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ASSESSMENT OF THE DRIVERS, BARRIERS, AND IMPROVEMENT STRATEGIES FOR INNOVATION AMONG CONSTRUCTION FIRMS IN KATSINA STATE, NIGERIA

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ABSTRACT

Innovation is widely recognized as a critical factor for improving the performance and competitiveness of construction firms. However, the successful adoption of innovation depends largely on the factors that drive innovation, the barriers that hinder its implementation, and the strategies adopted to enhance innovation within construction organisations. Despite the growing importance of innovation in the construction industry, many firms continue to face challenges that limit their ability to adopt and implement innovative practices effectively. This study therefore aimed to assess the drivers, barriers, and strategies for improving innovation among construction firms in Katsina State, Nigeria, from the perspective of construction professionals. The study adopted a quantitative survey research design. Data were collected using a structured questionnaire and analysed using frequency, percentage, mean score, and standard deviation. The findings revealed that technological developments, knowledge sharing/willingness to exchange ideas on innovation, and new business opportunities/processes were the most significant drivers of innovation among construction firms in Katsina State, each recording a Mean Item Score (MIS) of 4.10, with standard deviations of 0.90, 1.08, and 1.13, respectively. These findings indicate that technological advancement, collaborative learning, and emerging market opportunities play a crucial role in motivating construction firms to embrace innovation. The study further identified weak institutional support, lack of understanding of the benefits of innovation, and lack of cooperation among stakeholders as the most critical barriers limiting innovation adoption, with MIS values of 3.82 (SD = 0.98), 3.81 (SD = 1.01), and 3.80 (SD = 0.93), respectively. These constraints reduce firms' capacity to invest in innovative technologies,

processes, and management practices, thereby affecting their overall performance and competitiveness. Regarding strategies for improving innovation, the findings showed that knowledge exchange, sharing and transfer, stakeholder engagement and involvement, and education and training/retraining were the most effective measures for promoting innovation among construction firms in Katsina State, with MIS values of 4.02 (SD = 0.96), 3.98 (SD = 0.89), and 3.98 (SD = 0.93), respectively. These strategies were perceived to have the greatest potential for strengthening innovation capability and supporting sustainable organisational development. The study concludes that strengthening the key drivers of innovation while addressing the major barriers through appropriate capacity-building initiatives, institutional support, and stakeholder collaboration will significantly improve innovation adoption among construction firms in Katsina State. The study therefore recommends that government agencies, professional bodies, and construction firms should implement policies and programmes that promote knowledge sharing, strengthen institutional support, encourage stakeholder collaboration, and provide continuous education and professional training to enhance innovation and improve the overall performance and sustainability of the construction industry.

KEYWORDS: Innovation, Construction Firms, Drivers of Innovation, Barriers to Innovation, Innovation Strategies, Katsina State.

1.1 INTRODUCTION

The construction industry plays a significant role in national economic development through the provision of infrastructure, employment generation, and support for industrial growth (Wei & Lam, 2014; Meng & Brown, 2018; Owolabi et al., 2019). As the industry continues to evolve in response to globalization, technological advancement, and increasing client expectations, innovation has become essential for improving organisational performance and ensuring sustainable competitiveness. However, the successful adoption and implementation of innovation in construction firms are influenced by several organisational, technological, financial, institutional, and environmental factors. Consequently, understanding the factors that promote or hinder innovation has become a major concern for researchers and industry practitioners.

Innovation does not occur in isolation but is driven by a combination of internal and external factors. Internal drivers include management commitment, skilled workforce, organisational culture, research and development activities, availability of financial resources, and

employees' willingness to embrace change. External drivers include market competition, technological advancement, government regulations, client demands, and collaboration with other organisations (Wei & Lam, 2014; Abiola-Falemu, Ogunsemi, & Oyediran, 2010; John, Shakantu, & Olaku, 2019). These drivers encourage construction firms to develop new products, improve construction processes, adopt advanced technologies, and implement better management practices in order to enhance efficiency, quality, and competitiveness.

Despite these motivating factors, many construction firms continue to experience numerous barriers that limit innovation adoption. Previous studies have identified inadequate financial resources, resistance to organisational change, lack of skilled personnel, weak research and development capacity, poor collaboration among project stakeholders, inadequate government support, limited technological infrastructure, and high implementation costs as major constraints to innovation in the construction industry (Moohammad, Yusof, & Kamal, 2014; Kamal, Yusof, & Iranmanesh, 2016; Brockmann, Brezinski, & Erbe, 2016; Owusu-Manu, Twumasi, & Addy, 2017). These barriers often reduce firms' ability to improve productivity, profitability, quality, and overall project performance.

To overcome these challenges, several scholars have recommended the implementation of strategies that promote innovation within construction firms. Such strategies include strengthening management support, investing in employee training and capacity development, increasing investment in research and development, promoting collaboration among stakeholders, adopting modern construction technologies, improving government policies and incentives, and establishing organisational cultures that encourage creativity and continuous improvement (Gledson & Phoenix, 2017; John, Shakantu, & Olaku, 2019; YuSheng & Ibrahim, 2020). These strategies are considered essential for enhancing innovation capability and ensuring the long-term sustainability of construction organisations in an increasingly competitive business environment.

Although innovation has been extensively studied in construction industries across different countries, the drivers, barriers, and strategies for improving innovation differ according to the prevailing economic, political, institutional, and socio-cultural conditions of each region (Lu et al., 2008; Liu, Skibniewski, & Wang, 2016). Therefore, there is a need to investigate these issues within the context of construction firms in Katsina State, Nigeria, in order to provide empirical evidence that can inform policy decisions and organisational practices aimed at strengthening innovation in the state's construction industry. This study is therefore focused on identifying the drivers of innovation, examining the barriers limiting innovation adoption,

and suggesting appropriate strategies for improving innovation among construction firms in Katsina State.

1.2 Statement of the Research Problem

Despite the significant contribution of the construction industry to economic development, the industry has consistently been regarded as a traditional and conservative sector with relatively low levels of innovation. Consequently, the construction industry worldwide has developed a poor reputation for innovation (Wei & Lam, 2014; Meng & Brown, 2018). Xiaolong, Ruixue, Rebecca, and Jason (2014) noted that the industry is recognised for its conservatism and lack of innovation. Similarly, Tajuddin, Iberahim, and Ismail (2015) reported that construction records one of the lowest innovation performances compared with other industries. Liu, Skibniewski, and Wang (2016) also observed that innovation performance within the construction industry remains relatively poor, while Kamal, Yusof, and Iranmanesh (2016) reported that many construction firms suffer from inadequate innovation practices. Brockmann, Brezinski, and Erbe (2016) argued that the industry is frequently criticised for its lack of innovation, while Owusu-Manu, Twumasi, and Addy (2017) described construction as a poor innovator relative to other sectors. Likewise, Dansoh, Oteng, and Frimpong (2017) maintained that the construction industry has long been perceived as a slow innovator with generally low innovation levels. In Nigeria, construction industry operators, including consultants, have also been found to exhibit low levels of innovation adoption (Moohammad, Yusof, & Kamal, 2014).

The low level of innovation has been linked to poor industry performance, including low productivity, poor profitability, inadequate quality, high project costs, cost and time overruns, and low client satisfaction (Abiola-Falemu, Ogunsemi, & Oyediran, 2010; Moohammad, Yusof, & Kamal, 2014; Liu, Skibniewski, & Wang, 2016; Shelton, Martek, & Chen, 2016; Meng & Brown, 2018; Owolabi et al., 2019). Consequently, the lack of innovation has become a major concern within the construction industry (Gledson & Phoenix, 2017).

Although innovation has been recognised as indispensable for organisations operating in increasingly competitive and technologically driven environments (Liu, Skibniewski, & Wang, 2016), many construction firms continue to experience challenges in adopting innovative practices. Rapid technological changes, increasing client expectations, stricter environmental regulations, rising construction costs, and intense competition require firms to continuously innovate in order to achieve higher efficiency, sustainability, and long-term competitiveness (Abiola-Falemu, Ogunsemi, & Oyediran, 2010; Moohammad, Yusof, &

Kamal, 2014; John, Shakantu, & Olaku, 2019; Wei & Lam, 2014; Owusu-Manu, Twumasi, & Addy, 2017). However, the extent to which these environmental factors serve as drivers of innovation, the barriers limiting innovation adoption, and the strategies capable of improving innovation among construction firms remain insufficiently understood, particularly in Katsina State.

Furthermore, although innovation in the construction industry has been widely investigated in different countries, Liu et al. (2016) argued that innovation differs across countries due to varying economic, political, social, and institutional conditions. Lu et al. (2008) therefore emphasised that innovation studies should be conducted within specific local contexts because environmental conditions differ across regions. Despite this recommendation, there is limited empirical evidence on the drivers, barriers, and strategies for improving innovation among construction firms in Katsina State, Nigeria. This knowledge gap necessitates an investigation into the factors influencing innovation and the development of practical strategies that can enhance innovation adoption among construction firms in the study area.

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1.3 Aim and Objectives

The aim of this research is to assess innovation among construction firms in Katsina State.

The objectives of the research are:

1. To identify the drivers to innovation in construction firms in Katsina
2. To identify the barriers to innovation in construction firms in Katsina
3. To suggest the strategies to improve innovation in construction firms in Katsina

2.0 Literature Review

2.1 Construction Firms

According to AbdulAzeez *et al*. (2015), construction is defined as the series of actions undertaken by an entity which produce, modify or alter building or infrastructure. This indicates that construction embrace a wide range of activities relating to infrastructure, buildings, repairs and maintenance (Hamilton, 2006); these activities are being carried out on project basis by entities involved in construction projects known as constuction firms (Mudi, Bioku, & Kolawole, 2015). Construction firms referred to as companies or organisations are corporate bodies or statutorily registered enterprises that run construction business (Ogbu, 2011; Ibrahim, 2014; Mudi *et al.*, 2015; Ogunde, *et al*., 2016; Kehinde & Simon-Ilogho, 2023). Furthermore, construction firms could be distinguished into contracting and consulting firms (Ogbu, 2011; Odediran, Adeyinka, Opatunji, & Morakinyo, 2012; Myers, 2013;

Ibrahim, 2014; Lu, Ye, Flanagan, & Jewell, 2014; Mudi *et al.*, 2015; Abba, Hussaini, & Mohammed, 2022; Kehinde & Simon-Ilogho, 2023); these are discussed in the subsequent subsections:

2.1.1 Construction Contracting Firms are widely known as contractors, who focuses on on-site assembly or physical execution of construction products, as such they heavily engage in provision of construction resources (manpower, machinery, materials and money) required to efficiently and effectively execute a construction project in accordance with a contract document and to produce maximum profit for the investors in the enterprise (Ibrahim, 2014; Lu *et al*., 2014; Mudi *et al.*, 2015; Ogunde, *et al*., 2016). In Nigeria, Ibrahim (2014) reported that the statutory business registration of these firms can either be sole-proprietorship, partnership, or corporation; and that they can be categorised by several criteria: scope of operation (local, regional, national and multinational); specialization (building and engineering); size and category of contracts (small, medium and large); and the company's owners' nationality (foreign and indigenous).

2.1.2 Construction Consulting Firms also known as design firms or consultants are described as construction professional service firms which rely more on intensive professional knowledge (such as architecture, engineering, environmental, geotechnical engineering, landscape architecture, urban planning, surveying*)*, highly skilled human capital, and high investment in technologies (Lu *et al.*, 2014). Ibrahim (2014) defined consultants as the core professionals who involved in building project procurement, and who are responsible for developing the requirements of project clients, setting targets and, deadlines, as well as establishing standards for meeting these requirements, preparing project documents that describe the targets, setting deadlines and standards, and monitoring the activities of contractors. In Nigeria, Kado, Garba and Dodo (2015) identified groups of consultancy firms as architectural design firms, structural design firms, mechanical and electrical design firms, and multi-disciplinary design firms (engaging in more than one aspect of building design). While, construction professionals were identified to include: architects, builders, quantity surveyors, engineers, land surveyors, estate valuers and town planners (Odediran *et al*., 2012; Ibrahim, 2014; Mudi *et al.*, 2015; Ezeokoli, Okolie, Okoye, & Belonwu, 2016; Ogunde, *et al*., 2016; Abba, Hussaini, & Mohammed, 2022; Suleiman, Shika, Dahiru, & Abdulrazaq, 2023). Mudi *et al.* (2015) state that these professionals are expected to possess the relevant skills, knowledge, tools and techniques to achieve project goals.

2.2 Drivers to Innovation in Construction Firms

Innovation in construction firms is influenced by a range of internal and external drivers that motivate organisations to adopt new technologies, processes, and management practices. According to Xiaolong et al. (2014), Ozorhon et al. (2015), Davis et al. (2016), Meng and Brown (2018), and Owolabi et al. (2019), these drivers operate at the project, organisational, and industry levels and stimulate firms to invest in innovation to improve their performance and competitiveness. The literature identifies several key drivers, including changing client requirements, market competition, cost reduction, technological developments, environmental sustainability, compliance with government regulations, knowledge sharing, organisational resources, and research and development activities. Other important motivating factors include new business opportunities, changing market conditions, pursuit of best practices, project complexity, innovation policies, reward systems, and the need for organisational survival and growth.

Table 2.2: Summary of Drivers to Innovation in Construction Firms.

Category	Major Drivers Identified from Literature
Market and Client Drivers	New client requirements, market trends, competition, and new business opportunities.
Technological and Knowledge Drivers	Technological developments, knowledge sharing, research and development, availability of organisational resources, and patents/copyright.
Regulatory and Environmental Drivers	Government regulations, government support and incentives, environmental pressure, sustainability requirements, and innovation policies.
Organisational and Strategic Drivers	Cost savings, willingness to take risks, pursuit of best practices, corporate responsibility, project complexity, reward schemes, changing business environment, organisational survival, stability, development, and recession recovery.

Source: Adapted from Xiaolong et al. (2014); Tajuddin et al. (2015); Ozorhon et al. (2015); Ozorhon and Oral (2016); Davis et al. (2016); Abdu and Jibir (2017); Gledson and Phoenix (2017); Meng and Brown (2018); Owolabi et al. (2019); Lindblad and Guerrero (2020).

2.3 Barriers to Innovation in Construction Firms

Barriers to innovation were identified as the 'factors militating against innovation' (Abiola-Falemu *et al*., 2010); 'challenges and problems that might hinder innovation process' (Ozorhon *et al*., 2015); 'factors that impede innovation' (Shelton *et al.,* 2016); and 'hindrances to innovation' (Owolabi *et al.*, 2019) in an organisation which prevent the

organisation from investing in innovation. Based on the information gathered in the literature, the barriers to innovation to construction firms are presented in the table below:

Table 2.3: Barriers to Innovation in Construction Firms.

S/No.	Barrier	Source(s)
1.	Construction clients lacking interest in innovations	Hemström, Mahapatra and Gustavsson (2017); Gledson and Phoenix (2017)
2.	Huge amounts of financial resources involved/ high costs associated with implementing the innovation	Abiola-Falemu *et al.* (2010); Ozorhon *et al.* (2015); Shelton *et al.* (2016); Gledson and Phoenix (2017); Owolabi *et al.* (2019)
3.	Lack of cooperation among stakeholders	Wei and Lam (2014); Liu *et al.* (2016)
4.	Lack the essential human capital to leverage on technological developments	Abiola-Falemu *et al.* (2010); Ozorhon *et al.* (2015); Shelton *et al.* (2016); Gledson and Phoenix (2017); Owolabi *et al.* (2019)
5.	Lack of understanding of the benefits of innovation	Ozorhon *et al.* (2015); Owolabi *et al.* (2019)
6.	Low level of investment in R&D	Abiola-Falemu *et al.* (2010); Wei and Lam (2014); Owolabi *et al.* (2019)
7.	Unsupportive organizational culture	Ozorhon *et al.* (2015); Owolabi *et al.* (2019)
8.	Temporary nature of construction projects	Ozorhon *et al.* (2015); Hemström *et al.* (2017)
9.	Fragmentation of the construction industry	Abiola-Falemu *et al.* (2010); Wei and Lam (2014)
10.	Risk aversion	Abiola-Falemu *et al.* (2010); Gledson and Phoenix (2017); Hemström *et al.* (2017)
11.	Rigid/complex regulations, codes and standards	Hemström *et al.* (2017)
12.	Weak institutional support	Owolabi *et al.* (2019)
13.	Contractual inflexibility	Shelton *et al.* (2016)
14.	Uniqueness of each construction project	Hemström *et al.* (2017)
15.	Lack of competition	Hemström *et al.* (2017)

Source: Literature NB: This list is not exhaustive

2.3 Strategies to Improving Innovation in Construction Firms

Xiaolong *et al*. (2014) and Ozorhon *et al*. (2015) considered strategies to innovation as the inputs or resources that can be utilised to promote and implement innovation; in addition, Hemström, Mahapatra and Gustavsson (2017) identified the strategies as the measures that facilitate and foster innovation. Based on the information gathered in the literature, the strategies to improving innovation in construction firms are presented in the table below:

Table 2.4: Strategies to Improving Innovation in Construction Firms.

S/No.	Strategy	Source(s)
1.	Investment in R&D	Xiaolong *et al.* (2014); Ozorhon *et al.* (2015); Meng and Brown (2018)
2.	Enhancing cooperation and communication among stakeholders	Liu *et al.* (2016); Hemström *et al.* (2017)
3.	Enhancing leadership	Ozorhon *et al.* (2015); Liu *et al.* (2016); YuSheng and Ibrahim (2020)
4.	Top management commitment	Ozorhon *et al.* (2015); Liu *et al.* (2016); Meng and Brown (2018)
5.	Fostering innovation-supportive culture	Liu *et al.* (2016); Davis *et al*. (2016); Meng and Brown (2018); YuSheng and Ibrahim (2020)
6.	Establishment of incentive mechanisms/ schemes/system	Ozorhon *et al.* (2015); Liu *et al.* (2016); Meng and Brown (2018)
7.	Knowledge exchange, sharing and transfer	Xiaolong *et al.* (2014); Ozorhon *et al.* (2015); Ozorhon and Oral (2016); Liu *et al.* (2016); Meng and Brown (2018)
8.	Education and training	Ozorhon *et al.* (2015); Meng and Brown (2018)
9.	Government intervention (e.g. financial incentives, regulations)	Liu *et al.* (2016); Hemström *et al.* (2017)
10.	Stakeholder engagement/involvement	Ozorhon *et al.* (2015); Liu *et al.* (2016); Meng and Brown (2018)
11.	Quick response to changing environments	Liu *et al.* (2016); Meng and Brown (2018)
12.	Enhancing partnership	YuSheng and Ibrahim (2020)
13.	Promoting competition	Lindblad and Guerrero (2020)
14.	Dedicated innovation team	Ozorhon *et al.* (2015)
15.	Continuous improvement of innovation performance	Meng and Brown (2018)
16.	Appropriate response to innovation opportunities and risks	Meng and Brown (2018)

Source: Literature NB: This list is not exhaustive

3.0 RESEARCH METHODOLOGY

This study adopted a quantitative survey research design to investigate the drivers, barriers, and strategies for improving innovation among construction firms in Katsina State, Nigeria. The quantitative approach was considered appropriate because it allows the collection and analysis of numerical data for objective interpretation, while the survey design enabled the collection of opinions from a representative sample of construction professionals (Creswell, 2003; 2013; Saunders et al., 2009; Gledson & Phoenix, 2017). The study population comprised 715 registered construction professionals, including architects, builders, engineers, quantity surveyors, estate surveyors, land surveyors, and town planners practicing in Katsina State. Using the Yamane (1967) formula, a sample size of 88 was determined and increased to 114 respondents to accommodate non-response, following Glenn (1992). The sample was proportionately allocated across the professional groups using Bowley's (1926) proportional

allocation method, while purposive sampling was employed to select respondents with sufficient knowledge and experience relevant to innovation in construction firms (Ilori et al., 2018; Kumar, 2011; Tichapondwa, 2013).

Primary data were collected using a structured questionnaire developed from constructs identified in the literature on construction innovation (Shokri-Ghasabeh & Chileshe, 2016; Kamal et al., 2016; Ezeokoli et al., 2016; Owusu-Manu et al., 2017; Owolabi et al., 2019). For this aspect of the study, the questionnaire focused on respondents' perceptions of the drivers of innovation, barriers to innovation, and strategies for improving innovation, with responses measured on a five-point Likert scale. The collected data were analysed using Microsoft Excel, employing descriptive statistics such as frequency, percentage, Mean Item Score (MIS), and Standard Deviation (SD). Frequency and percentage were used to summarise respondents' characteristics, while MIS and SD were used to determine the relative importance and ranking of the identified drivers, barriers, and improvement strategies among construction firms in Katsina State (Holt, 2014; Samuel & Eziyi, 2014; Ezeokoli et al., 2016).

4.0 RESULTS AND DISCUSSIONS

4.1 Questionnaire Response Rate

A total of Eighty-four valid responses were received, representing 73.7% response rate. This response rate was deemed adequate and acceptable for the study, beacause the response rate is relatively high (73.7%) as compared to similar studies relating innovation in construction firms by Wei and Lam (2014) (5.51%), Ozorhon *et al.* (2015) (33%), Kamal *et al.* (2016) (12.1%), Meng and Brown (2018) (22.9%), Duodu and Rowlinson (2021) (17%), hence, this validates representativeness of the sample of study. Furthermore, Moser and Kalton (1971) also stated that the result of a survey could be considered as biased and of little value if the response was lower than 30-40%, the response rate for this research is 73.7% which indicate an unbiased and higher value of the survey. Table 4.1 shows details of the response rate.

Table 4.1: Questionnaire Response Rate.

Questionnaire	Frequency	Percentage (%)
No. of responses received	84	73.7
Non-responses accounted	30	26.3
Total	**114**	**100.0**

Source: Field Survey, 2026

4.2 Demography of the Respondents

A total of 84 valid responses were analysed. The respondents comprised professionals from diverse construction disciplines, with Builders (22.62%), Quantity Surveyors (19.05%), and Civil Engineers (16.67%) constituting the largest groups. All respondents were registered members of their respective professional bodies, with 77.38% being corporate members, indicating that the respondents possessed the professional competence required to provide reliable information. In terms of educational qualification, the majority held Master's degrees (30.95%), while 27.38% each possessed a First Degree and a Postgraduate Diploma, demonstrating a high level of educational attainment. Regarding firm type, 69.04% of the respondents worked in firms engaged in both consulting and contracting services, while the remaining respondents were equally distributed between consulting and contracting firms (15.48% each). Furthermore, most respondents (84.52%) had six years or more of professional experience, indicating substantial industry exposure and enhancing the credibility and reliability of the data collected.

Table 4.2: Summary of Respondents' Demographic Characteristics. (n = 84)

Characteristic	Major Findings
Professional Affiliation	Builders (22.62%), Quantity Surveyors (19.05%), and Civil Engineers (16.67%) constituted the largest professional groups, with all major construction professions represented.
Professional Membership	Corporate Members (77.38%), Non-corporate Members (16.67%), Fellows (5.95%).
Educational Qualification	Majority possessed a Master's Degree (30.95%), while 27.38% each held a First Degree and Postgraduate Diploma; all respondents had at least HND/Bachelor's qualification.
Type of Firm	Most respondents (69.04%) worked in firms engaged in both consulting and contracting activities, while 15.48% each worked solely in consulting or contracting firms.
Work Experience	Majority (84.52%) had six years or more of professional experience, indicating adequate industry knowledge and practical exposure.

Source: Field Survey (2026).

4.3 Drivers of Innovation

A total of 24 expected drivers to innovation in construction firms were identified, these drivers were presented in tabular form and the respondents were asked to indicate their level of agreement on these drivers to innovation in construction firms in Katsina State built on a five point scale; 1 “Strongly Disagree” indicating strong belief that the item in question is not a driver, 2 “Disagree” indicating belief that the item in question is not a driver, 3 “Neutral” indicating neither agree nor disagree (i.e. moderate view with latent inclination toward

agreement or disagreement – depending upon the mean score), 4 "Agree" indicating belief that the item in question is a driver and 5 "Strogly agree" strong belief that the item in question is a driver. Table 4.5 shows the result of drivers to innovation in construction firms in Katsina State based on the perception of professionals. An overall group mean and standard deviation of **3.90 (SD = 1.04)** were recorded for the entire drivers to innovation which when approximated to **4.0** translate to "Agree" indicating that the respondents generally agree that all the identified drivers are drivers to innovation in construction firms. Furthermore, out of the 24 drivers identified, the top three leading drivers were: "technological developments" with MIS of 4.10 (SD = 0.90), followed by "knowledge sharing/willingness to exchange ideas on innovation" with MIS of 4.10 (SD = 1.08) and then "new business opportunities/processes" with MIS of 4.10 (SD = 1.13).

Table 4.3: Drivers to Innovation in Construction Firms in Katsina State.

S/N	Driver	Frequency					∑F	∑FX	Mean	SD	Rank
		1	2	3	4	5					
1.	New clients' requirements/demands	3	3	16	43	19	84	324	3.86	0.93	14th
2.	Competition	3	0	13	42	26	84	340	4.05	0.89	6th
3.	Cost savings	3	6	16	33	26	84	325	3.87	1.05	13th
4.	Design/market trends	6	0	6	56	16	84	328	3.90	0.95	12th
5.	Compliance with new government regulations/legislations	3	6	10	46	19	84	324	3.86	0.97	15th
6.	Government support/incentive	3	10	10	45	16	84	313	3.73	1.02	20th
7.	Environmental pressure	6	3	19	37	19	84	312	3.71	1.08	23th
8.	Technological developments	3	3	3	49	26	84	344	4.10	0.90	1st
9.	Knowledge sharing/willingness to exchange ideas on innovation	6	3	0	43	32	84	344	4.10	1.08	2nd
10.	Changes toward sustainability	3	3	3	52	23	84	341	4.06	0.88	5th
11.	New business opportunities/processes	6	0	13	26	39	84	344	4.10	1.13	3rd
12.	Changing business environments	3	3	26	29	23	84	318	3.79	1.01	17th
13.	Pursuit of best practice	6	0	10	36	32	84	340	4.05	1.07	7th
14.	Willingness to take risks	6	3	16	40	19	84	315	3.75	1.07	18th

15. Research and Development intensity	6	0	10	39	29	84	337	4.01	1.06	11th
16. Corporate responsibility	6	6	16	33	23	84	313	3.73	1.15	21st
17. Presence of organizational resources for innovation	3	3	10	42	26	84	337	4.01	0.95	10th
18. Availability of patents and copyright	6	0	23	36	19	84	314	3.74	1.04	19th
19. Needs to develop standards	3	3	10	36	32	84	343	4.08	0.98	4th
20. Survival, stability and development	3	6	10	32	33	84	338	4.02	1.06	9th
21. Recession aftermath	10	0	29	32	13	84	290	3.45	1.13	24th
22. Project Complexity	10	3	16	26	29	84	313	3.73	1.30	22nd
23. Innovation Policy	6	3	13	39	23	84	322	3.83	1.10	16th
24. Reward Schemes	3	6	6	40	29	84	338	4.02	1.02	8th
Average Mean								**3.90**	**1.04**	
NB: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree, SD = Standard Deviation										

Source: Field Survey, 2026

4.4 Barriers to Innovation

A total of 15 expected barriers to innovation in construction firms were identified, these barriers were presented in tabular form and the respondents were asked to indicate their level of agreement on these barriers to innovation in construction firms in Katsina State built on a five point scale; 1 "Strongly Disagree" indicating strong belief that the item in question is not a barrier, 2 "Disagree" indicating belief that the item in question is not a barrier, 3 "Neutral" indicating neither agree nor disagree (i.e. moderate view with latent inclination toward agreement or disagreement – depending upon the mean score), 4 "Agree" indicating belief that the item in question is a barrier and 5 "Strogly agree" strong belief that the item in question is a barrier. Table 4.6 shows the result of barriers to innovation in construction firms in Katsina State based on the perception of professionals. An overall group mean and standard deviation of **3.66 (SD = 1.03)** were recorded for the entire barriers to innovation which when approximated to **4.0** translate to "Agree" indicating that the respondents generally agree that all the identified barriers are barriers to innovation in construction firms. Furthermore, out of the 15 barriers identified, the top three leading barriers were: "weak institutional support" with MIS of 3.82 (SD = 0.98), followed by "lack of understanding the

benefits of innovation" with MIS of 3.81 (SD = 1.01) and then "lack of cooperation among stakeholders" with MIS of 3.80 (SD = 0.93).

Table 4.4: Barriers to Innovation in Construction Firms in Katsina State.

S/N	Barrier	Frequency					∑F	∑FX	Mean	SD	Rank
		1	2	3	4	5					
1.	Lack of clients' interest in innovations	6	10	23	35	10	84	285	3.39	1.08	15th
2.	Huge amounts of financial resources involved/ high costs associated with implementing the innovation	3	6	26	33	16	84	305	3.63	0.99	9th
3.	Lack of cooperation among stakeholders	0	10	16	39	19	84	319	3.80	0.93	3rd
4.	Lack of essential human capital to leverage on technological developments	3	10	23	25	23	84	307	3.65	1.11	8th
5.	Lack of understanding the benefits of innovation	0	13	13	35	23	84	320	3.81	1.01	2nd
6.	Low level of investment in Research and Development	6	10	13	32	23	84	308	3.67	1.21	6th
7.	Unsupportive organizational culture	3	10	16	39	16	84	307	3.65	1.04	7th
8.	Temporary nature of construction projects	3	13	23	26	19	84	297	3.54	1.11	14th
9.	Fragmentation of the construction industry	6	6	16	43	13	84	303	3.61	1.06	10th
10.	Risk aversion	3	10	19	39	13	84	301	3.58	1.01	12th
11.	Rigid/complex regulations, codes and standards	0	13	19	46	6	84	297	3.54	0.84	13th
12.	Weak institutional support	3	6	13	43	19	84	321	3.82	0.98	1st
13.	Contractual inflexibility	3	10	16	45	10	84	301	3.58	0.97	11th
14.	Uniqueness of each construction project	0	6	19	46	13	84	31	3.79	0.7	5th

							8		9	
15. Lack of competition	6	13	6	26	33	84	319	3.80	1.311	4th
Average Mean								**3.66**	**1.03**	
NB: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree, SD = Standard Deviation										

Source: Field Survey, 2026

4.5 Strategies to Improve Innovation

A total of 16 expected strategies to improve innovation in construction firms were identified, these strategies were presented in tabular form and the respondents were asked to indicate the effectiveness of these stategies toward improving innovation in construction firms in Katsina State built on a five point scale; 1 "Not effective" indicating degree that the item in question is not effective at all, 2 "Faily effective" indicating degree that the item in question is slightly effective, 3 "Effective" indicating degree that the item in question is moderately effective, 4 "More effective" indicating degree that the item in question is very effective and 5 "Most effective" indicating degree that the item in question is extremely effective. Table 4.6 shows the result of the strategies toward improving innovation in construction firms in Katsina State based on the perception of professionals. An overall group mean and standard deviation of **3.83 (SD = 1.00)** were recorded for the entire strategies to improve innovation which when approximated to **4.0** translate to "More effective" indicating that the respondents generally agree that all the identified strategies are very effective to improving innovation in construction firms. Furthermore, out of the 16 strategies identified, the top three very effective strategies were: "knowledge exchange, sharing and transfer" with MIS of 4.02 (SD = 0.96), followed by "stakeholder engagement/involvement" with MIS of 3.98 (SD = 0.89) and then "education and training/retraining" with MIS of 3.98 (SD = 0.93).

Table 4.5: Strategies to Improve Innovation in Construction Firms in Katsina State.

S/N	Strategy	Frequency					∑F	∑FX	Mean	SD	Rank
		1	2	3	4	5					
1.	Investment in Research and Development	0	13	23	19	29	84	316	3.76	1.09	10th
2.	Enhancing cooperation and communication among stakeholders	3	3	32	23	23	84	312	3.71	1.02	12th
3.	Enhancing leadership	6	3	23	33	19	84	308	3.67	1.09	13th
4.	Top management commitment	3	3	2	2	2	8	32	3.8	1.	5th

			3	6	9	4	7	9	04	
5. Fostering innovation-supportive culture	3	10	23	29	19	84	303	3.61	1.08	14th
6. Establishment of incentive mechanisms/ schemes/system	3	3	32	23	23	84	312	3.71	1.02	12th
7. Knowledge exchange, sharing and transfer	0	6	19	26	33	84	338	4.02	0.96	1st
8. Education and training/retraining	3	0	19	36	26	84	334	3.98	0.93	3rd
9. Government intervention (e.g. financial incentives, regulations)	3	0	29	26	26	84	324	3.86	0.98	8th
10. Stakeholder engagement/involvement	0	6	16	36	26	84	334	3.98	0.89	2nd
11. Quick response to changing environments	3	10	13	32	26	84	320	3.81	1.11	9th
12. Enhancing partnership	3	3	26	33	19	84	314	3.74	0.97	11th
13. Promoting competition	3	0	19	46	16	84	324	3.86	0.85	7th
14. Dedicated innovation team	0	6	23	29	26	84	327	3.89	0.93	4th
15. Continuous improvement of innovation performance	0	6	23	29	26	84	327	3.89	0.93	4th
16. Appropriate response to innovation opportunities and risks	3	6	16	33	26	84	325	3.87	1.05	6th
Average Mean								**3.83**	**1.00**	
NB: 1 = Not Effective, 2 = Fairly Effective, 3 = Effective, 4 = More Effective, 5 = Most Effective, SD = Standard Deviation										

Source: Field Survey, 2026

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study assessed the drivers, barriers, and strategies for improving innovation among construction firms in Katsina State, Nigeria from the perspective of construction professionals. The findings revealed that innovation in construction firms is influenced by a combination of technological, organisational, and market-related factors. Specifically, technological developments, knowledge sharing and willingness to exchange innovative ideas, and the availability of new business opportunities and processes were identified as the major drivers that encourage construction firms to adopt innovation. These drivers play a significant role in enhancing firms' capacity to respond to changing client needs, improve operational efficiency, and remain competitive within the construction industry.

The study also established that construction firms face several challenges that hinder innovation adoption. The most significant barriers identified include weak institutional support, inadequate understanding of the benefits of innovation, and poor cooperation among construction stakeholders. These constraints reduce firms' ability to adopt new technologies, improve construction processes, and implement innovative management practices, thereby limiting their overall performance and competitiveness.

Furthermore, the study found that improving innovation among construction firms requires deliberate and coordinated efforts by both industry stakeholders and policymakers. The most effective strategies identified include promoting knowledge exchange, sharing and transfer, strengthening stakeholder engagement and collaboration, and providing continuous education, training, and retraining for construction professionals. The study therefore concludes that addressing the identified barriers while strengthening the key drivers through appropriate improvement strategies will significantly enhance innovation adoption, organisational performance, and the long-term sustainability of construction firms in Katsina State.

5.2 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

1. Construction firms should leverage the identified drivers of innovation by investing in emerging technologies, encouraging knowledge sharing among employees, and exploring new business opportunities that promote innovative construction practices.
2. Government agencies and relevant professional bodies should strengthen institutional support for innovation by developing enabling policies, providing incentives, and creating a favourable regulatory environment that encourages innovation within the construction industry.
3. Construction firms should improve collaboration among project stakeholders, including contractors, consultants, clients, academic institutions, and professional associations, to facilitate the exchange of innovative ideas, skills, and best practices.
4. Continuous education, professional training, and capacity-building programmes should be organized to increase awareness of the importance and benefits of innovation and to equip construction professionals with the knowledge and skills required to adopt innovative technologies and practices.
5. Industry stakeholders should establish mechanisms that promote knowledge management, research collaboration, and technology transfer to accelerate innovation

adoption and improve the competitiveness, productivity, and sustainability of construction firms in Katsina State.

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