CRAFTSMEN'S PRODUCTIVITY IN THE GHANAIAN CONSTRUCTION INDUSTRY

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Keywords: ***Communication, Construction Industry, Craftsmen, Enablers, Productivity***

ABSTRACT

The construction industry in Ghana is a crucial driver of economic growth, but artisan productivity, particularly in the Cape Coast Metropolis, has been a persistent concern. This study aimed to identify the enablers of craftsmen productivity in the Ghanaian construction industry, specifically within the Cape Coast Metropolis. This study employed a mixed-methods approach, encompassing quantitative and qualitative data collection techniques. The quantitative component involved administering structured questionnaires to 70 craftsmen (20 masons, 10 carpenters, 10 plumbers, 20 steel benders, and 10 painters), and the qualitative component comprised semi-structured interviews with a purposefully selected sample of participants. The data analysis process utilised descriptive and inferential statistics, with factor analysis as the primary statistical tool to identify underlying variables influencing productivity. This study's findings underscore the multifaceted nature of artisan productivity, revealing that several factors significantly impact it. These factors include proper management of materials and tools, provision of a safe working environment, and the specific nature of the construction profession. Additionally, the study highlighted the importance of experience, training, teamwork, effective communication, and access to project information in enhancing productivity levels. This study concludes with recommendations to strengthen artisan productivity in the Ghanaian construction industry. These recommendations encompass prioritising safety measures, fostering a culture of teamwork, investing in training and development programs, ensuring access to project information, and addressing the unique challenges and expectations associated with different construction professions. By implementing these recommendations, stakeholders in the construction industry can improve productivity, ultimately fostering economic growth and development in Ghana.

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1.0 INTRODUCTION

The construction industry in Ghana plays a pivotal role in the nation's economic development, serving as a barometer for productivity and efficiency within the sector. Labour productivity, particularly among craftsmen, is a critical metric that reflects the overall effectiveness of construction activities. It is defined as the ratio of output to input (Bamfo-Agyei, Aigbavboa, & Thwala, 2019), making it an essential indicator for assessing the operational efficiency and economic viability of construction projects.

Despite its significance, a pervasive concern exists about the low productivity of craftsmen across Ghana, particularly in the Cape Coast Metropolis. The significant costs of steel bending craftsmanship, a sizable portion of overall contract expenses, highlight this concern. This issue affects project timelines and the quality of work delivered, leading to potential financial losses and diminished client satisfaction (Hofstadler & Kummer, 2021; Dlamini & Cumberlege, 2021). Furthermore, addressing these productivity challenges requires a multifaceted approach that includes training programs, better resource allocation, and innovative technologies to enhance efficiency and skill levels among artisans (Kawakami-Arevalo et al., 2022; Karl et al., 2022).

In addition, fostering a culture of collaboration among craftsmen and encouraging knowledge sharing can be crucial in improving overall productivity and craftsmanship quality (Shang et al., 2023; Amusan et al., 2021). Moreover, investing in mentorship initiatives can bridge the gap between experienced craftsmen and newcomers, ensuring that valuable skills and techniques are passed down effectively (Robinson-Edward et al., 2020). This holistic strategy aims to resolve immediate issues. It lays the foundation for sustainable growth and craftsmanship excellence, ultimately leading to a more resilient workforce capable of adapting to future challenges.

As researchers increasingly focus on the behavioural aspects of accountability, such as motivation, trust, and leadership dynamics, there is a pressing need to investigate how these elements affect craftsmen productivity in the construction industry (Agbo & Ayegba, 2014: 1678). Therefore, this study aims to fill this gap by systematically analysing the enablers of craftsmen productivity in the Ghanaian construction industry, focusing on the Cape Coast Metropolis. By identifying and understanding the factors that enhance productivity, this study seeks to provide actionable insights to inform improvement strategies. Ultimately, the findings will benefit contractors and clients and contribute to the sustainable growth of the construction sector in Ghana, thereby aligning with national economic development goals.

2.0 LITERATURE REVIEW

2.1 Theories Underpinning the Study

Quantifying productivity is a condition for empirical analysis in several research fields. What is usually needed is a measure of output differences that is not explained by different input choices and arises instead through marginal product increases (Del, Di Liberto, & Petraglia, 2011). The construction sector is an essential part of Ghana's economy and has made a substantial contribution to the country's growth and development. The literature reviewed reasons for construction productivity and examined productivity measurement techniques adopted by construction firms (Adinyira, Boadu, & Baiden-Amissah, 2018a).

Existing theories on factors affecting craftsmen's productivity in the construction industry often revolve around various aspects such as skill level and training, work environment, management supervision and motivation and morals; however, gaps in these theories for the Ghanaian construction industry may include cultural and socio-economic factors, access to resources and supply chain dynamics. The study also adopted the theory of accountability to improve transparency and performance. Productivity measure serves as a policy indicator to gauge how well an organisation or country is performing in the efficient use of resources, in our ability to achieve greater material well-being, offset inflationary pressures and compete internationally (Adinyira, et al, 2018b).

2.2 Theory of Accountability for Optimising Craftsmen's Productivity

Accountability in construction productivity relies heavily on performance metrics and indicators to assess individual and organisational effectiveness. However, measuring performance in construction can be challenging due to the subjective nature of project success, the influence of external factors (e.g., weather, regulatory changes), and the long-term nature of construction projects.

The Theory of Accountability may not provide sufficient guidance on effectively overcoming these measurement challenges." Various cultural and behavioural factors influence construction productivity, such as communication styles, organisational culture, and leadership practices. The Theory of Accountability may not sufficiently account for these factors or guide how to foster a culture of accountability that promotes productivity and performance improvement in construction settings. Construction projects are inherently risky, with factors such as cost overruns, schedule delays, and safety hazards posing significant challenges to project success. The Theory of Accountability may not fully integrate risk management principles into its framework or adequately address how accountability can mitigate project risks and uncertainties effectively; however, it provides researchers with a solid theoretical foundation, empirical avenues for exploration, policy relevance, interdisciplinary insights, and practical implications for enhancing accountability.

While the Theory of Accountability offers valuable insights into organisational behaviour and governance, it also has several weaknesses, such as:

b) ***Limited Focus on Power Dynamics:*** The theory often overlooks power dynamics within organisations and society if accountability mechanisms operate neutrally and equitably. However, power imbalances can distort accountability processes, leading to selective enforcement and impunity for those in positions of authority.

c) ***Overemphasis on Formal Structures:*** The Theory of Accountability focuses on formal accountability structures, such as rules, regulations, and reporting mechanisms, while neglecting informal mechanisms and cultural norms that shape behaviour. This narrow focus may overlook the role of social networks, trust, and informal sanctions in promoting accountability.

e) ***Difficulty in Measuring Accountability:*** Accountability is a complex and multifaceted concept that can be challenging to measure objectively. Traditional metrics, such as compliance rates or audit findings, may not capture the full extent of accountability or its impact on organisational performance and integrity. Addressing these weaknesses requires a more nuanced and context-sensitive approach to studying accountability. Researchers should consider the interplay of formal and informal mechanisms, power dynamics, and contextual factors in shaping accountability processes and outcomes. Additionally, there is a need for innovative methodologies and indicators that can capture the multidimensional nature of accountability in practice. By addressing these weaknesses, researchers can advance their understanding of accountability and contribute to more effective governance and organisational management.

2.3 Ghanaian Construction Industry

The building sector significantly influences the economic expansion and social progress of countries. With 13.7% of the country's GDP, Ghana's construction sector is second only to agriculture in terms of GDP contribution (Kheni et al., 2020). Organisational culture is another critical factor that affects the Ghanaian construction industry. Organisational culture in the sector is hierarchical, with limited employee input into decision-making. This culture impacts employee motivation, influencing output and H&S performance (Agyekum, Osei-Kyei, & Chan, 2016). A multi-stakeholder strategy, including the government, business leaders, and other stakeholders, is necessary to address these issues.

2.4 The Concept of Productivity and Its Measurement

Productivity is a crucial idea in business and economics, and measuring it is critical for assessing how well companies and economies are performing. Because construction is usually labour-intensive, productivity at the activity level is frequently referred to as labour productivity; it measures the input in terms of work hours and the output in terms of the material value of the work achieved (Agbo & Ayegba,2014). In Ghana, for example, the Free Zones Act of 1995 was passed, among other things, to provide incentives such as tax concessions to firms granted licenses under the Act (Ameyaw & Alfen, 2016).

2.5 The Concept of Craftsmen's Productivity

Human resources and technology are some factors that influence industry developments, especially among MSI leather artisans. In addition, human resources contribute to improvements in product yields. Higher levels of education can increase labour productivity, thereby raising wages for these labourers. (Susilowati, Ananda, Ashar, & Susilo, 2020). In Ghana, the agency responsible for the registration of contractors (i.e., building or civil contractors) is the Ministry of Water Resources, Works, and Housing (MWWOH) (Amoah, Ahadzie, & Dansoh, 2011).

2.6 Factors Affecting Craftsmen's Productivity

Although some research has been carried out on factors influencing productivity, there is still much to be done, even in developed countries, to improve productivity. Statistical methods can assess the impact of each factor, and attention can be given to those parameters that adversely affect productivity. Besides factors, factor groups also varied across regions in these studies. "Management factor group", "managerial factor group", "project-related factor group", "labour group", "technological factor group", and "supervision factor group" were evaluated as the most significant factor groups in Egypt, Palestine, Lithuania, Qatar, Kuwait and Indonesia, respectively (Kazaz., Ulubeyli., Acikara., & Er, 2016). Previous studies looked at the construction industry. However, many of the workers are employed on building sites. Most civil engineering projects are mechanised. Researchers have identified various factors related to the time aspect in different construction industries. Lack of materials, incomplete drawings, incompetent supervisors, tools and equipment, absenteeism, poor communication, and instruction time (Alinaitwe, Mwakali, & Hansson, 2007).

Poorly skilled workforce: A genuine lack of adequately skilled individuals available in the accessible labour market was the definition of skill shortage. According to this concept, a particular labour market is experiencing a scarcity of skilled employees (Zekaria & Mekonnen, 2021). This shows a discrepancy between the abilities required for a job and those already held by the workforce.

Poor Supervision: Several studies have found numerous facilitators and challenges to successful clinical supervision, which is a severe problem in the workplace (Rothwell, Kehoe, Farook, & Illing, 2021: 9). A thorough examination of the literature on abusive supervision examined many angles of the same problem. Supervising research degree candidates effectively is a complex, multi-faceted procedure that considers problems at all scales, from those of individual students (Tepper & Henle,2022, p. 487). A lack of medical staff monitoring in clinical practice settings has been associated with subpar patient outcomes.

Managerial Factors: Managers' knowledge and attitudes significantly impact output. Despite having access to cutting-edge technology and skilled labour, productivity is poor in many firms. The reason for the low production is ineffective, careless management. Managers with dedication and experience might achieve unexpected outcomes with regular individuals.

Type of Project: Building information modelling (BIM) digitally depicts a building project's structural and functional details. Construction projects can now benefit from BIM, which offers advantages such as greater collaboration, improved project visualisation, and higher productivity. The purpose of this literature study is to investigate how BIM affects building projects.

Enhanced Project Visualisation: BIM provides stakeholders with a clearer understanding of the project design and construction process.

Increased Efficiency: BIM has been shown to increase efficiency in construction projects. BIM enables better scheduling and sequencing of construction activities, reducing construction time and cost (Azhar, Khalfan, Maqsood & Ahmed, 2012: 17).

3.0 RESEARCH METHODOLOGY

3.1 Introduction

Using a mixed-methods approach, this study explores the enablers of artisans' productivity in the Ghanaian construction industry. Quantitative and qualitative data will be collected for the study using surveys, questionnaires and observations. The study's target audience will be

craftsmen in Ghana's construction industry. The research's conclusions will provide light on the crucial elements that determine. An essential part of Ghana's economy, the construction sector creates job opportunities and boosts the country's Gross Domestic Product (GDP). However, because of its significant influence on project deadlines, prices, and quality, stakeholders in the sector have expressed concern about artisans' productivity. (Acquah & Osei-Kyei. 2020: 49).

3.2 Research Design

This study uses a mixed-methods design that blends quantitative and qualitative techniques to achieve the research aims. As it enables the triangulation of data and the confirmation of findings, using mixed-methods research designs offers a more thorough knowledge of the phenomena under inquiry (Johnson & Onwuegbuzie, 2004 p. 14).

3.3 Method of Data Collection

Data collection using a quantitative method is part of the study's second phase, which gathers data on the variables of interest. A structured questionnaire with closed-ended questions will be employed.

3.4 Method of Data Analysis

To examine the correlations between the variables of interest, factor analysis will be evaluated using descriptive and inferential statistics (Field, 2018). As the statistical tool for this research, factor analysis will be used to group and identify the underlying variables that correlate. Factor analysis can be explanatory, where the goal is to discover the underlying structure, or confirmatory, which is used to test hypotheses about the structure of data (Fabrigar & Wegener, 2011).

3.5 Research Instrument

The research instrument includes a questionnaire. For this study, the questionnaire was selected as the research instrument. Sets of questionnaires were designed to obtain data relevant to the objectives outlined in this study.

3.6 Sample and Sampling Techniques

According to Mason (2006), a population is a pool of all potential individuals, measurements, or objects of interest. A population refers to the complete set of cases or elements from which a sample is taken (Bryman & Bell, 2007). Data is usually gathered from a sample to gather information about a large population. For this research, the population consists of five building construction sites in the Cape Coast metropolis, which constitute 60 artisans (20 masons, 10 carpenters, 10 plumbers, 20 steel benders, and 10 painters).

3.7 Sample Techniques

Purposeful sampling is used in this study. Purposeful sampling enables the researcher to collect data, resulting in improved understanding and more accurate study findings. The responses from construction artisans currently employed in the construction industry are considered valid and relevant to the achievement of the aim and objectives of this study.

4.0 ANALYSIS AND DISCUSSION

4.1 Demographic profile of the respondents

Table 1 provides a comprehensive overview of the demographic characteristics of the study participants. It highlights a predominance of male respondents (91%), with the majority possessing a Senior High School (29%) or Junior High School (24%) level education. Notably, masons and steel benders were the most prominent professional groups (29% and 28%, respectively), and a significant portion of respondents (39%) reported 11-15 years of work experience.

These demographic findings align with the literature on the Ghanaian construction industry, emphasising its male-dominated nature and the prevalence of workers with relatively lower levels of formal education (Agyekum et al., 2016). The overrepresentation of masons and steel benders underscores the industry's labour-intensive nature, which relies heavily on these trades. The substantial work experience of the majority of respondents suggests a mature workforce, which could have implications for productivity levels and the adoption of new technologies. However, this study also reveals some nuances that warrant further exploration. The presence of a small but significant proportion of female artisans challenges the traditional gender norms in the industry and highlights the evolving landscape of the construction workforce in Ghana.

Table 1: Demographic profile of the respondents

Demographics		**Respondents**	**Percentages %**
Gender	Male	64	91
	Female	6	9
	Total	**70**	**100**
Level of Education	Tertiary education HND	13	19
	SHS	20	29
	JHS	17	24
	Basic	10	14
	No Education	10	14
	Total	**70**	**100**
Professional background	Carpenters	12.5	18
	Masons	20	29
	Steel benders	19.5	28
	Painters	8	11
	Plumbers	10	14
	Total	**70**	**100**
Work experience	1 -5 years	12	17
	6 – 10 years	23	33
	11 - 15 years	27	39
	Over 16 years	8	11
	Total	**70**	**100**

4.2 Correlations Between the Categorical Variables

The correlation matrix (Table 2) showcases the interrelationships between various factors and their potential impact on craftsmen's productivity. Notably, 'Poor performance' exhibits strong positive correlations with 'Inadequate instruction' (0.543), 'Unsafe working conditions' (0.532), and 'Poor teamwork' (0.493). This suggests that these factors significantly contribute to decreased productivity.

Additionally, 'Inexperience craftsmen' shows a moderate positive correlation with 'Drawing skills' (0.616), indicating that a lack of experience might be associated with lower proficiency in drawing skills. Interestingly, 'Adequate communication' and 'Proper management' demonstrate weak correlations with most other variables, suggesting that their direct influence on productivity might be less pronounced in this context.
The strong positive correlation between 'Poor performance' and 'Unsafe working conditions' underscores the critical importance of safety in the construction sector. This aligns with Kazaz et al. (2016), who highlighted the significance of supervision and project-related factors, encompassing safety considerations. The implications are clear: prioritising safety measures and providing a secure working environment is crucial for worker well-being and directly contributes to enhanced productivity. Similarly, the substantial positive correlation between 'Poor performance' and 'Inadequate instruction' emphasises the necessity of clear communication and practical training. This resonates with Alinaitwe et al. (2007), who identified poor communication and instruction time as key factors affecting productivity. The findings suggest that investing in comprehensive training programs and ensuring clear communication channels are essential in mitigating performance issues and fostering a productive workforce.

The notable positive correlation between 'Poor performance' and 'Poor teamwork' highlights the importance of collaborative work environments. While existing literature often focuses on individual factors such as skill level and motivation, this study emphasises the collective aspect of construction work. The implication is that fostering a culture of teamwork and cooperation can significantly improve performance outcomes. Interestingly, the weak positive correlation between 'Adequate communication' and 'Poor performance' contradicts the commonly held belief that communication is a primary driver of productivity. This discrepancy might be attributed to the specific context of the Ghanaian construction industry, where hierarchical structures and limited employee input may hinder the effectiveness of communication efforts. Further research is warranted to explore the nuances of communication dynamics within this context. In conclusion, this study's findings reinforce the significance of safety, training, and teamwork in optimising craftsmen's productivity within the Ghanaian construction industry. Furthermore, it challenges the conventional notion of communication's role and calls for a deeper understanding of its impact in this setting. By addressing these identified factors and delving into the complexities of communication, stakeholders can enhance productivity and foster a thriving construction sector in Ghana.

Table 2 Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Poor performance	1.000															
(2) Drawing skills	0.526	1.000														
(3) Inexperience craftsmen	0.351	0.616	1.000													
(4) Unavailability of drawings on site	0.394	0.412	0.490	1.000												
(5) Delayed material delivery	0.502	0.524	0.505	0.509	1.000											
(6) Adequate communication	0.053	0.028	0.094	-0.057	0.038	1.000										
(7) Proper management	0.355	0.138	-0.055	-0.015	0.095	0.262	1.000									
(8) Task breakdowns	0.264	0.162	0.094	-0.055	0.023	0.272	0.389	1.000								
(9) Adequate training	0.319	0.225	0.223	0.115	-0.008	0.122	0.410	0.506	1.000							
(10) Inadequate instruction	0.543	0.445	0.400	0.392	0.330	0.268	0.224	0.417	0.332	1.000						
(11) Poor teamwork	0.493	0.532	0.317	0.277	0.479	0.281	0.098	0.152	0.155	0.486	1.000					
(12) Unsafe working conditions	0.532	0.302	0.306	0.304	0.585	0.296	0.150	-0.038	-0.087	0.287	0.542	1.000				
(13) Quick payment	0.225	0.149	0.175	0.186	0.118	0.100	0.304	0.320	0.481	0.227	0.029	0.077	1.000			
(14) Lack of experience	0.156	0.014	0.081	-0.002	0.057	0.032	0.013	-0.052	-0.041	0.102	0.098	0.147	-0.029	1.000		
(15) Age	0.134	0.101	0.165	0.227	0.086	-0.126	-0.038	-0.036	-0.016	0.180	0.223	-0.016	0.055	0.161	1.000	
(16) Type of Construction Profession	0.120	0.057	0.042	0.112	0.002	-0.098	0.151	-0.014	0.031	-0.156	-0.154	0.027	-0.161	-0.067	-0.008	1.000

obs=70)

Factor analysis/correlation Number of obs = 70

Method: principal factors Retained factors = 10

Rotation: (unrotated) Number of params = 115

4.4 Factor loadings (pattern matrix) and unique variances

The Table 3 analysis yielded 10 retained factors, explaining 114.87% of the total variance. The first three factors account for a substantial portion of the variance (Factor 1: 28.3%, Factor 2: 27.3%, and Factor 3: 27.2%), indicating their prominence in understanding the underlying structure of the data. The remaining factors explain progressively smaller portions of the variance. The LR test strongly rejects the hypothesis of independence, suggesting a significant relationship among the observed variables.

The emergence of 10 retained factors indicates a multi-faceted nature of craftsmen's productivity, aligning with previous research highlighting the complexity of productivity determinants in construction (Kazaz et al., 2016). However, the high cumulative variance explained by the first three factors suggests the potential to simplify productivity interventions by focusing on key drivers. The prominence of the first factor underscores the critical role of managerial factors, echoing findings from previous studies that emphasise the influence of management practices on productivity (Alinaitwe et al., 2007). This suggests enhancing managerial skills and adopting effective leadership styles could significantly boost craftsmen's productivity. Interestingly, the second factor indicates that project type significantly influences productivity. While prior research has acknowledged project-specific factors, the strength of this factor suggests a need for greater customisation of productivity strategies based on project characteristics (Azhar et al., 2012). The third factor underscores the importance of supervision, corroborating existing literature that identifies the quality of supervision as a crucial determinant of productivity (Rothwell et al., 2021). This emphasises the need to invest in supervisor training and development to improve oversight and communication on construction sites. Though explaining less variance, the remaining factors still contribute to the overall understanding of productivity. These factors, including skill level, work environment, and motivation, align with the broader theoretical framework of productivity determinants (Adinyira et al., 2018a).

Table 3: Observation Retained factors

Factor	Variance	Difference	Proportion	Cumulative
Factor1	2.090	0.070	0.283	0.283
Factor2	2.020	0.006	0.273	0.556
Factor3	2.014	1.480	0.272	0.828
Factor4	0.534	0.022	0.072	0.900
Factor5	0.512	0.032	0.069	0.970
Factor6	0.480	0.096	0.065	1.035
Factor7	0.384	0.112	0.052	1.087
Factor8	0.271	0.107	0.037	1.123
Factor9	0.164	0.139	0.022	1.145
Factor10	0.025	.	0.003	1.149

LR test: independent vs. saturated: chi2(120) = 389.82 Prob>chi2 = 0.0000

4.5 Rotated factor loadings (pattern matrix) and unique variances

Table 4 presents the rotated factor loadings (pattern matrix) and unique variances extracted from the analysis. The results reveal ten distinct factors influencing craftsmen's productivity. Notably, 'Unsafe Working' displays the highest loading (0.809) on Factor 1, suggesting its significant impact on productivity. Similarly, 'Inexperience Craftsmen' (0.766) and 'Adequate Training' (0.749) load strongly

on Factor 2 and 3, respectively, highlighting their importance. Other factors, such as 'Poor Teamwork,' 'Delayed Material Delivery,' and 'Proper Management,' also exhibit substantial loadings on various factors. The 'Uniqueness' column indicates the variance in each variable not explained by the extracted factors, with 'New Experience' showing the highest uniqueness (0.844), suggesting it may be influenced by additional factors beyond those identified in this analysis.

The emergence of factors related to skill and experience (Factor 2), training and task management (Factor 3), and communication (Factor 5) echoes previous research findings (Kazaz et al., 2016; Alinaitwe et al., 2007). This confirms the persistent importance of these factors in influencing productivity. The significance of safety and performance issues (Factor 1) also resonates with the literature, highlighting the critical role of a safe working environment in ensuring optimal productivity (Agyekum et al., 2016).

The prominence of teamwork and communication (Factor 4) underscores the collaborative nature of construction work and the need for effective communication strategies. This suggests that interventions focusing on team building and communication skills training could significantly enhance productivity. Identifying a factor related to the type of construction profession and management practices (Factor 6) suggests a potential interplay between these variables. This warrants further investigation into how different professions may require tailored management approaches to optimise productivity. The possible influence of age (Factor 7) on productivity raises questions about the experience-productivity relationship and the potential need for age-specific training and support mechanisms.

4.6 Factor rotation matrix

The factor analysis extracted ten underlying factors for the variance observed in the 17 variables related to craftsmen's productivity, as shown in Table 5. The initial three factors are particularly noteworthy, explaining 83% of the variance. Factor 1, explaining 28.27% of the variance, appears to be associated with on-site challenges and worker performance, encompassing 'unsafe working conditions,' 'poor teamwork,' 'delayed material delivery,' and 'poor performance.' Factor 2, contributing 27.32% to the explained variance, seems to reflect issues around skills and planning, including 'inexperienced artisans,' 'drawing skills,' and the 'unavailability of drawings on site.' In contrast, Factor 3, accounting for 27.24% of the variance, suggests effective management and communication aspects, comprising 'adequate communication,' 'proper management,' 'task breakdown,' and 'adequate training.'

The results align with the literature underscoring established connections between productivity and factors such as safety, communication, and skilled labour (Kazaz et al., 2016). The prominence of Factor 1, encompassing safety and teamwork, resonates with the literature's emphasis on the work environment's role in productivity (Adinyira et al., 2018a). The significance of experience and skill, reflected in Factor 2, further echoes prior research (Susilowati et al., 2020). Additionally, the emergence of communication and management in Factor 3 supports the literature's assertion of their influence on construction outcomes (Agyekum et al., 2016).

However, the findings also offer new insights. The clustering of delayed material delivery with safety and teamwork in Factor 1 suggests an interplay between these variables that warrants further investigation. While material delays are recognised as productivity impediments, their association with safety and teamwork underscores the potential for cascading effects, where delays disrupt collaboration and compromise safety practices. Moreover, the presence of 'drawing skills' and 'unavailability of drawings on-site' within Factor 2 points toward the critical role of information accessibility in craftsman

productivity. This highlights the need for effective knowledge management and communication strategies on construction sites. The implications of these findings are multifaceted. Addressing safety concerns and fostering teamwork should be prioritised, as their influence extends beyond immediate productivity to encompass the overall project environment. Enhancing the skills and experience of artisans, coupled with improved access to project information, can significantly boost productivity. Moreover, clear communication and effective management practices remain crucial for successful project execution.

Table 4 Rotated factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Factor10	Uniqueness
Poor performance	0.600	0.300	0.374	0.136	-0.179	0.144	0.109	0.189	-0.071	-0.017	0.287
Drawing skills	0.296	0.660	0.182	0.289	-0.097	0.064	-0.078	0.029	-0.073	0.040	0.332
Inexperience craftsmen	0.191	0.766	0.080	0.005	0.075	-0.029	0.068	0.017	-0.017	-0.039	0.358
Unavailability of drawing on site	0.293	0.558	0.030	-0.062	-0.141	0.035	0.173	0.094	0.283	-0.015	0.458
Delayed material delivery	0.604	0.495	-0.021	0.041	-0.081	-0.038	-0.041	0.005	0.095	0.086	0.363
Adequate communication	0.227	-0.055	0.211	0.100	0.556	-0.076	-0.071	0.051	-0.023	-0.001	0.568
Proper management	0.246	-0.124	0.591	-0.005	0.082	0.206	-0.011	-0.009	-0.034	0.077	0.519
Task breakdown	-0.018	0.041	0.639	0.128	0.176	-0.005	-0.080	0.197	-0.049	0.050	0.492
Adequate training	-0.067	0.182	0.749	0.046	0.002	-0.001	0.005	-0.005	0.008	-0.058	0.395
Inadequate instructions	0.288	0.367	0.379	0.233	0.133	-0.139	0.150	0.393	0.034	-0.003	0.368
Poor teamwork	0.518	0.292	0.083	0.531	0.127	-0.127	0.096	0.087	-0.008	-0.004	0.308
Unsafe working	0.809	0.171	-0.054	0.035	0.170	-0.004	-0.008	-0.019	0.004	-0.020	0.282
Quick Payment	0.075	0.140	0.560	-0.155	-0.033	-0.254	0.062	-0.091	0.118	0.004	0.546
New experience	0.162	-0.006	-0.047	0.003	0.012	-0.059	0.275	0.062	-0.205	-0.044	0.844
age	0.015	0.165	-0.026	0.146	-0.141	-0.035	0.454	0.078	0.051	0.004	0.715
Type of	0.022	0.056	0.014	-0.123	-0.089	0.546	-0.023	-0.055	0.017	-0.000	0.671

Table 5 Factor rotation matrix

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Factor9	Fact~10
Factor1	0.619	0.607	0.405	0.222	0.042	-0.026	0.095	0.150	0.029	0.010
Factor2	-0.291	-0.297	0.882	-0.022	0.182	-0.019	-0.090	0.062	-0.048	0.011
Factor3	-0.541	0.558	0.140	-0.215	-0.520	0.111	0.145	-0.037	0.157	-0.021
Factor4	0.354	-0.154	0.111	-0.381	-0.244	0.719	-0.253	-0.226	0.014	0.049
Factor5	0.112	-0.374	0.054	0.250	-0.441	0.172	0.677	0.285	-0.133	-0.025
Factor6	0.293	-0.165	0.102	-0.603	-0.139	-0.537	0.265	-0.206	0.304	-0.027
Factor7	-0.108	0.141	-0.083	-0.394	0.619	0.348	0.466	0.258	0.085	-0.108
Factor8	-0.012	0.135	0.051	-0.061	0.085	-0.046	0.260	-0.586	-0.731	-0.142
Factor9	-0.053	-0.047	0.047	0.413	0.167	0.169	0.264	-0.622	0.555	0.036
Factor10	-0.032	0.039	-0.016	-0.065	0.058	-0.018	0.120	-0.024	-0.109	0.981

5. CONCLUSION AND RECOMMENDATIONS

The study aimed to identify the enablers of artisans' productivity in the Ghanaian construction industry, focusing on the Cape Coast Metropolis. The research employed a quantitative approach to gather data from 70 artisans. The findings revealed that several factors significantly influence artisans' productivity, including proper management of materials and tools, safe working conditions, and the specific nature of the construction profession.

The study also highlighted the importance of experience, training, teamwork, communication, and access to project information in enhancing productivity. The study findings align with the literature, emphasising the critical role of effective management, safety, and skill development in improving construction productivity. However, the study also offers new insights into the interplay of these factors and identifies additional areas for consideration, such as the impact of material delays on teamwork and safety and the importance of information accessibility for artisans.

Based on these findings, several recommendations can be made to enhance artisans' productivity in the Ghanaian construction industry. First and foremost, construction firms and policymakers should prioritise safety measures and create a culture of teamwork on construction sites. This can be achieved through regular safety training, clear communication channels, and fostering a collaborative work environment. Second, investing in training and development programs for artisans is crucial to enhancing their skills and knowledge. These programs should be tailored to the specific needs of different professions and address potential skill gaps. Third, ensuring access to project information, such as drawings and specifications, is essential for craftsmen to perform their tasks effectively. Implementing knowledge management systems and promoting open communication can facilitate information sharing and improve productivity.

5.1 Practical Implications

The study's findings have several practical implications for stakeholders in the Ghanaian construction industry. Contractors can utilise these insights to develop targeted interventions to improve project productivity. This may involve implementing better resource management practices, investing in safety training, and fostering a culture of teamwork and collaboration. Clients can also benefit from these findings by understanding the factors contributing to project delays and cost overruns. This knowledge can enable them to make informed decisions when selecting contractors and to set realistic expectations for project timelines. Policymakers can use the study's recommendations to develop policies and regulations that promote productivity and safety in the construction industry. This may include setting standards for training and certification, mandating safety measures, and encouraging the adoption of innovative technologies.

5.2 Social Implications

Enhancing artisans' productivity has broader social implications for Ghana. Improved productivity can lead to faster project completion, lower costs, and greater economic growth. This can create more job opportunities, improve living standards, and contribute to the country's overall development. Furthermore, focusing on safety and teamwork can create a more positive and supportive work environment for artisans, increasing job satisfaction and well-being.

5.3 Future Research

While this study provides valuable insights into the enablers of artisans' productivity, there are several avenues for future research. First, longitudinal studies could track the long-term impact of interventions to improve productivity. Second, comparative studies could examine artisans' productivity across different regions of Ghana and construction sectors. Third, research could examine the role of technology and innovation in enhancing productivity, particularly in the Ghanaian construction industry. Finally, further investigation is needed to understand the complex interplay among cultural, social, and economic factors that influence artisans' productivity.

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