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AN EMPIRICAL ASSESSMENT OF INNOVATION PRACTICES OF QUANTITY SURVEYING FIRMS IN GHANA

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ABSTRACT

Innovation is ascertained to be a major driver of growth of the productivity of a firm. This has spurred the interest of many researchers to study and harness the adoption of innovation. Extant literature indicates that some professional services offered by the quantity surveying (QS) firms are not needed by the client, or may be outdated. Consequently, the QS firms have to develop the stamina to challenge the existing unnecessary and unwanted or outdated practices and implement innovative practices. What is more alarming is that the QS firms are rated to have a low disposition towards the adoption of innovation. This established context propelled the need for empirically assessing the innovation practices amongst the QS firms in Ghana. A quantitative research approach was employed for this study and a census sampling technique was adopted. A total of 43 questionnaires were administered to the entire population and 24 were retrieved. The current level of innovation practices amongst the Ghanaian QS firms was interpreted using Rogers' innovation diffusion theory. The results indicated that QS firms in Ghana are early adopters of process innovation, product/technological innovation and business system innovation. The study showed that QS firms adopt innovation practices in rendering their services and even though they do not initiate new ideas, they are the first to adopt the ideas initiated by the innovators. This study has drawn attention to the assessment of innovation practices and increasing the knowledge base of innovation practices in Ghanaian QS firms.

Keywords: Innovation, quantity surveying, process innovation, product/technology innovation, business system innovation, Ghana

1. INTRODUCTION

The revolution from the supply of product to offering specialised solutions to clients including services has been affirmed to be one of the contributing factors to success in the 21st century (Sandberg, 2003). Normann (2000) succinctly defined service as the rightful use of something or someone without necessarily having to own that thing or person. Consultancy services are executed by highly educated professionals who are experts in solving problems, making judgments and giving advice to people (Sandberg, 2003). Blayse and Manley (2004) described the construction industry as made up of manufacturing and services industries. Quantity surveying (QS), design and engineering are included in the services industry. This description is largely supported by extant literature. The clients, designers and contractors depend on the services rendered by the QS all the way through the project life cycle to accomplish the objectives of the project and also to discharge their contractual and technical obligations (Musa et al., 2010; Mukherjee, 2001; Reichstein et al., 2005). Masidah and Khairuddin (2005) studied the QS firms and identified that some of the professional services they render might be unnecessary and unwanted by the client, and the only way the QS profession can be attractive is to meet the expected standards of the client. Consequently, the QS firms have to develop the stamina to challenge the existing unnecessary and unwanted or outdated practices and implement innovative practices (Olatunji et al., 2010).

Furthermore, the environment within which the construction industry exists is periodically undergoing transformation, and the only means for a construction industry to survive in a complex and changing environment is through innovation (Ofori, 2012; Steele and Murray, 2004). It is not surprising, therefore, that many researchers have concentrated their attention on studies relating to innovation adoption (Seaden and Manseau, 2001; Beatty et al., 2001; Winch, 2003; Wang and Ahmed, 2004; Barrett et al., 2007; Knowles et al., 2008; Ozorho et al., 2010; Kamaruddeen et al., 2012). Furthermore, the diverse nature of the construction industry shows the different ways in which innovation practices exist (Ozorhon et al., 2010), and the hidden nature of most of the innovation practices that exist in the sector contributes to the complexity of its precise assessment and also wrong analysis (Barrett et al., 2007). Within the construction industry, most researchers have limited their focus to the contracting firms while most of the innovation-rich firms (including QS) are not included in the assessment of innovation and are also not part of the standard construction industry innovation classification (Seaden and Manseau, 2001; Winch, 2003; Barrett et al., 2007). Moreover, the visibility of

the work of the QS is not appreciated by participants in the industry who are not directly affected, even though it contributes largely to the success of a project more than the other team players (Hardie et al., 2005).

The Ghanaian construction industry operators are rated to have a low disposition towards the adoption of innovative (new techniques/ideas) changes (Adow et al., 2013). According to Toole et al., (2010), the need for innovation in the construction industry has been undermined, whereas, innovation is well embraced by large engineering-procurement-construction. Studies on innovations within the construction industry have been few. Owusu-Manu et al. (2015) explored the determinants of management innovations among the Ghanaian construction consultants. Their study showed that community and market demands were a major driver of innovations. Ashiboe-Mensah (2012) also studied how and why certain selected innovations are adopted or rejected in the Ghanaian building industry. Their study primarily looked at three selected materials and what influence their adoption has in the wider Ghanaian building industry. However, the level of innovation practices amongst QS firms in Ghana is noticeably missing from literature. Anecdotal evidence also seems to support the view that QS firms are not innovative enough. This research was therefore carried out with the aim of empirically assessing the innovation practices amongst the construction industry consultants with particular focus on QS firms in Ghana.

2. LITERATURE REVIEW

2.1 Theoretical background

Various definitions for innovation exist; for instance, a definition by Tether and Howells (2007) which is relevant to all practices in the economy, including the services industry, postulates that innovation is successful utilization of new ideas or "…an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (Rogers, 2003: 12). In relation to the construction industry, Toole (1998) posited that innovation is the usage of new technology by an organisation to substantially decrease the installation cost of a living space but increase the installed performance and improve the business process.

2.1.1 Rogers' innovation diffusion theory

Rogers (2003: 221) defined the rate of adoption as "…the relative speed with which an innovation is adopted by members of a social system". The rate at which a construction industry will respond to change, that is adoption or rejection, has principal implications for

the progress, advancement and, most importantly, the survival of that industry. Therefore the internal dynamic of a construction industry must be such that it can easily respond to changes (Steele and Murray, 2004). Rogers (2003) classified members of a social system (organisation) on the basis of which an individual is relatively earlier in adopting new ideas than other members of an organisation. This classification includes innovators, early adopters, early majority, late majority, and laggards. Figure 1 illustrates the distribution of the various adopters.

Innovators are keen on experiencing new ideas (Rogers, 2003); they initiate new ideas by introducing innovation from outside the social system (Steele and Murray, 2004). The early adopters have the highest degree of opinion leadership in most social systems; potential adopters get information and advice about the innovation from them (Steele and Murray, 2004). The early majority hardly have a leadership role but they have effective interaction with other members of the social system (Rogers, 2003). The late majority wait for most of their colleagues to adopt the innovation before they feel safe to adopt (Rogers, 2003). The laggards are the last members to adopt because they desire to maintain their status quo and operate according to tradition; they only interact with other laggards in the social system (Steele and Murray, 2004). The current study adopted Rogers' classification of the rate of adoption of innovation in its analysis.

The adoption of Rogers' innovation diffusion theory to innovation practices is validated by the work of other researchers. Fell (1998) adopted Rogers' theory to measure innovativeness in single-family homebuilders in California, Oregon and Washington. In addition, Less (2003) applied Rogers' innovation diffusion theory to investigate faculty adoption of computer technology for instruction in the North Carolina Community College System. Furthermore, Moohammad et al. (2014) also used Rogers' innovation diffusion theory to assess consultancy services innovation practices in Nigeria.

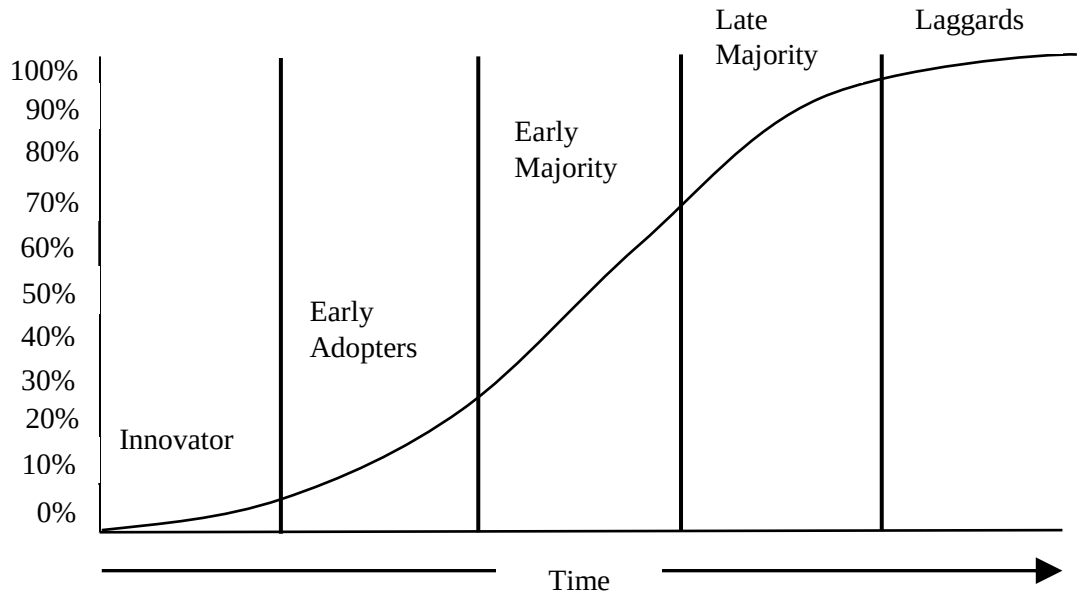

Figure 1: Adopter classification

Source: Rogers (2003)

2.2 Innovation dimensions adopted for the study

2.2.1 Process innovation

Process innovation is a central element in the main theories of innovation and despite its importance, academic research into process innovation is still in its infancy (Reichstein and Salter, 2006). Process innovation results in the enhancement of the production and management process in an organisation through the introduction of new production procedures, new management approaches and new technologies (Wang and Ahmed, 2004). Generally, process innovation is the introduction of new elements into an organisation's production or service operations. These elements include input materials, task specifications, work and information flow mechanisms, and equipment used to produce a product or render a service with the ultimate aim of achieving lower cost and higher product quality (Reichstein and Salter, 2006).

2.2.2 Product/Technological innovation

Product innovation has gained much attention because the success of a product and the sustainability of the success of a business, growth and expansion into new areas depend on product innovation (Wang and Ahmed, 2004). "Product innovation is defined as a new or (significantly) improved good or service" (Polder et al., 2010). Wang and Ahmed (2004)

defined product innovation as the originality and significance of new products introduced to the market at an appropriate time. The output of an organisation are products which can be tangible or intangible and technology is the "humanware", software and hardware that play key roles during the production and management processes of a company (Boer and During, 2000). Boer and During (2000) defined the "humanware" as the knowledge, experience and skills of people; methods and techniques as the software, and tools and equipment as the hardware needed by companies.

2.2.3 Business system innovation

Business innovation is broader in scope than the other dimensions of innovation (Sawhney et al., 2011). In spite of this, the business concept of innovation is neglected during the measurement of the overall innovation capacity of companies (Vilà and MacGregor, 2007). Sawhney et al. (2011) defined business innovation as the establishment of substantial or radical novel value for customers and the firm by creatively changing one or more of the current business systems or completely establishing novel business systems. Business innovation is only germane if it creates value for customers (new value, not new things) and if the customers are also willing to pay for it, thereby creating value for the firm (Sawhney et al., 2011). The business system inter alia includes offerings (products or services that are valued by customers), platform (using common components to create derivative offerings), customers (discover unmet customers), presence (channel of distribution adopted by a company to deliver offerings to the market or places where the customers can readily obtain these), network (a network that links the company and its products and services to the customers) and brand (the creative ways of communicating promise of a company to the customers) (Sawhney et al., 2011).

3. RESEARCH METHODOLOGY

The population for this study were registered QS firms in Accra and Kumasi. The list of registered QS firms in Ghana was obtained from the secretariat of the Ghana Institution of Surveyors. The list provided 46 registered QS firms in Ghana with their respective locations and contact details. The survey was limited to firms located in Accra and Kumasi because most of the construction activities are focused in these two cities (Ahadzie, 2007). Moreover, from the list, 84.8 per cent of the firms were located in Accra, 8.7 per cent were located in Kumasi and 6.5 per cent of the firms were located in other parts of the regions of Ghana. The

population for the study (QS firms in Accra and Kumasi) was finally determined to be 43. Census sampling technique was adopted for this study owing to the relatively small size of the study population (43 firms). Data was collected using a well-structured questionnaire with a five-point Likert scale ranging from (1) "Strongly disagree" to (5) "Strongly agree" to measure the response of each respondent. Firm innovativeness – process innovation, product/technological innovation and business system innovation – were measured using twenty-one-item instrument adopted from Knowles et al. (2008), Beatty et al. (2001), Wang and Ahmed (2004), and Kamaruddeen et al. (2012).

Out of the 43 questionnaires that were administered to top management at each quantity surveying firm, 24 were retrieved, representing a response rate of 55.81 per cent. According to Baruch (1999), a response rate of approximately 35 per cent is satisfactory for most academic studies targeting top management or organisations' representatives. This implies that the response rate obtained for this study (55.81%) is acceptable. Furthermore, the response rate achieved was compared with that of Owusu and Badu (2009) who recorded 53.7 per cent and Ahadzie (2007) who also achieved a response of 45 per cent, therefore justifying the adequacy of the response rate for this study. Respondents were asked to indicate the extent to which their firm adopts process, product/technological and business system innovation on a five-point Likert scale ranging from (1) "Strongly disagree" to (5) "Strongly agree". Alston and Miller (2002) and Moohammad et al. (2014) conducted a similar study and adopted Rogers' innovation diffusion theory to interpret the Likert scale as shown in Table 1.

Table 1: Likert scale interpretation

Likert scale interpretation and distribution of values			*Interpretation of Rogers' innovation adoption classification based on 5-point Likert scale*	
Likert scale	**Likert description**	**Value allocation**	**Value range allocation**	**Rogers' innovation adoption status**
1	Not at all	1.0-1.49	0.1-1.0	Laggard
2	Slightly true	1.5-2.49	1.1-2.0	Late majority
3	Moderately true	2.5-3.49	2.1-3.0	Early majority
4	Mostly true	3.5-4.49	3.1-4.0	Early adopters
5	Completely true	4.5-5.00	4.1-5.0	Innovators

Source: Alston and Miller (2002); Moohammad et al. (2014)

Cronbach's reliability test was conducted to ascertain the internal consistency of the items within the test. The Cronbach's alpha value ranges from 0 to 1 and the acceptable coefficients for the scale should meet or exceed 0.70 criteria for test reliability (Howland and Wedman, 2004). The result of the reliability test as shown in Table 2 depicts that the values of the Cronbach's alpha coefficient exceed 0.70, thus confirming the reliability of the measuring instrument. Furthermore, all items in each construst were subjected to the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy to verify whether the sample for this study is sufficient. A sample is adequate if the KMO value is greater than 0.5 (Field, 2005; Child, 1990). Also, as presented in Table 2, the KMO for each dimension was greater than 0.5, hence suggesting the adequacy of the sample size for this study.

4. FINDINGS AND DISCUSSION

According to Rogers' (2003) innovation diffusion theory adopter classification, the QS firms in the Ghanaian construction industry are early adopters of process, product/technological and business systems innovation practices. The mean score for QS firms' adoption of process innovation practices in Ghana is 3.625 as shown in Table 3. This correspond to the early adopters' classification based on the five-point Likert scale interpretation of Rogers' innovation adoption classification. Similarly, the mean score for QS firms' adoption of product/technological innovation practices in Ghana is 3.458 as shown in Table 4. This also corresponds to the early adopters' classification based on the five-point Likert scale interpretation of Rogers' innovation adoption classification. Lastly, the mean score for QS firms' adoption of business systems innovation practices in Ghana is 3.333 as shown in Table 5. This corresponds to the early adopters' classification based on the five-point Likert scale interpretation of Rogers' innovation adoption classification. The overall level of QS firms' innovation adoption in Ghana was determined to be early adopters with an overall mean score of 3.50 as shown in Table 6. Finally, it can be concluded that the QS firms in Ghana are early adopters of innovation practices in rendering services.

Table 2: Firm innovativeness construct, Cronbach's alpha reliability analysis and KMO tests

Construct	KMO	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted	Cronbach's alpha of components
Process innovation	.782					0.882
Our firm actively develops in-house solutions to improve our processes of rendering services.		18.13	15.505	.597	.877	
Our firm sees creating new processes of rendering services as critical to our success.		18.33	14.232	.710	.860	
When it comes to creating new processes, our firm is far better than the competition.		18.92	12.167	.876	.828	
Our firm tends to be an early adopter of new processes of rendering service.		19.21	14.694	.705	.862	
Our firm actively seeks new processes of rendering service from outside this organization.		19.17	12.493	.666	.873	
Within our firm, we are able to implement new processes of rendering service used by other organisations.		18.96	13.607	.672	.865	
Product/Technological innovation	.685					.810
Our firm actively develops new services in-house.		32.79	31.737	.477	.794	
Our firm sees creating new services as critical to our success.		32.42	29.297	.561	.784	
When it comes to creating new services, our firm is far better than the competition.		33.13	32.810	.479	.795	
Our firm tends to be an early adopter of new services.		33.04	29.172	.730	.766	
Within our firm, we are able to implement new services used by other organisations.		32.96	28.476	.713	.766	
Our firm actively seeks new services from outside this organisation.		32.83	32.928	.301	.815	
Our staffs are computer literate.		31.50	34.261	.576	.796	
Our firm actively develops in-house information technology solutions.		32.92	31.123	.513	.790	
Our firm is well computerised.		31.96	32.476	.415	.801	
Our firm encourages online service transactions.		33.08	31.645	.322	.818	
Business system innovation	.647					.816
Our firm sees creating new business systems as critical to our success.		12.83	10.145	.328	.856	
When it comes to creating new business systems, our firm is far better than the competition.		13.79	9.303	.685	.768	
Our firm tends to be an early adopter of new business systems.		13.92	8.688	.725	.750	
Within our firm, we are able to implement new business systems used by other organizations.		13.58	8.341	.618	.777	
Our firm actively seeks new business systems from outside this organisation.		13.54	6.868	.766	.727	

Table 3: Level of QS firms' process innovation practices

Likert scale	Likert description	Rogers' innovation adoption status	Value range allocation	Frequency	Percentage	Mean	Median	Mode	Std. deviation	Variance	Std. error of mean
1	Not at all	Laggard	0.1-1.0	-	-						
2	Slightly true	Late majority	1.1-2.0	2	8.3						
3	Moderately true	Early majority	2.1-3.0	8	33.3						
4	Mostly true	Early adopters	3.1-4.0	11	45.8	3.625	4.00	4	0.824	0.679	0.168
5	Completely true	Innovators	4.1-5.0	3	12.5						
	Total			24	100.0						

Table 4: Level of QS firms' product/technological innovation practices

Likert scale	Likert description	Rogers' innovation adoption status	Value range allocation	Frequency	Percentage	Mean	Median	Mode	Std. deviation	Variance	Std. error of mean
1	Not at all	Laggard	0.1-1.0	-	-						
2	Slightly true	Late majority	1.1-2.0	1	4.2						
3	Moderately true	Early majority	2.1-3.0	11	45.8						
4	Mostly true	Early adopters	3.1-4.0	12	50.0	3.458	3.50	4	0.588	0.346	0.120
5	Completely true	Innovators	4.1-5.0	-	-						
	Total			24	100.0						

Table 5: Level of QS firms' business system innovation practices

Likert scale	Likert description	Rogers' innovation adoption status	Value range allocation	Frequency	Percentage	Mean	Median	Mode	Std. deviation	Variance	Std. error of mean
1	Not at all	Laggard	0.1-1.0	-	-						
2	Slightly true	Late majority	1.1-2.0	4	16.7						
3	Moderately true	Early majority	2.1-3.0	8	33.3						
4	Mostly true	Early adopters	3.1-4.0	12	50.0	3.333	3.50	4	0.761	0.580	0.155
5	Completely true	Innovators	4.1-5.0	-	-						
	Total			24	100.0						

Table 6: Level of QS firms' overall innovation practices

Likert scale	Likert description	Rogers' innovation adoption status	Value range allocation	Frequency	Percentage	Mean	Median	Mode	Std. deviation	Variance	Std. error of mean
1	Not at all	Laggard	0.1-1.0	-	-						
2	Slightly true	Late majority	1.1-2.0	-	-						
3	Moderately true	Early majority	2.1-3.0	12	50.0						
4	Mostly true	Early adopters	3.1-4.0	12	50.0	3.50	3.50	3[a]	0.511	0.261	0.104
5	Completely true	Innovators	4.1-5.0	-	-						
	Total			24	100.0						

a. Multiple modes exist. The smallest value is shown

This result is consistent with other findings on innovation studies which adopted similar methods in other construction sectors. For instance, Fell (1998) adopted Rogers' theory (2003) to measure innovativeness in single-family homebuilders in California, Oregon and Washington. Also, Moohammad et al. (2014) recently studied the Nigerian construction industry's innovation practices and observed that they were adopters of process, and product/technological and business systems innovations. Further analysis of the results indicates a standard deviation less than 1.0 for process, and product/technological and business systems innovations (0.824, 0.588 and 0.761 respectively). Basically, a standard deviation less than 1.0 means that the values in the statistical data set are on average close to the mean of the data set. Therefore, there is little variability in the data used for this study. Additionally, it can also be interpreted that all the respondents have a common interpretation of the items measuring innovativeness. Also, the standard deviation for overall innovation practices is 0.511 which means in general that the responses retrieved are concentrated around the mean, implying the respondents have a common interpretation of the questions asked.

The results suggest that although the Ghanaian QS firms do not initiate new ideas, they are the first to adopt the ideas initiated by the innovators, and other potential adopters (other firms in the same social system) come to them for information and advice on the innovation. The results also suggest that QS firms generally practice the three dimensions of innovations in their consultancy services business operations. This means that they adopt process innovation (e.g. input materials, task specifications, work and information flow mechanisms and equipment used to render service), product/technological innovation (e.g. new or significantly improved good or service, "humanware", software and hardware) and business system innovation (e.g. market research, advertising, promotion, recognizing new market opportunities, branding, and networking) practices in their services. Studies by Ashiboe-Mensah (2012) point to the fact that the building industry is not new to innovation; however certain innovations are adopted whilst others are rejected.

Despite studies confirming that innovation does take place within consultancy firms, the rate at which they took place was unknown prior to the study (Owusu-Manu et al., 2015). With the current economic situation, firms need to constantly innovate and improve their firms' performance. This could largely account for why QS firms are able to adopt ideas initiated by

innovators. The wider construction industry also stands to benefit from new innovations as other potential adopters rely on QS firms to innovate. As the study shows that QS firms are not able to initiate their own ideas, this is rather worrying. This could be the explanation for the fact that the construction industry is still riddled with problems such as time and cost overruns. The quantity surveyor is the cost expert on the consultancy team and the ability of this professional to find innovate solutions to such problems remains critical.

5. CONCLUSION AND FURTHER RESEARCH

The study sought to establish the level of innovation practices adopted by QS firms in Ghana. From the response retrieved from top managements at various QS firms in Accra and Kumasi, it was concluded that the QS firms in Ghana are early adopters of innovation practices based on Rogers' (2003) adopter classification. The studies point to the fact that QS firms generally practise the three dimensions of innovations under the Rogers adopters' category in their consultancy services business operations. The early adopters as described by Rogers (2003) have the highest degree of opinion leadership in most social systems, and potential adopters obtain information and advice about the innovation from them. Future research could focus on developing a framework for analysing innovation adoption in Ghanaian QS firms and also identifying measures that could enhance innovation adoption in Ghanaian QS firms.

The reason and motivation for this study was due to the huge gap created by the argument raised by Seaden and Manseau (2001), namely that the QS firms have received less attention in the assessment of innovation in the construction industry and this argument was affirmed by Barrett et al. (2007). However, this study was conducted to address this gap in the Ghanaian QS firms. This study has drawn attention to the assessment of innovation practices and increasing the knowledge base of innovation practices, thereby ascertaining facts on the current level of innovation practices in Ghanaian QS firms. As QS firms do not initiate innovative ideas it is worthy of note that this inability needs serious attention. The socio-economic nature of the study context coupled with the peculiar challenges provides a huge basis for QS firms to initiate ideas that are pertinent to the particular environment. As the Ghanaian construction industry is constantly berated for cost and time overruns, the key role played by QS firms in developing tailor-made solutions for Ghana cannot be overemphasised. Having analysed the current adoption level of innovation of QS firms, the Ghana Institution of Surveyors can also initiate

innovative solutions for adoption by firms for the advancement of the QS profession. Furthermore, the study provides a watershed that the Ghanaian government can harness to formulate appropriate policy for construction sector implementation to achieve greater productivity that will ultimately engender the growth and sustainability of the construction industry.

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