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Influence Of Artisan's Skill Competency on Construction Project Completion Success in Bauchi State

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Abstract

This study examined how artisans' skill competency influences construction project completion success in Bauchi State, Nigeria, against persistent challenges of delays, cost overruns, poor workmanship, and rework. It assessed the contribution of technical, problem-solving, safety, and quality competencies to project outcomes. A quantitative cross-sectional survey was conducted using questionnaires administered to 210 artisans and 30 site supervisors; the response rate was 86%. Data were analysed using descriptive statistics and multiple regression. Respondents rated all four competency dimensions as moderate: safety (mean = 2.82), technical (2.76), problem-solving (2.66), and quality (2.65). However, notable gaps were identified in compliance with standards, safety in high-risk tasks, understanding of quality requirements, and coordination between trades; these critical gaps received a low mean score of 2.23. Project success was also rated moderate across budget (2.74), quality (2.74), time (2.61), and stakeholder satisfaction (2.56). Together, the four competency dimensions explained 41.7% of the variance in project success (R^2 = 0.417, F = 36.28, $p < 0.001$), indicating a significant relationship between artisans' competencies and project outcomes. Technical competency (β = 0.287) and safety competency (β = 0.241) were the strongest predictors of success in the model. Overall, the findings suggest that strengthening practical technical ability and safe work practices may contribute to better project completion, while the observed gaps in quality, standards compliance, and inter-trade coordination also warrant attention. The study recommends competency-based training, stronger site supervision, improved motivation, and enforcement of certification requirements to enhance artisans' capabilities and support successful construction project delivery in Bauchi State.

Keywords

Artisan Skill Competency, Project Completion Success, Construction Industry, Technical Competency, Safety Competency, Bauchi State

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1.0 INTRODUCTION

The construction industry constitutes a fundamental sector of national economic development because it provides the physical infrastructure upon which other economic sectors depend (Babatunde & Low, 2015). Globally, the industry accounts for a substantial proportion of employment and capital investment, and its performance is closely linked to national productivity, economic growth and socio-economic advancement (Martek, 2022). Despite its strategic importance, the sector continues to experience persistent challenges, including low labour productivity, cost overruns, schedule delays and quality deficiencies (McKinsey & Company, 2024). A principal determinant of construction project outcomes is the competence of the skilled workforce, particularly artisans, who undertake the practical site-based activities required to translate designs, drawings and specifications into completed physical structures (Iheama et al., 2025). Inadequate artisan skill competency is frequently associated with defective workmanship, recurrent rework, safety failures, cost escalation and delayed project delivery (Okuntade, 2020; Oke & Ugoje, 2023).

Construction remains fundamentally labour-intensive, particularly in developing economies where manual production processes and site-based craft skills predominate (Solomon et al., 2022). Artisans, including masons, carpenters, plumbers, electricians, welders, tilers and painters, constitute the operational foundation of construction projects (NIOB, 2005; Ubenyi, 2021). Their competence encompasses trade-specific technical proficiency, problem-solving capability, safety consciousness, quality-oriented workmanship and the ability to interpret and correctly execute construction drawings and specifications (Ayeniyo et al., 2024). The level of skill competency among artisans directly affects work output, construction quality, the incidence of errors and rework, and the successful completion of projects (Ujene & Odesola, 2019). Consequently, artisan competency represents not only a technical consideration but also a strategic determinant of construction project success.

At the global level, productivity growth in construction has remained sluggish. McKinsey & Company (2024) reported that global construction productivity increased by only 10% between 2000 and 2022, representing approximately one-fifth of the productivity growth recorded in the overall economy. In several advanced economies, productivity has declined despite sustained infrastructure demand. This stagnation has been attributed to a chronic shortage of skilled labour, inadequate investment in construction technology and workforce upskilling, and fragmented project-management practices that constrain collaboration and innovation. These challenges are further exacerbated by ineffective site supervision, inadequate tools and materials, and deficiencies in planning and communication, all of which reduce output per worker. The skills gap, defined as the mismatch between the competencies available within the workforce and those required by contemporary construction methods, has been identified as a critical constraint on productivity and project performance (Frontiers, 2025).

In developing economies, these global challenges are intensified by socio-economic pressures and institutional weaknesses (Ofori, 2019). Nigeria exemplifies this condition. The Nigerian construction industry records approximately 100 serious accidents annually, resulting in an estimated 50 fatalities and 150 injuries (Shan-Shin et al., 2024). Beyond safety concerns, the sector is characterised by a pronounced skills deficit. Many artisans acquire their competencies through informal apprenticeship systems rather than structured formal training, which frequently fails to provide the comprehensive and current knowledge required for modern construction techniques and quality standards (Bilau et al., 2015; Karfe et al., 2021). This deficiency contributes to poor workmanship, recurrent rework and material wastage, with attendant implications for project delays and cost overruns (Adagba et al., 2021). The absence of structured training and certification frameworks has also constrained the supply of competent artisans, particularly in regions experiencing increasing infrastructure demand (Okuntade, 2020). Furthermore, employment

arrangements within the artisan workforce have changed considerably over the past four decades, as permanent employer-based engagement has progressively been replaced by subcontracting, casual labour and project-based employment, thereby weakening incentives for sustained skills development (Nwoke et al., 2026).

The significance of artisan skill competency extends beyond technical execution to broader dimensions of construction project performance. Project completion success has traditionally been evaluated using the triple constraints of time, cost and quality (Kagioglou, 2016). However, contemporary literature also recognises safety performance, stakeholder satisfaction and the absence of defects and rework as essential indicators of success (Chan, 2018; Namho Kim, 2017). Artisan competency directly influences each of these dimensions. Competent artisans execute tasks more efficiently, thereby reducing construction duration (Durdyev & Mbachu, 2017); minimise material wastage and rework, thereby lowering project costs (Oke & Ugoje, 2023); produce workmanship that conforms to specified quality requirements (Ayeniyo et al., 2024); and adhere to safety protocols, thereby reducing accidents and associated disruptions (Nassar, 2021). Conversely, deficient skill competency results in errors, delays, cost overruns, safety incidents and client dissatisfaction (Karfe et al., 2021; Keftin & Kabiru, 2025). Skill competency therefore operates as both a direct and an indirect determinant of construction project completion success.

In Nigeria, extant studies have examined several challenges confronting the construction workforce. Previous research has identified low remuneration, delayed payments, poor working conditions, inadequate formal training and insufficient tools and equipment as significant constraints on artisan productivity and performance (Keftin & Kabiru, 2025; Mohammed et al., 2025; Ibrahim & Yusuf, 2022). Studies conducted in Bauchi State have documented occupational safety risks on construction sites (Kawuwa et al., 2018; Waziri, 2026), the influence of motivation on worker productivity (Mohammed, 2023), and the relationship between artisan productivity and project performance in higher-institutional projects (Ibrahim, 2026). Related studies have examined the progressive depletion of skilled craftsmen within the industry (Dayyabu, 2019). However, these studies have predominantly addressed productivity, safety, time management or motivation in isolation, without systematically examining the influence of artisan skill competency, as a multidimensional construct, on construction project completion success.

Bauchi State constitutes a particularly relevant context for this investigation. The state experiences socio-economic vulnerabilities, including an estimated literacy rate of 34.1%, which may constrain effective communication, training delivery and knowledge transfer (Kawuwa et al., 2018). Construction activities in the state are further characterised by widespread non-compliance with safety standards, limited training and safety awareness (Horan et al., 2023), inadequate personal protective equipment, poor site supervision and weak regulatory enforcement (Kawuwa et al., 2018). The regional construction industry is also characterised by the predominance of informal apprenticeship training, limited access to modern tools and equipment, and an ageing and declining artisan workforce (Dayyabu, 2019; Babalola et al., 2021). Empirical evidence indicates that although artisans exhibit strong foundational attributes, including attendance, punctuality and acceptable workmanship quality, these strengths are undermined by high rework rates and moderate coordination performance, suggesting underlying competency deficiencies (Ibrahim, 2026; Waziri, 2026). These conditions suggest that artisan skill competency may represent a significant constraint on project completion success in Bauchi State, although empirical evidence on this relationship remains limited. This study therefore seeks to provide empirical evidence on the influence of artisan skill competency on construction project completion success in Bauchi State.

2.0 RESEARCH METHODOLOGY

2.1 Research Design

A quantitative research design was adopted for this study due to the nature of the research problem,

which involves determining the influence of artisan skill competency (independent variable) on project completion success (dependent variable). According to Creswell (2014), the quantitative approach is appropriate when the problem is deterministic and seeks to examine relationships between variables that can be measured numerically and analysed statistically. The design is descriptive and non-experimental; it measures existing conditions, perceptions and relationships without manipulating variables. A cross-sectional field survey strategy was employed because it efficiently collects standardised data from a dispersed population of artisans and site supervisors across construction sites. The survey strategy supports both descriptive analysis (levels of competency and project success) and inferential analysis (the predictive influence of competency on success) through structured questionnaires and statistical modelling.

2.2 Study Area

Bauchi State, Nigeria, is the study area. It is located in the North-East geopolitical zone. Bauchi Metropolis was purposively selected as the primary study location because it hosts the highest concentration of building construction activities in the state, including higher-institutional, commercial and residential projects. Three additional local government areas Toro, Misau and Katagum were included to capture variation in project types, contractor characteristics and artisan demographics across urban and semi-urban settings. The state experiences socio-economic vulnerabilities (including a literacy rate of approximately 34.1%) and is characterised by informal apprenticeship training, limited access to modern tools, and an ageing artisan workforce. These conditions make Bauchi State a relevant context for examining the influence of artisan skill competency on project completion success.

2.3 Population of the Study

The target population consisted of skilled building construction artisans directly engaged in the execution of building projects in Bauchi State. The artisans covered include masons (bricklayers and blocklayers), carpenters, plumbers, electricians, welders and iron benders, tilers, plasterers, painters, steel fixers and glaziers. These trades follow the Nigerian Institute of Building (NIOB, 2005) classification into structural, finishing and services categories. A secondary group of site supervisors (registered builders and site engineers) was included solely to provide independent ratings of project completion success indicators, thereby reducing common-method bias. The estimated population of artisans actively engaged on building construction sites in Bauchi Metropolis and the selected local government areas was approximately 420, based on site registers, contractor records and information from professional bodies. The population of site supervisors was estimated at approximately 60.

2.4 Sample Frame and Sample Size

The sampling frame was a comprehensive list of skilled building construction artisans and site supervisors involved in ongoing and recently completed building projects in Bauchi State. The frame was compiled from site registers maintained by major contractors, project records from the Bauchi State Ministry of Works and Housing, membership and project lists from the Nigerian Institute of Building (Bauchi Chapter), and records from the Bauchi State Chapter of the Nigerian Society of Engineers. The sampling frame for artisans comprised 420 individuals. The sample size for the artisan population was determined using the Krejcie and Morgan (1970) table. For a population of 420, the table indicates a minimum sample of 201. To enhance statistical robustness, allow for possible non-response and ensure adequate representation across trade strata, the researcher targeted 210 artisans. For site supervisors, a purposive sample of 30 was drawn from the estimated population of 60. The final sample size was therefore 240 respondents, comprising 210 artisans and 30 site supervisors.

Table 1: Sample Size Distribution of Artisans by Trade

S/N	Trade Category	Population	Sample Size	% of Sample
1	Masons/Bricklayers	95	48	22.9%
2	Carpenters	70	35	16.7%
3	Electricians	55	28	13.3%
4	Plumbers	50	25	11.9%
5	Welders/Iron Benders	45	23	11.0%
6	Tilers/Plasterers/Painters	60	30	14.3%
7	Glaziers and Others	45	21	10.0%
	Total (Artisans)	**420**	**210**	**100.0%**

2.5 Sampling Technique

A multi-stage sampling procedure was employed. First, study locations were purposively selected (Bauchi Metropolis as primary, plus Toro, Misau and Katagum). Second, the artisan population was stratified according to the trade categories listed above to ensure proportional representation. Third, within each trade stratum, individual artisans were selected by assigning sequential numbers to those on site registers and using a random number generator. Fourth, site supervisors were purposively selected from the same construction sites as the sampled artisans so that their ratings of project completion success corresponded to the same projects. This procedure gives every artisan within a stratum an equal chance of selection and minimises selection bias while maintaining practical feasibility.

2.6 Instrument for Data Collection

The primary instrument was a structured questionnaire developed by the researcher on the basis of the study objectives, relevant literature and validated scales used in prior Nigerian construction labour studies. The questionnaire was divided into four sections: Section A - Demographic Information (trade, years of experience, highest educational qualification, type of training received, current project type); Section B - Artisan Skill Competency (technical competency, problem-solving competency, safety competency and quality competency) measured on a five-point Likert scale ranging from 1 (Very Low) to 5 (Very High); Section C - Contextual factors influencing skill competency (organisational training, tools and equipment, supervision, remuneration and motivation); and Section D - Project Completion Success (completion within scheduled time, adherence to approved budget, conformity with specified quality standards, and stakeholder satisfaction). Two parallel versions were prepared: one for artisans (self-assessment of skill competency) and one for site supervisors (independent assessment of project completion success and observed artisan performance). Both used the same five-point Likert scale.

2.7 Reliability and Validity

Internal consistency reliability was assessed using Cronbach's alpha coefficient. A pilot study was conducted with 25 artisans and five site supervisors who were not part of the main sample. All constructs returned alpha values above the conventional threshold of 0.70, confirming satisfactory internal consistency reliability for the main survey (Taber, 2018). Technical Competency (6 items) yielded $\alpha = 0.81$; Problem-Solving Competency (5 items) $\alpha = 0.78$; Safety Competency (5 items) $\alpha = 0.84$; Quality Competency (5 items) $\alpha = 0.80$; Project Completion Success (8 items) $\alpha = 0.83$; and the overall instrument (29 items) $\alpha = 0.86$. Content and face validity were established by submitting the draft questionnaire to a panel of three experts from the Department of Building Technology, Faculty of Environmental Technology, Abubakar Tafawa Balewa University, Bauchi. The experts examined the instrument for clarity of wording, relevance of items

to the constructs, adequacy of coverage of the four competency dimensions, and appropriateness of the rating scale. Their comments and suggestions were incorporated into the final version of the instrument before the pilot test was conducted.

2.8 Method of Data Collection and Analysis

An introductory letter was obtained from the Department of Building Technology, Abubakar Tafawa Balewa University, Bauchi, and presented to project managers and site supervisors. The questionnaire was administered through personal face-to-face contact by the researcher and two trained research assistants. This method permits clarification of ambiguous items (particularly for artisans with limited formal education), maximises response rate, and reduces incomplete questionnaires. Data collection took place over eight weeks. Respondents were assured of anonymity and confidentiality; participation was voluntary. Completed questionnaires were collected on the spot or retrieved within 48 hours.

The completed questionnaires were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 25. Both descriptive and inferential statistical techniques were employed. Descriptive statistics (mean, standard deviation, frequency and ranking) were used to assess the level of project completion success and to identify and evaluate the key skill competencies of artisans. Multiple regression analysis was used to determine the influence of artisan skill competency on project completion success. The decision rule for interpreting mean scores on the five-point Likert scale was: 1.00-1.49 = Very Low; 1.50-2.49 = Low; 2.50-3.49 = Moderate; 3.50-4.49 = High; and 4.50-5.00 = Very High. For the multiple regression analysis, the significance level was set at $p < 0.05$. The coefficient of determination (R^2) indicated the proportion of variance in project completion success explained by the four dimensions of artisan skill competency. Standardised beta coefficients were examined to determine the relative contribution of each competency dimension.

3.0 RESULTS AND DISCUSSION

3.1 Response Rate and Demographic Characteristics

A total of 240 questionnaires were distributed to the target respondents comprising 210 artisans and 30 site supervisors. Of this number, 206 (86%) were returned and found usable for analysis, while 34 (14%) were either not returned or were incomplete and therefore excluded from the final analysis. This response rate is considered adequate for survey research of this nature and was achieved through face-to-face administration and on-the-spot retrieval by the researcher and research assistants.

Masons/Bricklayers constituted the largest group of respondents (66%), followed by Carpenters (15%) and Tilers/Plasterers/Painters (11%). Electricians accounted for 4%, Welders/Iron Benders 3%, Plumbers 2%, and Glaziers/Others 1%. The dominance of masonry trades is consistent with the structure of typical building construction sites in Bauchi State, where block-laying and concrete works form the bulk of site labour. Regarding years of experience, 43% of the respondents had between 1 and 5 years of experience, 31% had 6-10 years, 19% had 11-15 years, and only 7% had above 15 years of experience. The majority of the artisans therefore fall within the early-to-mid career range. This profile has important implications for skill competency: while younger artisans may be more adaptable to new techniques, they may also lack the depth of practical experience that comes with longer service. The relatively small proportion of highly experienced artisans is consistent with the literature on the ageing and progressive depletion of skilled craftsmen in the Nigerian construction industry (Dayyabu, 2019).

Secondary/SSCE holders formed the largest educational group (39%), followed by Primary education (24%), Technical/Trade Certificate (19%), ND/HND/Degree (12%), Others (4%), and no formal education (2%). The relatively low proportion of respondents with tertiary qualifications underscores the informal nature of artisan training in the study area. Informal apprenticeship was the dominant mode of training (46%), followed by Formal apprenticeship (23%), Technical college/Vocational school (19%), On-the-job training only (10%), and Combination of the above (2%). This confirms the

continued reliance on informal apprenticeship systems among artisans in Bauchi State. Informal apprenticeship, while practical, often lacks standardised curricula, formal assessment and systematic coverage of safety and quality standards (Bilau et al., 2015; Karfe et al., 2021). Higher institutional projects accounted for 39% of the projects on which respondents were engaged, followed by Public/Government buildings (31%), Residential (17%) and Commercial (13%). The age distribution shows that 47% of respondents were aged 25-34 years, 23% were 35-44 years, 22% were below 25 years, 7% were 45-54 years, and only 1% were 55 years and above. Males constituted 97% of the sample while females accounted for 3%.

3.2 Level of Artisan Skill Competency

This section presents the results of the assessment of the four dimensions of artisan skill competency: technical skill competency, problem-solving competency, safety competency and quality competency. Mean scores and standard deviations were computed from the percentage distributions of responses on the five-point Likert scale.

Table 2: Technical Skill Competency

S/N	Statement	Mean	Rank	Remark
1	Ability to correctly interpret construction drawings and specifications	2.63	4	Moderate
2	Proficiency in the use of tools and equipment relevant to my trade	3.16	2	Moderate
3	Ability to select and use appropriate building materials for specific tasks	2.64	3	Moderate
4	Mastery of basic and advanced techniques required in my trade	2.61	5	Moderate
5	Ability to execute work according to approved standards and specifications	2.23	6	Low
6	Competence in measuring, setting out and ensuring dimensional accuracy	3.28	1	Moderate
	Grand Mean (Technical Skill Competency)	**2.76**		**Moderate**

The Moderate overall rating indicates that while artisans possess a functional level of technical skill, there remain notable weaknesses, particularly in the ability to execute work strictly according to approved standards and specifications (Mean = 2.23, Low). The relatively stronger performance on measuring and setting-out (Mean = 3.28) suggests that basic craft skills acquired through informal apprenticeship are present. However, the translation of those skills into consistent, specification-compliant workmanship is weaker. This finding is consistent with the high proportion of respondents trained through informal apprenticeship (46%), which may not emphasise formal standards compliance or systematic quality control. The Low mean on standards compliance is a critical finding because project quality and client satisfaction depend heavily on adherence to drawings and specifications.

Table 3: Problem-Solving Competency

S/N	Statement	Mean	Rank	Remark
7	Ability to identify problems that arise during construction activities	2.69	3	Moderate
8	Capacity to analyse construction challenges and propose practical solutions	2.80	1	Moderate
9	Ability to adapt work methods when unexpected site conditions occur	2.79	2	Moderate
10	Skill in making sound on-the-spot decisions to keep work progressing	2.61	4	Moderate
11	Ability to improvise safely when standard materials or tools are temporarily unavailable	2.43	5	Low
	Grand Mean (Problem-Solving Competency)	**2.66**		**Moderate**

Problem-solving competency is rated Moderate overall (grand mean = 2.66). The lowest mean on safe improvisation (2.43, Low) indicates a particular weakness when materials or tools are unavailable. Given the frequent material and tool shortages reported on many Nigerian construction sites, this gap has direct implications for both productivity and safety. The moderate scores on analysis and adaptation suggest that artisans can recognise problems but may lack the structured problem-solving capacity that formal training would develop.

Table 4: Safety Competency

S/N	Statement	Mean	Rank	Remark
12	Knowledge of PPE and consistent use of it	3.65	1	High
13	Awareness of common site hazards and ability to avoid them	2.80	2	Moderate
14	Ability to follow safety procedures and instructions given by supervisors	2.80	2	Moderate
15	Willingness to report unsafe conditions or practices on site	2.61	4	Moderate
16	Competence in working safely at heights, with electricity, or with heavy materials	2.23	5	Low
	Grand Mean (Safety Competency)	**2.82**		**Moderate**

Safety competency shows a mixed picture. Knowledge and use of PPE is the strongest single item across the entire competency scale (Mean = 3.65, High). However, competence in high-risk tasks is Low (Mean = 2.23). Willingness to report unsafe conditions is only Moderate. These results indicate that while basic PPE awareness exists possibly as a result of site rules or previous awareness campaigns deeper safety competence, especially in high-risk operations and proactive hazard reporting, remains limited. This is consistent with the literature on safety challenges in Bauchi construction sites

(Kawuwa et al., 2018; Waziri, 2026) and points to the need for practical, trade-specific safety training beyond general PPE instruction. Falls from height, electrical incidents and injuries involving heavy materials are among the most common causes of serious accidents on Nigerian construction sites (Shan-Shin et al., 2024).

Table 5: Quality Competency

S/N	Statement	Mean	Rank	Remark
17	Commitment to producing work that meets specified quality standards	2.63	3	Moderate
18	Ability to detect and correct defects before they become major problems	3.16	1	Moderate
19	Attention to detail and neatness in finishing work	2.64	2	Moderate
20	Willingness to re-do work when it falls below acceptable quality	2.61	4	Moderate
21	Understanding of quality requirements as stated in drawings and specifications	2.23	5	Low
	Grand Mean (Quality Competency)	**2.65**		**Moderate**

Quality competency is rated Moderate overall (grand mean = 2.65), but understanding of quality requirements stated in drawings and specifications is Low (Mean = 2.23). This is a critical finding because quality compliance begins with the ability to interpret and apply the stated requirements. The moderate ability to detect and correct defects is positive, yet the low understanding of formal quality requirements suggests that quality control is largely experiential rather than specification-driven. Combined with the Low mean on standards compliance under technical competency, these results indicate a systemic weakness in the formal quality management capability of the artisan workforce.

Table 6: Summary of Competency Dimensions

Competency Dimension	Grand Mean	Rank	Remark
Safety Competency	2.82	1	Moderate
Technical Skill Competency	2.76	2	Moderate
Problem-Solving Competency	2.66	3	Moderate
Quality Competency	2.65	4	Moderate

All four dimensions fall within the Moderate category. No dimension reached the High threshold (3.50). This indicates that artisans in the study area possess a moderate overall level of skill competency, with particular weaknesses in standards compliance, safe improvisation, high-risk safety competence, and understanding of formal quality requirements. The consistency of Moderate ratings across all four dimensions suggests that competency development efforts must be comprehensive rather than focused on a single dimension.

3.3 Factors Influencing Artisan Skill Competency

Organisational and site-level support factors were themselves only Moderate or Low (grand mean = 2.68). Access to modern tools, equipment and materials and working conditions and safety provisions on site ranked highest (both Mean = 2.80).

The lowest was motivation and recognition for good workmanship (Mean = 2.43, Low). Training and retraining availability was only Moderate (2.63). These findings indicate that the organisational and site-level support systems that should develop and sustain artisan competency are themselves only moderately present. The low rating for motivation is consistent with the literature on poor remuneration and lack of recognition of artisans in the Nigerian construction industry (Keftin & Kabiru, 2025; Mohammed, 2023) and points to a clear area for managerial intervention. Improving motivation, alongside structured training and better access to tools, would be expected to support the development of the competency dimensions shown earlier to be only Moderate.

3.4 Level of Project Completion Success

Project completion success was assessed across four dimensions: time, budget, quality and stakeholder satisfaction.

Table 7: Summary of Project Completion Success Dimensions

Success Dimension	Grand Mean	Rank	Remark
Budget Performance	2.74	1	Moderate
Quality Performance	2.74	1	Moderate
Time Performance	2.61	3	Moderate
Stakeholder Satisfaction	2.56	4	Moderate

All success dimensions fall within the Moderate category. Stakeholder satisfaction is the weakest dimension (grand mean = 2.56). Coordination with other trades is particularly Low (Mean = 2.23). This finding is important because construction is a multi-trade activity; poor inter-trade coordination contributes to delays, rework and client dissatisfaction. The Moderate overall rating of project success is consistent with the Moderate competency ratings and with literature identifying poor workmanship and rework as major causes of time and cost overruns on Nigerian construction projects (Oke & Ugoje, 2023; Adagba et al., 2021). Time performance is Moderate overall (2.61), but the Low rating for minimisation of artisan-related delays (2.43) indicates that rework and slow progress attributable to artisans remain a recognised problem. Budget performance (2.74) and quality performance (2.74) are Moderate, leaving room for improvement through better competency, particularly in the areas of standards compliance and defect prevention that were shown to be weak.

3.5 Influence of Artisan Skill Competency on Project Completion Success

In order to determine the influence of artisans' skill competency on project completion success, multiple regression analysis was performed. The four competency dimensions (Technical, Problem-Solving, Safety and Quality) were entered as independent variables, while the composite project completion success score (average of Time, Budget, Quality and Stakeholder Satisfaction) served as the dependent variable. The analysis was conducted using SPSS at a significance level of $p < 0.05$.

Table 8: Model Summary of Multiple Regression

R	R^2	Adjusted R^2	Std. Error	F (Sig.)
0.646	0.417	0.406	0.512	36.28 (0.000)

The multiple correlation coefficient (R) is 0.646, indicating a moderately strong positive relationship between the set of competency dimensions and project completion success. The coefficient of determination (R^2) is 0.417, meaning that the four competency dimensions jointly explain 41.7% of the variance in project completion success. The Adjusted R^2 of 0.406 confirms that the model retains explanatory power after adjusting for the number of predictors. The remaining 58.3% of variance is attributable to other factors not included in the model (such as material availability, weather, client-related delays and supervisory quality). The ANOVA results show that the F-statistic is 36.28 with a significance value of 0.000 ($p < 0.001$). This indicates that the regression model is statistically significant and that the four competency dimensions collectively have a significant influence on project completion success. The null hypothesis that there is no linear relationship between the competency dimensions and project completion success is therefore rejected.

Table 9: Coefficients of Multiple Regression

Predictor	B	Std. Error	Beta (β)	t	Sig.
(Constant)	0.842	0.187		4.503	0.000
Technical Skill Competency	0.271	0.068	0.287	3.985	0.000
Problem-Solving Competency	0.148	0.071	0.156	2.085	0.038
Safety Competency	0.229	0.065	0.241	3.523	0.001
Quality Competency	0.186	0.073	0.198	2.548	0.012

All four competency dimensions make statistically significant unique contributions to the prediction of project completion success. Technical skill competency has the strongest standardised beta coefficient ($\beta = 0.287$, $p < 0.001$), followed by Safety competency ($\beta = 0.241$, $p = 0.001$), Quality competency ($\beta = 0.198$, $p = 0.012$) and Problem-Solving competency ($\beta = 0.156$, $p = 0.038$). These results indicate that an increase of one standard deviation in technical skill competency is associated with an increase of 0.287 standard deviations in project completion success, holding the other predictors constant. The positive signs of all coefficients confirm that higher levels of each competency dimension are associated with higher levels of project completion success. The regression findings provide direct empirical support for the study objective: artisan skill competency, measured across its four dimensions, exerts a statistically significant and positive influence on project completion success in Bauchi State. Technical and Safety competencies make the strongest contributions, suggesting that interventions prioritising these two dimensions are likely to yield the greatest improvement in project outcomes.

Site supervisors' independent assessment of artisan performance and project success yielded a grand mean of 2.83 (Moderate). The highest-rated items related to quality of workmanship (2.98) and the control of rework/wastage and client satisfaction (both 2.95). The lowest was the rating of the adequacy of artisans' technical, safety and quality competencies (2.61). Supervisors rate overall artisan-related project outcomes as Moderate. Their rating of the adequacy of artisans' competencies is consistent with the artisans' self-assessed competency grand means (all between 2.65 and 2.82). This triangulation strengthens the reliability of the Moderate competency conclusion and supports the validity of the regression findings.

4.0 CONCLUSION

Based on the findings of this study, the following conclusions are drawn. The level of artisan skill competency (technical, problem-solving, safety and quality) among building construction artisans in

Bauchi State is Moderate. While basic craft and PPE knowledge exist, critical gaps remain in standards compliance, high-risk safety competence, and formal quality understanding. The organisational and site-level factors that should support competency development are themselves only Moderate or Low. Motivation and recognition are particularly weak. Project completion success on the dimensions of time, cost, quality and stakeholder satisfaction is Moderate. Stakeholder satisfaction and the minimisation of artisan-related delays are the weakest areas.

Artisan skill competency exerts a statistically significant and positive influence on project completion success. The four competency dimensions jointly explain 41.7% of the variance in success, with Technical and Safety competencies making the strongest contributions. Site supervisors' independent assessments corroborate the artisans' self-ratings, confirming that both competency and project success are Moderate rather than High. The predominance of informal apprenticeship training, limited formal education, and a young workforce suggest that structured competency development programmes have significant potential to raise both skill levels and project outcomes.

It is recommended that competency-based training programmes be institutionalised, focusing especially on standards compliance, high-risk safety operations, drawing interpretation and inter-trade coordination. Site supervision should be strengthened to provide continuous guidance and quality control. Motivation and recognition systems for good workmanship should be improved, alongside better access to modern tools and equipment. Certification enforcement should be pursued to raise the baseline competence of the artisan workforce. Future research could extend the model to other states in the North-East and incorporate additional contextual variables such as material availability, weather conditions and client-related factors to account for the residual variance unexplained by competency alone.

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