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DETERMINANTS OF ARTISAN PRODUCTIVITY ON CONSTRUCTION SITES IN ADAMAWA STATE, NIGERIA: THE ROLE OF INCENTIVES

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ABSTRACT

Low productivity among construction artisans remains a persistent challenge in Nigeria, particularly in informal and resource-constrained construction environments where weak incentive structures contribute to project delays, cost overruns, and inefficient resource utilization. Despite the widespread use of incentive schemes, there is limited context-specific evidence on how different types of incentives influence artisan productivity at the site level, especially in Adamawa State. This study therefore examines the effect of financial and non-financial incentives on artisan productivity on selected building construction sites in the state. An exploratory survey design was adopted, with data collected from 96 artisans including masons, carpenters, plumbers, iron benders and tilers across key trades using a structured questionnaire. Data were analyzed using descriptive statistics, correlation, and regression analysis. The findings reveal that financial incentives dominate current practice, with performance bonuses (mean - 0.87) and profit sharing (mean - 0.85) ranking highest, while non-financial incentives such as recognition (mean - 0.49) and praise (mean - 0.48) remain underutilized. Correlation results show strong positive relationships between incentives and productivity components, while regression analysis indicates that incentives explain 51% of the variation in productivity. The study demonstrates that although financial incentives are critical in driving short-term performance, their effectiveness is constrained when not supported by structured implementation and complementary non-financial motivators. The study concludes that a balanced and well-integrated incentive strategy can significantly enhance artisan productivity. The study recommends that construction managers adopt transparent, timely, and multi-dimensional incentive systems aligned with site operations to improve worker performance and overall project delivery.

Keywords: Artisans, Building, Construction, Incentive, Productivity

INTRODUCTION

The relationship between incentives and artisan productivity on building construction sites has attracted considerable attention in construction management literature, particularly in developing regions (Daniel et al., 2020). This is because artisans are central to the successful delivery of construction projects, as their output directly affects quality and timelines. According to Afuye (2016), the efficiency of site workers is largely dependent on how well they are motivated through structured incentive systems. However, low productivity among construction artisans remains a persistent challenge in developing regions, often resulting in project delays, cost overruns, and compromised quality. This issue is particularly evident on building construction sites in Nigeria and particularly Adamawa State, where irregular wage payments, limited training opportunities, and poor working conditions frequently undermine artisan commitment and output.

Soji et al. (2022) define productivity as output per unit of input, reflecting how efficiently labour, time, and resources are utilized. Incentives, on the other hand, are rewards or penalties designed to influence behaviour and improve performance (Ebekozien et al., 2021). Existing literature classifies incentives into financial and non-financial types, both of which affect artisan productivity in different ways (Ebekozien et al., 2021; Amusan et al., 2017). Financial incentives such as wages, bonuses, and overtime payments are widely recognized as strong motivators, particularly in economically constrained environments (Ibrahim et al., 2022; Lindsay et al., 2016). However, non-financial incentives, including recognition, job security, training, and conducive work environments, also play a crucial role in sustaining long-term performance (Ayeniyoa et al., 2020; Afolabi et al., 2018; Ugulu, 2017).

Empirical studies have established a positive relationship between incentives and productivity in the construction sector (Assad et al., 2021; Dalyop et al., 2017). Amusan et al. (2021) found that improved incentive schemes significantly increased output among construction workers in developing countries. In a similar vein, Dalyop et al. (2017) observed that poor remuneration and lack of motivation were major causes of low productivity among Nigerian artisans. Furthermore, timely and transparent payment systems are also critical in sustaining artisan motivation and productivity. Delays in wage payments often lead to dissatisfaction and reduced efficiency. Idowu et al. (2022) noted that irregular payments are among the most significant factors affecting labour productivity in construction projects.

However, much of this evidence is generalized across developing countries, with limited context-specific analysis of how different incentive schemes interact to influence artisan productivity at the local level. In Adamawa State, issues such as delayed payments, weak management practices, and limited recognition systems persist, yet there is a scarcity of empirical data quantifying their combined effects on productivity. This represents a critical gap in the literature. Furthermore, cultural and social dynamics in Nigeria where respect, recognition, and interpersonal relationships are highly valued suggest that non-financial incentives may be as important as financial rewards in motivating artisans (Holt et al., 2023., Daniel et al., 2020; Dalyop et al., 2017). Despite

this, existing studies tend to emphasize monetary incentives, with less attention given to how a balanced incentive structure can enhance productivity in practice (Soji et al., 2022; Amusan et al., 2021; Gyamfi et al., 2020; Afuye 2016).

This study is anchored in motivational theories, particularly McGregor's Theory Y, which posits that workers are inherently motivated to perform when supported by favourable conditions (McGregor, 1960 cited in Idowu and Aligamhe, 2023), and expectancy theory, which links effort to anticipated rewards (Gyamfi et al., 2020). These perspectives provide a theoretical basis for understanding how both financial and non-financial incentives can influence artisan productivity outcomes. Therefore, this study aims to examine the relationship between financial and non-financial incentive schemes and artisan productivity on selected building construction sites in Adamawa State to bridge the existing gap in literature and offer practical insights for improving artisan performance and overall project delivery in the Nigerian construction industry.

MATERIALS AND METHODS

The study adopted an exploratory survey design to examine the relationship between incentive schemes and workers' productivity on construction sites in Adamawa State, Nigeria. This design was considered appropriate because it facilitates the collection of context-specific empirical data from artisans operating within real project environments, thereby enabling an evidence-based assessment of motivation–productivity relationships in construction settings (Cresswell & Cresswell, 2018). The study was conducted across ten (10) active building construction sites located in Yola, Adamawa State. The sites were identified through a preliminary reconnaissance survey of ongoing construction activities. Site selection was guided by three inclusion criteria: the site must be actively under construction at the time of data collection, the site must engage multiple artisan categories such as carpenters, masons, iron benders, plumbers, and tilers, and access approval must be granted by site supervisors or contractors. This structured selection process ensured that only operational and data-accessible sites were included, thereby improving the relevance and reliability of field observations.

From the selected sites, a total population of 180 artisans was established through a direct site-by-site enumeration exercise, as no formal registry of artisans exists in the study area. This population served as the sampling frame for the study. A sample size of 130 artisans was determined using Yamane's (1967) statistical formula for finite populations. However, only 96 completed questionnaires were deemed valid for analysis, representing a response rate of 73.8%. The reduction from 130 to 96 was due to 18 incomplete questionnaires, 9 non-returns, and 7 responses excluded during data screening because of inconsistent or missing data. Only fully completed and reliable responses were included in the final dataset to ensure analytical accuracy and reduce bias from incomplete information. A combination of sampling techniques was employed in the study. Cluster sampling was first used to identify the ten active construction sites, while purposive sampling was then applied to select artisans within each site who had direct experience with incentive practices and had worked on the site for at least six months. This approach ensured that respondents had sufficient exposure to incentive-related dynamics in construction operations. Although this limits broad statistical generalization, it enhances analytical depth and contextual understanding of the phenomenon under investigation (Demir, 2022). To improve representativeness across trades, equal allocation was applied, with 26 questionnaires assigned to each artisan category (carpenters, masons, iron benders, plumbers, and tilers). This was necessary due to the absence of reliable workforce distribution data across the selected sites and allowed for meaningful cross-trade comparison.

Data were collected using a structured questionnaire designed with five-point Likert-scale items measuring financial incentives, non-financial incentives, and perceived productivity. Likert-scale composite scores were treated as continuous variables in line with established practice in behavioural construction research. The instrument was adapted from prior motivation–performance studies by Mutale (2013) and contextualized to reflect construction site realities. Composite indices were computed by averaging item scores for each construct. Productivity was operationalized as perceived labour efficiency, task completion effectiveness, and resource utilization efficiency as reported by artisans, due to the absence of standardized productivity measurement systems in informal construction settings. Content validity of the instrument was established through expert review by three specialists in construction management and measurement evaluation. A pilot study was also conducted to ensure clarity and contextual appropriateness of the questionnaire items. Reliability testing using Cronbach's Alpha confirmed internal consistency of all constructs, with values exceeding the acceptable threshold of 0.70 (Sekaran & Bougie, 2013), indicating that the instrument was reliable for analysis.

Data collection was carried out over a two-week period during active working hours to ensure accessibility of respondents and relevance of responses. Questionnaires were administered face-to-face to improve response accuracy. To reduce bias, respondents completed the instruments individually without interference from site supervisors. For respondents with limited literacy, trained research assistants provided neutral clarification without influencing responses. Ethical standards were strictly observed through voluntary participation, informed consent, and assurance of confidentiality throughout the process including accommodation for varying literacy levels. Data were coded and analyzed using IBM SPSS Statistics version 25. Descriptive statistics were used to summarize respondent characteristics and incentive patterns, while Pearson correlation analysis was used to examine relationships between variables. Multiple regression analysis was employed to assess the effect of incentives on productivity. Prior to analysis, key statistical assumptions including normality, linearity, homoscedasticity, and multicollinearity were tested and confirmed to be satisfactory. Variance Inflation Factor (VIF) values confirmed the absence of multicollinearity.

RESULTS AND DISCUSSION

Questionnaires Responses and Respondents' Characteristics

A total of 96 valid questionnaires were retrieved out of 130 administered, representing a response rate of 73.8%, which indicates a strong level of participation among the targeted artisans. The distribution across trades shows a relatively balanced representation, with masons recording the highest responses with 21, followed by carpenters with 20. 19 Plumbers and tilers each responded 19, while iron benders had the lowest response rate of 17. This spread suggests that the findings reflect a broad cross-section of construction site operatives. The respondents were largely experienced, with between 10 and 20 years of practice, indicating that the data is grounded in practical, long-term industry exposure.

The educational background of respondents reveals that only 45% attained secondary education, while the remaining 55%

had either primary education or no formal schooling. This characteristic is particularly important in understanding motivational preferences, as lower levels of formal education often correlate with a stronger inclination toward immediate and tangible rewards. Furthermore, the dominance of respondents involved in building construction projects (89%) compared to civil works (11%) suggests that the findings are more representative of building construction practices within Adamawa State.

Incentive Schemes in the Adamawa State Construction Industry

Table 1 reveal a clear dominance of financial incentives in the construction industry in Adamawa State, with performance bonuses (0.87), profit sharing (0.85), gain sharing (0.80), and discretionary bonuses (0.79) ranking highest. In contrast, non-financial incentives such as job security (0.51), recognition (0.49), and praise (0.48) recorded significantly lower rankings. This pattern is consistent with earlier studies by Amusan et al. (2021) and Gyamfi et al. (2020), which observed that construction organizations in developing contexts tend to prioritize direct financial rewards due to prevailing economic conditions.

From a theoretical standpoint, these findings strongly align with Expectancy Theory reported by Gyamfi et al. (2020), which suggests that workers are more motivated when there is a clear and immediate relationship between effort and reward. In the context of Adamawa State, where employment is often informal and income streams are uncertain, performance-based incentives provide tangible and predictable outcomes, thereby strengthening motivation. Similarly, Herzberg's Two-Factor Theory helps explain why financial incentives dominate, as basic economic needs must first be satisfied before intrinsic motivators such as recognition or praise can have a meaningful impact as suggested by Ayeniyoa et al. (2020) and Afolabi et al. (2018).

Table 1: Various Incentive Programs used in Building Construction Sites in Adamawa State

S/N	Incentive Provided	5	4	3	2	1	N	Total	Mean	Rank
1	Performance bonus	69	9	3	11	4	96	416	0.87	1st
2	Profit sharing	60	18	4	9	5	96	407	0.85	2nd
3	Gain sharing	62	2	12	8	12	96	382	0.80	3rd
4	Discretionary bonus	57	12	7	3	17	96	377	0.79	4th
5	Commission	54	9	6	7	20	96	358	0.75	5th
6	Pay for knowledge	18	12	24	6	36	96	258	0.53	7th
7	Perquisites	22	14	9	16	35	96	260	0.54	6th
8	Job security	7	9	16	21	43	96	246	0.51	8th
9	Recognition	6	8	18	21	43	96	201	0.49	9th
10	Praise	4	12	14	24	42	96	200	0.48	10th

Source: Field Work

The findings also reflect the structural realities of the local construction industry, where artisans are frequently engaged on short-term project contracts with limited job security. Under such conditions, immediate financial gains are prioritized over long-term or intangible benefits. This supports the observations of Dalyop et al. (2017), who identified poor remuneration and weak motivation as major contributors to low productivity among Nigerian artisans. However, the low ranking of non-financial incentives should not be interpreted as a lack of importance. Rather, it highlights their limited application within the industry. Studies by Holt et al. (2023) and Soji et al. (2022) suggest that in more structured environments, non-financial incentives such as recognition, career development, and improved working conditions play a critical role in sustaining long-term productivity. Their underutilization in Adamawa State therefore represents a gap in managerial practice rather than an absence of impact.

Challenges Affecting the Implementation of Incentives

Table 2 presents the respondents' perceptions of the major challenges associated with the implementation of incentives in the Nigerian construction industry. The results shows that unplanned incentive programs (0.95), scheduling difficulties (0.92), and budget constraints (0.77) as the most significant challenges affecting the implementation of incentive systems. These findings suggest that the effectiveness of incentives is less dependent on their availability and more on how well they are designed and integrated into project management processes. Furthermore, unplanned incentive programs introduce ambiguity into the reward structure, thereby weakening the motivation–performance relationship described in Expectancy Theory as documented by Gyamfi et al. (2020). When workers are uncertain about how their efforts translate into rewards, motivation is likely to decline. This supports the findings of Soji et al. (2022), who reported that poorly structured incentive systems can reduce clarity and weaken supervisory effectiveness on construction sites.

Scheduling difficulties reflect the interdependent nature of construction activities, where multiple trades must coordinate within constrained timelines. Incentive systems that focus narrowly on individual performance may conflict with team-based workflows, resulting in inefficiencies. This aligns with earlier studies by Gyamfi et al. (2020) and Afolabi et al. (2018) which emphasize the need for incentive structures that balance individual and collective performance. Budget constraints further highlight the financial limitations faced by contractors in the Nigerian construction industry. As noted by Ayeniyoa et al. (2020), many firms operate under tight margins and unstable cash flows, which restrict their ability to implement consistent and effective incentive programs. In such situations, irregular or delayed incentives may undermine worker trust and reduce motivation, reinforcing the findings of Idowu et al. (2022) regarding the negative impact of payment delays on construction performance.

Although adverse relationships among workers ranked lowest, this finding should be interpreted cautiously. Because poorly designed incentive systems can still foster unhealthy competition, as noted by Gyamfi et al. (2020) and Afolabi et al. (2018). The relatively low ranking may reflect limited recognition of such issues rather than their absence.

Table 2: Challenges Affecting the Implementation of Incentives in Adamawa Construction Industry

S/N	Challenges	5	4	3	2	1	N	Total	Mean	Rank
1	Unplanned Incentive program	77	15	3	1	2	96	458	0.95	1st
2	Scheduling difficulties	74	12	5	2	3	96	440	0.92	2nd
3	Budget difficulty	24	56	3	4	9	96	370	0.77	3rd
4	Approval of Changes	43	18	13	9	13	96	357	0.74	4th
5	Sacrificing quality for speed	31	18	19	21	7	96	333	0.70	5th
6	Delay in specification and requirement review	22	5	14	28	27	96	255	0.53	6th
7	Adverse relationship among the working team	11	8	19	8	50	96	210	0.44	7th

Source: *Field Work*

Relationship Between Incentives and Productivity

Inferential Analysis

Table 3 presents the correlation analysis between incentives and the major components of productivity, namely labour, capital, materials, and management and technology. The relationship was measured using the correlation coefficient (r-value) and the level of significance (p-value). The correlation analysis demonstrates strong positive relationships between incentives and productivity components: labour ($r = 0.73$), capital ($r = 0.75$), materials ($r = 0.69$), and management and technology ($r = 0.72$), all statistically significant ($p < 0.05$). These findings are consistent with prior studies by Idowu et al. (2022), Soji et al. (2022), and Afuye (2016), which established that incentive systems enhance worker motivation, efficiency, and overall productivity in construction environments.

The strong relationship between incentives and labour productivity is expected, as incentives directly influence worker effort and commitment. This supports the assertion by Idowu and Aligamhe (2023) that motivation plays a critical role in improving construction workforce performance. However, the observed relationships with capital, materials, and management should be interpreted as indirect rather than causal. Incentives do not directly alter the availability of resources but influence worker behaviour in ways that improve resource utilization. For example, motivated workers may handle materials more carefully, reduce wastage, and use equipment more efficiently. This interpretation aligns with Idowu et al. (2022), who emphasized behavioural factors in resource management.

Similarly, the relationship between incentives and management and technology may reflect broader organizational practices. Firms that implement structured incentive systems are also more likely to adopt better management strategies and technological tools, suggesting that incentives are part of a wider performance management framework. This observation supports earlier findings by Soji et al. (2022) and Afuye (2016) that emphasized good management strategies improve productivity.

Table 3: Pearson Correlation

S/N	Variable Pair	r-value	p-value	Relationship
1	Incentives → Labour	0.73	0.001	Strong positive
2	Incentives → Capital	0.75	0.001	Strong positive
3	Incentives → Materials	0.69	0.002	Strong positive
4	Incentives → Management and Technology	0.72	0.001	Strong positive

Source: Field Work

Effect of Incentives on Productivity

Linear Regression

Table 4 presents the results of a linear regression analysis examining the effect of incentives on productivity in the construction industry. The analysis includes the coefficient of determination (R^2), the F-value, and the p-value to assess the strength and significance of the relationship. The regression analysis indicates that incentives explain 51% of the variation in productivity ($R^2 = 0.51$), with a statistically significant model ($p < 0.05$). This finding confirms that incentives are a major determinant of productivity, consistent with the work of Amusan et al. (2021), who reported that incentive systems account for a substantial proportion of variation in worker output. However, the remaining 49% of unexplained variation highlights the influence of other factors such as skill levels, supervision quality, environmental conditions, and resource availability. This reinforces the argument that productivity in construction is inherently multidimensional, as also noted by Idowu et al. (2022).

Table 4: Linear Regression

S/N	Variable Relationship	R^2	F-value	p-value
1	Incentives → Productivity	0.51	12.45	0.000

Source: Field Work

Multiple Regression

Table 5 presents the summary of multiple regression analysis that examines the combined effect of several independent variables (likely components of incentives) on productivity in the construction industry. Key statistics included are R, R^2, Adjusted R^2, standard error, F-value, and significance level. The R value of 0.652 indicates a moderate to strong positive correlation between the set of independent variables and productivity, suggesting that the model explains a substantial relationship between the predictors and the outcome. The R^2 value of 0.455 shows that approximately 45.5% of the variance in productivity is explained by the combined effect of the independent variables in the model. The Adjusted R^2 of 0.428 accounts for the number of predictors relative to the

sample size, indicating that after adjusting for model complexity, about 42.8% of the variation in productivity is still explained by the predictors. This suggests the model has good explanatory power while remaining reliable. The F-value of 38.720 with a p-value (Sig.) of 0.000 indicates that the overall regression model is statistically significant. In other words, the set of independent variables collectively has a significant association with productivity, and the likelihood that this result is due to chance is extremely low.

Table 5: Model Summary of Multiple Regression

Model	R	R^2	Adjusted R^2	Std. Error	F	Sig.
1	0.652	0.455	0.428	0.312	38.720	0.000

Source: Field Work

The multiple regression results further demonstrate that a combination of incentive types explains a significant portion of productivity variation, supporting the findings of Idowu et al. (2022) that intrinsic and extrinsic motivators jointly influence performance outcomes. This suggests that reliance on financial incentives alone may not be sufficient for sustained productivity improvement. The dominance of financial incentives reflects the economic realities of the workforce, while the limited use of non-financial incentives indicates gaps in managerial practice. These findings demonstrate that incentives play a significant role in shaping productivity outcomes in the Adamawa State construction industry. Consistent with the findings of Amusan et al. (2021) and Gyamfi et al. (2020), that a balanced incentive strategy which integrates both financial and non-financial elements is more effective in enhancing productivity. Implying that while financial incentives address immediate economic needs, non-financial incentives contribute to long-term motivation, job satisfaction, and workforce stability.

From a practical perspective, improving artisan productivity requires a structured and evidence-driven approach to incentive management. The prominence of unplanned incentive programs and scheduling difficulties in the findings of this study indicates that construction managers must develop transparent and well-defined incentive systems that clearly link performance to rewards. Therefore, aligning incentives with project timelines and team-based workflows is particularly critical in construction environments where tasks are highly interdependent. Furthermore, the study highlights the importance of timely and consistent reward delivery, as irregular payments undermine trust and weaken motivation, especially in income-dependent labour settings. While financial incentives ranked highest, the low utilization of non-financial incentives such as recognition and praise reveals a significant gap in practice. Making it is important to address this gap through training opportunities, improved working conditions, and recognition systems that can enhance long-term motivation and workforce stability. Thus, a balanced and well-integrated incentive strategy, combining both financial and non-financial elements, would provide a more sustainable pathway for improving productivity and project performance in the Adamawa State construction context.

CONCLUSION

This study established a strong positive relationship between incentives and artisan productivity on construction sites in Adamawa State, showing that incentive systems significantly enhance labour efficiency, resource utilization, and overall project performance. While the findings indicate strong associations rather than direct causation, they confirm incentives as an important managerial tool in construction site operations. Financial incentives particularly bonuses, profit sharing, and commissions emerged as the most influential drivers of productivity, reflecting the economic realities of the workforce. This aligns with Expectancy Theory, which emphasizes the link between effort and reward, and Herzberg's Two-Factor Theory, where financial rewards serve as key motivators in meeting basic needs. However, non-financial incentives such as recognition, training, and improved working conditions also contribute to worker commitment, teamwork, and job satisfaction.

The findings highlight that incentive systems are most effective when integrated into project planning and control processes. Because properly designed schemes can reinforce performance targets, enhance supervision, and promote efficient use of resources. Conversely, challenges such as delayed payments, poor planning, and scheduling inefficiencies reduce their effectiveness, underscoring the need for alignment with project timelines, cash flow, and clear performance metrics. The study concludes that combining financial and non-financial incentives leads to better productivity outcomes. Effective construction management therefore requires not only the provision of incentives but their strategic design, timely implementation, and alignment with both worker motivation ideas and project objectives.

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