified as one of the problems with an online survey (Regmi *et al.* 2016), the form was designed to accept one response per respondent. The link to the questionnaire was shared on all YQSF WhatsApp platforms. This arm of the parent body of Quantity surveyors in Nigeria (Nigerian Institute of Quantity surveyors) has the capability in terms of experience and exposure to respond to the questionnaire for this study.

A rule of the thumb for adequacy of sample size is set at 30 responses (Ott and Longnecker 2010). After cleaning up of received responses, thirty-four responses were fit for analysis. However, this is considered a low response rate considering the membership base of the YQSF. This reveals that respondent apathy exists among the respondents. This might also be attributed to the study area being a relatively new space in developing countries. Data collected was analyzed using SPSS to obtain the descriptive statistics (for demography) and calculate the mean and standard deviation. The mean is the average score, while the standard deviation shows the average variability of scores from the mean (Marczyk *et al.* 2005).

3.1   Respondent Information

For this study, respondents attended to the online questionnaire from different parts of Nigeria. Nine states were represented out of the 36 in the country, representing 25%. The states represent 4 out of the six geopolitical zones in the country. However, Lagos State has the highest number of respondents. This is not surprising as Lagos state is the commercial hub of Nigeria; besides, it houses many construction firms and other parastatals in the country. The respondents consist of 64% students and 36% practicing quantity surveyors; this consists of 60.6% student members, 21.3% probationer members, and 16.3% are corporate members of the Nigerian Institute of Quantity surveyors.

4   RESULTS

4.1   Source of BIM Awareness

The source of awareness by respondents varies significantly. Awareness in this context was defined as respondents "hearing or coming across the concept". Most respondents were aware of BIM from school and the internet. The least source of BIM awareness are seminar and workshops and the professional body (NIQS). This is consistent with the findings by Ahn and Kim (2016), where the main source of BIM awareness was the school.

4.2 BIM Consciousness Among Respondents

Table 1 reveals that respondents have heard about BIM, with a mean of 2.12; the result shows that young quantity surveyors know fully about BIM. A strong interest in learning more about BIM was observed. However, it is worth drawing attention to the indifference of respondents when asked to rate their level of BIM awareness. Although they have heard about BIM, the awareness level is perceived to be low. This can be due to the quality of the information they possess. It is also evident that the firms where respondents work does not support BIM; thus, many have not used BIM. This aligns with Alufohai (2012) position that the only trace of BIM in the Nigerian construction industry is the Architects. Many Quantity surveying firms are not prepared for BIM adoption and have never used it on projects. This is supported by the response rate (3.58) to the digitization of processes by Quantity surveying firms. Hence, Quantity surveying firms must start making the necessary decisions and adjustments required to adopt BIM. Meanwhile, the quantity surveying profession in the Nigerian construction industry is also well poised for fast technological advancement owing to its young, technology-ready and eager population. Harnessing this, digitization in the quantity surveying profession will experience an accelerated adoption rate.

Table 1. BIM consciousness level among YQSF.

Statements	Mean	Std. Dev
I have heard of BIM	2	1.392
I fully know what BIM is	2.12	1.166
I have an interest in BIM	1.88	1.083
Rate your BIM awareness level	2.45	1.003
Are you aware BIM tools can perform QS functions	2.61	1.391
I have adopted BIM before	4.06	1.345
The firm I work with supports BIM	3.33	1.339
My firm digitized all processes	3.58	1.119
I am BIM-ready	2.67	1.575
I have heard about industry foundation classes (IFC)	3.97	1.311
I know what IFC is	3.03	1.51
Clients are aware and request the use of BIM on projects	3.39	1.171

Table 2. BIM tools awareness.

BIM tools respondents are aware of	%
Buildsoft Cubit	3
e QS2	3
Exactal CostX	3
Exactal CostX; Revit; Buildsoft Cubit; Vico	3
Exactal CostX; Revit; Navisworks	6.1
Exactal CostX; Revit; Navisworks; Buildsoft Cubit	3
Exactal CostX; Revit; Navisworks; Tekla Structure (Manager); Buildsoft Cubit	3
Exactal CostX; Revit; Vector, QsCad, Mbelite, Mb3	3
Aware of None	15
Navisworks	3
QsCad	3
Revit	25
Revit; Buildsoft Cubit	3
Revit; Innovaya	3
Revit; Navisworks	9.1
Revit; Tekla Structure (Manager)	3
Revit; Tekla Structure (Manager); Buildsoft Cubit	6.1

To test the respondents' readiness, they were requested to identify different BIM tools they are aware of and can operate (Table 2 & 3). From the results, Revit is the most popular and most used software by respondents, followed by Naviswork. It is also encouraging that some respondents are aware of more than one BIM tool and can also operate more than one. Some are also learning Revit through self-improvement. Similar to previous studies (Kugbeadjor *et al.* 2015, Ahn and Kim 2016), Revit is the most widely known and adopted BIM tool. This might be attributed to being "easier-to-use" (Eastman *et al.* 2008). As opposed to the study by Akerele and Moses (2016), which found a low level of BIM awareness in the Nigerian construction industry, this study shows

that BIM awareness among young quantity surveyors is to the contrary. The awareness exhibited by respondents for this study is beyond the head knowledge but the practical knowledge of BIM tools. This study is useful in forecasting the prospects of any profession, firm or industry in adopting technology from the demographical distribution. However, a limitation of this study is the response rate compared to the registered members of the YQSF. Although this might be attributed to infrastructural challenges in accessing the questionnaire online and the relatively new stage of the subject matter in developing countries.

Table 3. Software respondents can operate.

Software	%
AutoCAD	3
e QS2	3
Exactal CostX	3
Mb3	6.1
Navisworks	3
None	51.5
Revit	21.2
Revit; Learning	3
Revit; Navisworks	9.1

5 CONCLUSIONS

The adoption of BIM is a critical discourse in the construction industry due to its inherent benefits for the construction industry. However, studies have not looked at adoption based on demographic variables. Demographic variables (age) have been reported in studies to impact technology adoption and implementation. Also, they can be used to forecast the technology adoption prospect of a firm or industry. This study investigated the BIM consciousness among young quantity surveyors in the Nigerian construction industry. This is to assess the prospect of BIM adoption in the construction industry by focusing on quantity surveyors. The results from the study suggest that respondents are BIM-ready, aware of BIM and can operate some BIM tools. Furthermore, the study identified the BIM tools which are prominently known and learnt among young quantity surveyors. However, results suggest that the BIM adoption at the industry and firm-level is low. Also, the respondents' awareness is limited to BIM, but they possess a low IFC awareness level.

The study results reveal that the quantity surveying profession stands in good stead for fast technology adoption. This is due to the possession of an eager and technologically savvy young population. Secondly, the study shows that most of these young quantity surveyors achieved BIM awareness from the internet, school, colleagues, and personal development. However, these efforts require support from the older generation making up the parent quantity surveying association (NIQS) and the firms these young quantity surveyors practice. There is an urgent need to digitise processes by quantity surveying firms and orient the clients in terms of BIM advantages. Also, there is a need to introduce BIM in the school curriculum so graduates can be adequately prepared for the industry. Furthermore, the study provides an insight for BIM software manufacturers to assess how their products fair in developing countries. Implementing BIM workflow in quantity surveying firms in the Nigerian construction industry is a potential area for future research.

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