

Factors Affecting Construction Labour Productivity for Effective Projects Delivery Performance In Borno State Nigeria

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Abstract: *Construction projects play a vital role in developed and developing countries' economic and social development. However, poor productivity in the construction sector often leads to significant revenue losses. This study assesses the factors affecting construction labour productivity and their impact on project delivery performance in Borno State, Nigeria. A quantitative research approach was employed, using a questionnaire that identified 28 factors affecting labour productivity, categorised into five groups and three categories related to project effectiveness. Data collated were drawn from (177) respondents, including 42 Architect, 54 Builders, and 81 Masons, involved in construction projects. The collected data were analysed using descriptive statistics (mean and standard deviation). The results reveal that key factors affecting labour productivity in the region include worker relationships (mean = 3.80), worker health (mean = 3.79), and incentive programs (mean = 3.72). For project delivery effectiveness, political interference (mean = 4.07), corruption (mean = 3.85), and on-site waste (mean = 3.78) were identified as significant influences. The study suggests that improving team dynamics, fostering healthy work environments, and implementing motivational strategies can enhance labour productivity. It recommends adopting effective project management practices, including detailed planning, scheduling, and resource allocation, to improve project delivery and overall performance in Borno State's construction sector.*

Keywords: construction labour productivity, project delivery, performance

INTRODUCTION

The construction industry contributes significantly to any country's socioeconomic development (Skitmore *et al.*, 2019; & Wong, 2020) and is regarded as one of the most critical labour incentives for skilled and unskilled labourers (Muzamil & Khushid, 2014). According to the International Labour Organization report (2001), more than 111 million construction workers are concentrated

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in low-income countries. One of the main factors affecting construction growth is productivity, which is mainly associated with labour performance (Tanko, Ting and Idiake, 2020).

Productivity generally describes the relationship between output and related input used in production (Azry & Hamza, 2019). It is one of the crucial problems that must be considered in the construction industry because productivity is used to measure the performance of a construction project. The cost spent on labour is 30% to 50% of the total project costs (Jarkas *et al.*, 2012). The significant influence of construction labour productivity towards the project cost and the profitability of construction companies will ultimately affect the completion of the project. Thus, productivity improvement in the construction industry continues.

However, to increase productivity, the construction workforce needs an improvement strategy. One of these strategies is to understand the parameters of both factors and practices that can effectively measure how much influence these factors and practices have on construction labour productivity (Tsehayae & Robinson, 2014). According to Sukumar (2016), Better productivity can be achieved if project management includes the skills of education and training, the work method, personal health, motivational factors, the type of tools, machines, required equipment and materials, personal skills, the workload to be executed, expected work quality, work location, the kind of work to be done, and supervisory personnel. Productivity is the dominating aspect in construction as it encourages cost-saving and effective utilisation of resources. It is the most crucial concern in developed and developing countries (Alagbari, 2017; Tahir, 2015).

Suppose a country's construction sector and economy are so closely linked. In that case, it makes sense to effectively manage the human resources within the industry by improving labour productivity factors and their effect on efficient project delivery. Agumba (2021). However, the uncertainties inherent in construction projects' environments contribute to the lack of universal consensus on a set of factors and classification of factors that affect construction labour productivity growth (Hughes & Thorpe 2014). Given the peculiarity of these factors across countries, identifying factors affecting construction labour productivity in each region/country is pivotal to productivity growth in these areas. This study aims to assess the factors affecting construction labour productivity for effective project delivery performance to improve project delivery in Borno state through the following objectives;

- i. To identify factors affecting construction labour productivity in Borno State Nigeria.
- ii. To evaluate project delivery performance factors in Borno State

LITERATURE REVIEW

Factors Affecting Construction Labour Productivity

Construction labour productivity is critical to project success, influencing project costs, timelines, and overall quality. A myriad of factors can impact the efficiency and effectiveness of construction workers, leading to variations in productivity levels. Understanding these factors is essential for

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Labour's experience and skill

According to Alaghbari (2017), labour experience and skill are some factors that negatively affect labour productivity, and labour plays a significant role in achieving good productivity. Contractors should have sufficiently skilled labourers employed to be productive. If skilled labour is unavailable and a contractor is required to complete specific tasks with less skilled labour, productivity may be affected. The absence of any crew member may impact the crew's production rate because workers will, typically, be unable to accomplish the same production rate with fewer resources and with different crew members.

Misunderstanding among labourers

Misunderstanding among labourers creates disagreements about responsibilities and the work bounds of each labourer, leading to many work mistakes and decreasing labour productivity. Lack of compensation and increased labourer age negatively affect labour productivity because labour speed, agility and strength decline over time and reduce productivity (Rahman et al. 2019).

Absence of work (labourers/supervisors)

Performance evaluation based on absenteeism can be measured by the change in the number of lost man-hours due to absence throughout the construction project. A decrease in the number of lost man-hours directly results in increased production or output on the job. According to Chitkara (2006), decreasing the number of absences helps maintain the budget workforce needed to complete the work according to schedule. It is, therefore, a vital performance measurement tool for construction projects and management.

Labourers' Education level

Labourer education level in the construction industry education is a crucial factor affecting productivity. Labourers must engage in technical and technological training to have essential knowledge of any problem within a specific time and budget. Any delay can cause valuation, leading to extra costs.

Supervision

Generally, projects come across design, drawings and specification changes during construction. If illustrations or specifications are incorrect and unclear, productivity is expected to decrease since labourers in the field are uncertain about what needs to be done. As a result, the task may be delayed or completely stopped and postponed until explicit instruction. There is a 30% loss of productivity when work changes are being performed (Nguyen *et al.*, 2021). Work inspection by the supervisor is an essential process to proceed. It is a visual assessment of workplace and work performance on site. For example, the contractor cannot cast concrete before inspecting the formwork and steelwork, thus affecting labour productivity (Sooley, 2022). Supervisors may request to rework a specific task without completing the required work according to the

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Rework

According to Eze *et al.*(2019), a host of problems can ultimately create rework for any construction project, and each individual working on the job can contribute to the increase of rework. Every sector, from human resources to engineering, has the potential to bog down a job and create additional tasks that need to be completed often at the last possible moment.

Human resource departments can provide unclear instructions for workers, hire people with insufficient skill levels, or schedule individuals for excessive overtime. Engineering and reviews can have late design or scope changes, poor document control, or errors and omissions. Materials and equipment supply may have late designer input, unrealistic schedules, insufficient turnover, or constructability problems. Leadership problems include ineffective project team management, poor communications, lack of safety, and lack of quality assurance or controls.

Temperature

Temperature affects the rate at which heat can be dissipated from the human body by radiation, convection and evaporation of sweat, heat and humidity, increasing the dangers of heat stroke and reducing work capacity. Start work at first light and avoid working during the day's heat (Sheldon Piva, 2022).

Public holiday

If workers work on holidays, there is not only a cost factor for holiday pay, but there is usually a loss of productivity as well. It may be addressed as a morale factor since workers are away from families and working instead of enjoying the holidays, or it can also be factored separately. Either way, productivity is usually lost (Monioa, 2024).

Poor Quality of Material

Quality has become one of the essential elements in recent years due to conceptual changes in the construction industry. In any industry, the product should be manufactured according to the required standard, which provides the worth of money and customer satisfaction. Quality is nothing but customer satisfaction with the performance, appearance and reliability of the project for the valuable cost range.

Late Supply of Construction Material

Delays in material supply have become one of the most critical factors leading to global delays in construction project delivery (Rahman 2017). There are many causes of project delays, of which shortage and delay in material supply are among the most notable in many studies. For example, Assat *et al.* (2015) studied the causes of delays in large building projects in Saudi Arabia. They identified a group of factors relating to materials, including causes related to shortages and delivery

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of materials. Alabari (2019) observed that late delivery and slow material mobilisation are the 1st among 25 factors contributing to the causes of non-excusable construction delays in Pakistan.

Material handling and Storing

Material handling is the process of moving, protecting, storing and controlling material throughout the construction process. It includes the steps taken when dealing with construction materials, from when they are delivered to the construction site until when they are disposed of. On the other hand, material storage is a sub-section of the handling process. It involves holding construction materials in a site place until these are required during the construction process. Employ the following for proper construction material handling and storage (Kaziz 2015).

- 1- Train your workers
- 2- Store smiler materials together
- 3- Dispose of waste construction
- 4- Choose storage space
- 5- Know each storage weight limit
- 6- Consider the security of your construction site

Ease of delivery to the site

This is caused by working in a remote area, the proximity of tools, break areas, material laydown yard, or other resources causing a loss of time for access. Inefficiencies can result from work near operating units such as heat from boilers, smoke from emissions, explosion zones, etc. This can cause work stoppages, need for protective clothing, work permits, or other requirements.

Suitability or Adequacy of Plant/Equipment Employed

The selection of the appropriate type and size of construction equipment often affects the required amount of time and effort and, thus, the Job-site productivity of a project. It is, therefore, important for site managers and construction planners to have a formula with the characteristics of the significant type of equipment most commonly used in construction (Salihu 2019).

Proper tools and equipment are essential for effectively operating any construction project work site. Equipment The construction site must have the correct tools and equipment to achieve timely and good-quality results. For every construction activity, there is an optimal combination of tools, equipment and labour. It depends on the nature and content of the work tools and how to effectively combine them with manual labour (Kuma and Sukumar, 2016).

Incentive for labourers

As the construction industry recovers from the stagnant wages, right-sizing and reduced volume and margins caused by the economic downturn 2008, a new challenge is emerging. Many workers left the industry and moved into other areas of work. The result is a growing shortage of skilled labour in markets nationwide. As companies navigate through the recovery, it's become necessary to implement programs to retain construction workers by offering higher wages, bonuses, and other

incentives. Skilled labour is valuable, and many companies attempting to attract quality people and rebuild their teams are facing rising labour costs. Companies are adopting creative forms of compensation and incentive programs to keep their most valuable employees. In addition to competitive salaries, many companies are beginning to offer bonus programs, including profit sharing, performance metrics-based bonuses and deferred compensation to retain workers. The key is to communicate and structure any bonus or incentive plans, so employees understand the parameters for receiving compensation.

Contractor Financial Capability

A contractor's financial stability determines whether they will stand or fall and, therefore, feature prominently on the list of many authors. A financially distressed contractor is more likely to have difficulty obtaining credit and new business opportunities (Mangitung and Emsley, 2022). The evaluation of financial soundness emphasises financial historical data to stabilise over a certain period to obtain a picture rather than the current financial position. The detailed measurement and financial analysis of earned out by event involve the assessment of the contractor's past, present and anticipated future financial condition. According to (Salihu et al., 2017), the objectives are to identify any weakness in the contractor's financial health that could lead to future problems and to determine any strength that might be capitalised upon. The financial status of the contractors is used as an orientation to cover aspects such as financial stability, credit rating, banking arrangement and bonding, as well as the financial capacity to perform the work (Salihu *et al.*, 2017).

Owner Financial Capability

The availability of adequate funds is undisputed a predominant identical success factor that determines the performance of any construction project. Almost all the studies on critical success factors identify these factors (Kazaz *et al.*, 2022) as necessary. The contrary component should maintain a healthy financial management system, primarily dependent on project performance and the effectiveness of claims for handy billing activities. Client financial capabilities also have a significant impact on cash flow management. However, there is some lack of consistency in this measuring criterion. It could be due to the assumption that cash flow management depends primarily on achieving cost and time criteria.

Incentive Payment and Financial Reward

Financial incentives are simply monetary rewards given to employees. These are sometimes considered tangible rewards because of their inherent monetary value (in contrast, intangible rewards such as praise from a manager or a mention in the company newsletter have no intrinsic financial value. Financial incentives, sometimes called monetary incentives, are often things we think of when it comes to rewards. However, they are not only the type of incentive provided in the workplace. Additionally, incentives are effective rewards for recognising when employees perform their regular duties as young. Companies that reward exceptional work performance or team recognition are more likely to foster positive work environments, build supportive relationships and encourage higher-quality output.

Project Delivery

The history of delivery methods started in the 1940s with the design-bid-build approach, which has been the most widely used in the United States for a long time (Scott, Stanford & Molenaar, 2020). According to Jackson (2020), due to the design-bid-build method, a segregating process was created, where the process was directly conducted by one contractor, owner, and architect, nurturing the project from conception to completion. However, this process created multiple cultures, causing issues such as inefficiency, fragmentation and resource waste (Viana, Hadikusumo, Mohammad & Kahvandi, 2020). These issues were partially tackled years later, in the 1960s, with the start of the new delivery method. The construction management method uses an approach that supervises and controls the project teams and information (Hamzeh *et al.*, 2019).

Project delivery performance factors

Project delivery performance is a multifaceted concept encompassing various factors influencing a project's success. Project delivery performance measures how effectively and efficiently a project is delivered and, ultimately, how well it meets its defined objectives (Kwofie, Aigbavboa & Thwala, 2020). It's a multifaceted concept that encompasses various aspects of project management. Project delivery performance refers to how effectively and efficiently a project is executed and measured against its predefined objectives. It's a comprehensive evaluation of a project's success, considering various factors beyond the traditional triple constraints of time, cost, and quality.

Traditional performance factors

Traditional performance factors are the core metrics used to evaluate project success. They have been the cornerstone of project management for decades and are relevant today. These factors primarily focus on the three fundamental elements of project management:

Time

This measures how well the project adheres to its planned timeline. It involves monitoring milestones, deadlines, and the overall project schedule. Project managers track significant events or achievements throughout the project's lifecycle (Ibrahim, Zayed & Lafhaj, 2024). These milestones serve as checkpoints to ensure progress is on schedule. Deadlines are specific dates by which particular tasks or deliverables must be completed. Monitoring deadlines helps identify potential delays and take corrective actions. This comprehensive plan outlines the entire project timeline, including start and end dates for different phases and tasks. Adhering to the overall project schedule is essential for timely completion (Ibrahim *et al.*, 2024). Project managers can significantly improve the chances of successful project delivery by effectively monitoring milestones, tracking deadlines, and adhering to the overall project schedule.

Cost

Cost is a fundamental factor in project delivery performance. It refers to the financial resources allocated to a project and how effectively they are managed. Monitoring actual costs against the planned budget is crucial to project cost control. It involves tracking the expenses incurred on a project and comparing them to the budgeted amounts (Venkataraman & Pinto, 2023). Develop a detailed budget that breaks down the project's costs into various categories like labour, materials, equipment, and overhead and allocate specific amounts to each category based on estimated costs and project scope. By effectively monitoring actual costs against the planned budget, project managers can make informed decisions, control expenses, and ensure the financial success of their projects (Elghaish, Abrishami, Hosseini & Abu-Samra, 2020).

Quality

Quality is a critical factor in project delivery performance. It refers to the degree to which a project's deliverables meet specified requirements and customer expectations. Quality in project delivery performance refers to the degree to which a project's final product or service meets the specified requirements and expectations of its stakeholders (Faraji, Rashidi, Meydani Haji Agha, Rahnamayiezekavat & Samali, 2022). These are the predefined standards, criteria, and conditions that the project's deliverables must meet. They can be technical specifications, functional requirements, or performance benchmarks. These are the project's customers' or clients' implicit or explicit needs and desires. They may include factors like usability, aesthetics, reliability, or timeliness. By prioritising quality, project managers can deliver successful projects that meet or exceed customer expectations and contribute to the organisation's overall success (Faraji *et al.*, 2022).

Emerging performance factors

In addition to the traditional performance factors of time, cost, and quality, several emerging factors increasingly influence project success. These factors reflect the evolving nature of projects and the changing expectations of stakeholders (Kwapong & Pipaliya, 2022). Here are some key emerging performance factors:

Client satisfaction

Client satisfaction is a crucial aspect of project delivery performance. It measures how well a project meets or exceeds the expectations of its clients or stakeholders. Client satisfaction is a critical metric of project delivery performance (Alshihre, Chinyio, Nzekwe-Excel & Daniel, 2020). It measures how well a project meets or exceeds the expectations of its clients or stakeholders. By prioritising client satisfaction, project teams can improve overall project performance and build long-lasting client relationships.

Risk management

Project risk management is a critical component of successful project delivery. It involves systematically identifying, assessing, and mitigating potential risks impacting the project's objectives (Kerzner, 2022). The first step in risk management is to identify potential risks. This

Publication of the European Centre for Research Training and Development UK can be done through various techniques, such as a collaborative process where team members brainstorm ideas about possible risks. Once risks have been identified, they must be assessed to determine their potential impact and likelihood of occurrence.

Change Management

Change management is a structured approach to transitioning individuals, teams, and organisations from a current state to a desired future state. Project management involves managing changes to a project's scope, timeline, or deliverables (Onubi & Hassan, 2020). Effective change management can minimise project timelines, budgets, and resources disruptions. By involving stakeholders and addressing their concerns, change management can reduce resistance to change.

Team performance

Team performance refers to a project team's collective effort and effectiveness in achieving project goals. A high-performing team can significantly impact a project's success by improving productivity, creativity, and problem-solving abilities (Haverila & Twyford, 2021). By focusing on these factors and implementing effective strategies, project managers can improve team performance and increase the likelihood of project success.

Communication

Effective communication among stakeholders is to minimise misunderstandings. Effective communication is crucial for successful project delivery. It ensures that all stakeholders are aligned, informed, and engaged. Here are some strategies to minimise misunderstandings. Select the most effective communication channels, such as email, phone calls, video conferencing, or face-to-face meetings (Ardhiansyah, Tjendani & Witjaksana, 2023).

Stakeholder Management

Engaging and managing stakeholders to ensure their support and buy-in. Stakeholder management identifies, analyses, and engages stakeholders throughout the project lifecycle (Maqbool, Deng & Rashid, 2020). It involves understanding their needs, expectations, and potential impact on the project. Effective stakeholder management is crucial for project success. By implementing these strategies, project managers can build strong relationships with stakeholders, mitigate risks, and increase the chances of project success.

Innovation and Creativity

Encouraging innovative solutions and approaches to project challenges. Innovation and creativity are essential for project success. They enable teams to think outside the box, develop creative solutions, and adapt to changing circumstances (Engebo, Klakegg, Lohne & Lædre, 2020). By fostering a culture of innovation and creativity, project teams can achieve better results and drive organisational success.

Sustainability

Considering environmental and social impacts in project planning and execution. Sustainability in project management refers to considering a project's environmental, social, and economic impacts throughout its lifecycle. It involves making choices that minimize negative impacts and maximise positive contributions to society and the environment (Ansari, Abouraia, El Morsy & Thumiki, 2024). By embracing sustainability principles, project managers can deliver projects that positively impact the planet and society. It's not just about doing the right thing; it's also about creating long-term value and building a more sustainable future.

METHODOLOGY

The quantitative method was used as a research design in both the data collection and analysis stages. The target respondents for this study are core construction practitioners with extensive experience in building construction projects and working on construction projects under ministries and agencies in Borno state. This includes site managers, contractors, and masons. The research used Krejcie and Morgan (1970) table to arrive at a sample size of 177 professionals within the building parlance from a sample frame of 213. The study adopted the simple random sampling technique. The instrument that was used in this study is a self-administered questionnaire. SPSS version 23 was used. For this research, 147 questionnaires were used for the analysis.

RESULT

One hundred and seventy-five (177) questionnaires were administered to practicing professionals in the Construction Industry within the study area. A total number of one hundred and forty-seven (147) questionnaires with an 83.05 % response rate were retrieved.

Labour Factor Affecting Construction Labour Productivity in Borno State, Nigeria

Descriptive statistics based on mean ranking were conducted to explore the Labor factor affecting construction labour productivity in Borno state, Nigeria. The results are presented in Table 6.

Labor factor

Table 1: Labor Factor Affecting Construction Productivity

Labour factor affecting construction productivity	Mean	Std. Deviation	Rank	Remark
Working relationships among workers	3.80	0.134	1	High
Health of workers	3.79	0.118	2	High
Laborer commitment to work	3.63	0.223	3	High
Level of familiarity with job	3.57	0.165	4	High
Level of motivation of workforce	3.54	0.100	5	High
Laborer level of education	3.42	1.152	6	High
Age of laborer	3.29	1.159	7	Moderate
Labourer experience and skills	2.90	1.323	8	Moderate

Table 1 presents the factors affecting construction labour productivity in the study area. The results revealed the Working relationship among workers (M=3.80, SD=1.134), health of workers (M=3.79, SD=1.118), Laborer commitment to work (M=3.63, SD=1.223) constitute the highest mean, respectively. The least was age of labourer and Laborer experience and skills, which constituted the mean of (M=3.29, SD=1.159) and (M=2.90, SD=1.323), respectively. The result suggests that soft skills and well-being are the most important factors affecting construction labour productivity in the study area. Working relationships, workers' health, and Laborer commitment have the highest average scores. This indicates these factors significantly impact productivity. The age of the labourer and the labourer's experience/skills have the lowest means. While they might play a role, they seem less critical in this study. In simpler terms, getting along with colleagues, being healthy, and feeling committed to the job seem more important for worker output than age or existing skills in this study.

Management factor

Descriptive statistics based on mean ranking were conducted to explore the Management factor affecting construction labour productivity in Borno state, Nigeria. The results are presented in

Table 2.

Table 2: Management Factors Affecting Construction Labour Productivity

Management Factors	Mean	Std. Deviation	Rank	Remark
Level of coordination among the construction parties	3.64	0.146	1	High
Adequacy of planning and risk management process	3.61	0.076	2	High
Welfare	3.60	0.248	3	High
Relationship between laborers and superintend	3.56	0.148	4	High
Supervisors absenteeism	3.48	1.190	5	High
Frequency of periodic meeting	3.46	1.160	6	High
Competencies of the project manager	3.23	1.360	7	Moderate

Table 2 presents the Management factors affecting construction labour productivity in the study area where the Level of coordination among the construction parties (M=3.64, SD=1.146), Adequacy of planning and risk management process (M=3.61, SD=1.076), and Welfare (M=3.60, SD=1.248) constitute the highest mean respectively. The lowest was the frequency of periodic meetings, which constituted the mean of (M=3.46, SD=1.160) and the competencies of the project manager (M=3.23, SD=1.360), respectively. The result indicates that several management factors influence construction labour productivity. The level of coordination among construction parties highlights the importance of collaboration between different teams (e.g., designers, engineers, subcontractors) to avoid delays and ensure a smooth workflow. Strong communication and clearly

defined roles are essential for achieving this. Effective planning that anticipates and mitigates risks minimises disruptions and keeps projects on schedule. This allows labourers to focus on their tasks without surprises. Providing a safe, healthy, and comfortable work environment with proper facilities contributes to worker morale and reduces fatigue. Taking care of basic needs like hydration and breaks can significantly impact productivity. While communication is important, commonplace meetings can disrupt workflow. Focusing on targeted meetings with clear agendas to address specific issues might be more beneficial. The competencies of the project manager having the lowest mean suggest there might be room for improvement in project manager skills. An effective project manager can delegate tasks efficiently, troubleshoot problems, and motivate workers, significantly impacting productivity.

Finance factor

Descriptive statistics based on the mean ranking were conducted to explore the financial factors affecting construction labour productivity in Borno state, Nigeria. The results are presented in Table 3.

Table 3: Finance Factors Affecting Construction Labour Productivity

Finance Factors	Mean	Std. Deviation	Rank	Remark
Incentive programs	3.72	0.187	1	High
Incentives payment and financial rewards	3.67	0.149	2	High
Fluctuation in exchange rate	3.67	0.229	3	High
Contractor financial capability	3.66	0.196	4	High
Government policy on finances	3.64	0.222	5	High
Owner financial capability	3.56	0.165	6	High

Table 3 presents the financial factors affecting construction labour productivity in the study area where the highest mean consists of Incentive programs (M=3.72, SD=1.187), Incentives payment and financial rewards (M=3.67, SD=1.149) and Fluctuation in the exchange rate (M=3.67, SD=1.229) respectively. The lowest mean constituted the government policy on finances (M=3.64, SD=1.222) and owner financial capability (M=3.56, SD=1.165), respectively. Based on the findings, the financial factors significantly impacting construction labour productivity in the study area are directly tied to incentives and rewards. Incentive programs suggest that programs designed to reward strong performance financially positively influence labour productivity. Regarding incentive payments and financial rewards, directly tying financial rewards to worker output is a major motivator for increased productivity. Fluctuation in the exchange rate could have a positive or negative impact depending on the situation. A strong exchange rate benefits the labourers financially and could increase productivity. However, currency fluctuations can also lead to uncertainty, potentially affecting morale and productivity. Government policy on finances: The study suggests that government financial policies have a relatively neutral impact on labour productivity in this context. Owner financial capability is the financial health of the construction

Publication of the European Centre for Research Training and Development UK company itself, which seems to have a minimal effect on labour productivity compared to more direct financial incentives.

Material/equipment factor

Descriptive statistics based on mean ranking were conducted to explore the Material/equipment factor affecting construction labour productivity in Borno state, Nigeria. The results are presented in Table 4.

Table 4: Material/Equipment Factor Affecting Construction Productivity

Material/Equipment Factor	Mean	Std. Deviation	Rank	Remark
Availability of tools and equipment in the market	3.82	0.073	1	High
Store location	3.76	0.042	2	High
Suitability of plant and equipment employed	3.72	0.259	3	High
Material handling and storage	3.69	0.005	4	High
Ease of material delivery	3.62	0.143	5	High
Material availability at project site	3.28	1.237	6	Moderate

Table 4 presents the Material/equipment factor affecting construction labour productivity where the availability of tools and equipment in the market ($M=3.82$, $SD=1.073$), Store location ($M=3.76$, $SD=1.042$), Suitability of plant and equipment employed ($M=3.72$, $SD=1.259$) constitute the highest means. The least means are the ease of material delivery ($M=3.62$, $SD=1.143$) and material availability at the project site ($M=3.28$, $SD=1.237$). The data suggests that material and equipment factors most impact construction labor productivity. If the tools and equipment are hard to find, it can significantly slow down workers. The location of the tool and equipment storage can affect how quickly workers can access what they need. Using the right equipment for the job dramatically affects worker efficiency. While important, getting materials to the site seems to have a slightly lesser impact on productivity than having the right tools and equipment readily available. Construction labourers are most productive when they have the right tools and equipment readily available and the equipment is suited for the task. Delays in acquiring these resources or using unsuitable equipment can hinder their progress more than challenges with material delivery or having some materials missing on-site.

External factors

Descriptive statistics based on mean ranking were conducted to explore the external factors affecting construction labour productivity in Borno state, Nigeria. The results are presented in Table

Table 5: External Factors Affecting Construction labour Productivity

External Factors	Mean	Std. Deviation	Rank	Remark
Variation in drawing	3.71	0.142	1	High
Design changes	3.67	0.136	2	High
On-site accidents	3.59	0.065	3	High
Government regulation and policies	3.46	1.130	4	High
Local authority approvals	3.26	1.200	5	Moderate
Weather condition	3.00	1.314	6	Moderate

Table 5 presents the external factors affecting construction labour productivity where the results indicate that the highest means constitute Variation in drawing (M=3.71, SD=1.142), Design changes (M=3.67, SD=1.136), and On-site accidents (M=3.59, SD=1.065) respectively. Local authority approvals (M=3.26, SD=1.200) and Weather conditions (M=3.00, SD=1.314) constitute the least means. The results show that changes to the project plan have the most significant impact on external factors affecting construction labour productivity. Variation in drawings refers to inconsistencies or errors in blueprints that require rework or clarification for labourers, slowing them down. Modifications made mid-construction can disrupt the workflow and require labourers to adapt to new specifications. These incidents can halt work entirely while safety protocols are followed and injuries are addressed. While obtaining permits from authorities can cause delays, it's likely less disruptive to daily work than plan changes or accidents. Construction projects are often planned with weather in mind, and minor variations may impact productivity less than other factors.

The effectiveness of project delivery performers in Borno state

Descriptive statistics based on mean ranking were carried out to explore project delivery efficiency in Borno state, Nigeria. The results were presented in three (3) themes showing each item's ranking, mean, standard deviation, and remark. Project delivery efficiency was assessed based on cost, quality, and time efficiency.

Cost Efficiency

Descriptive statistics based on the mean ranking were carried out to explore the effectiveness of construction project delivery in terms of cost in Borno state, Nigeria. The results are presented in Table 6.

Table 6: Cost Effectiveness in Borno State

Cost Efficiency	Mean	Std. Deviation	Rank	Remark
Political interferences	4.07	0.127	1	High
Waste on site	3.78	0.191	2	High
Additional work	3.69	0.090	3	High
Wrong method of estimation	3.60	0.145	4	High
On site financial control	3.56	0.141	5	High
Fraudulent practices and kickbacks	3.53	0.184	6	High
Fluctuation in price of material	3.23	1.314	7	Moderate

Table 6 presents the cost Effectiveness of construction project delivery results where the highest means constitute Political interferences (M=4.07, SD=1.127), waste on site (M=3.78, SD=1.191), and Additional work (M=3.69, SD=1.090) respectively. the least means constitute Fraudulent practices and kickbacks (M=3.53, SD=1.184), Fluctuation in price of material (M=3.23, SD=1.314). The study investigated how factors affect construction labour productivity and project cost efficiency. Political interference refers to external pressures or changes in plans due to political reasons, disrupting workflow and increasing costs. Inefficient use of materials or excess materials cluttering the workspace can slow workers and waste resources. Unexpected changes or modifications to the project plan require extra work, impacting productivity and planned budgets. External market forces causing material price changes are outside the project's direct control and have the least impact on cost efficiency among the factors listed.

Quality Effectiveness

Descriptive statistics based on mean ranking were carried out to explore the effectiveness of construction projects in terms of quality in Borno state, Nigeria. The results are presented in Table 7

Table 7: Quality effectiveness in Borno State

Quality efficiency	Mean	Std. Deviation	Rank	Remark
Corruption	3.85	0.149	1	High
Cash flow project	3.75	0.198	2	High
Drawings and specification	3.75	0.198	3	High
Nature of construction	3.74	0.147	4	High
Design complexity	3.66	0.185	5	High
Client requirement	3.48	1.125	6	High

Table 7 presents the effect of quality factors on effectiveness project delivery where Corruption (M=3.85, SD=1.149), Cash flow project (M=3.75, SD=1.198), and Drawings and specification (M=3.75, SD=1.198) constitute the highest means respectively. the least mean constitute Design complexity (M=3.66, SD=1.185), and Client requirement (M=3.48, SD=1.125) respectively. The result shows that corruption, cash flow project management, and clear drawings and

Publication of the European Centre for Research Training and Development UK specifications are likely the biggest factors positively affecting construction project delivery. The high means indicate a stronger correlation with efficient work by labourers. On the other hand, design complexity (3.66) and client requirements (3.48) seem to have a lesser positive effect on efficient project delivery. These factors may require more effort or cause delays for workers.

Time Effectiveness

Descriptive statistics based on mean ranking were carried out to explore the effectiveness of construction projects in terms of time in Borno state, Nigeria. The results are presented in Table 8

Table 8: Time effectiveness in Borno State

Time effectiveness	Mean	Std. Deviation	Rank	Remark
Setting timeliness and project deadline	3.74	0.206	1	High
Identification of purpose (setting goals)	3.72	0.145	2	High
Accountability, integrity and responsibility	3.65	0.151	3	High
Effectively defined activity to be performed	3.64	0.098	4	High
Controlling schedule of the project	3.61	0.185	5	High
Plan schedule management	3.39	1.214	6	Moderate

Table 8 presents the effect of factors affecting time on project Effectiveness where the highest mean constitutes Setting timeliness and project deadline ($M=3.74$, $SD=1.206$), Identification of purpose (setting goals) ($M=3.72$, $SD=1.145$), and accountability, integrity and responsibility ($M=3.65$, $SD=1.151$) respectively. The lowest mean constitutes the Controlling schedule of the project ($M=3.61$, $SD=1.185$) and Plan schedule management ($M=3.39$, $SD=1.214$), respectively. The result shows how different aspects of a construction labourer's work contribute to their overall time effectiveness. Construction labourers are most efficient when they clearly understand deadlines and project timelines. This allows them to plan their work effectively and avoid wasting time. When labourers understand the purpose of their tasks and have specific goals, they can focus their efforts and avoid unnecessary steps. This contributes to the efficient use of their time.

A strong sense of accountability motivates construction labourers to take ownership of their work and complete tasks efficiently. The controlling Schedule of the Project scored lower, suggesting that there might be room for improvement in how labourers stay informed about or influence the overall project schedule. Better communication or increased involvement in scheduling could improve effectiveness. Plan Schedule Management had the lowest score, indicating that labourers

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spend the least time efficiently managing their daily or task schedules. Providing tools or training in schedule management could significantly improve overall efficiency.

CONCLUSION

This research investigates the factors affecting construction labour productivity and their impact on effectiveness (cost, quality, and time). Strong emphasis is placed on worker relationships, health, and commitment, while experience and age play a lesser role. This suggests focusing on team building, healthy work environments, and motivation strategies for improved productivity. Coordination, planning/risk management, and worker welfare are crucial for productivity. The lesser impact of meeting frequency and project manager competency suggests these areas might be optimised but not the biggest focus. Incentive programs and timely rewards are important. Financial fluctuations seem to have a bigger impact than government policies or owner finances, suggesting a need for considering project financial buffering. Availability of tools, equipment, and plants is key. Material availability at the project site seems less critical, possibly due to good logistical planning.

Design changes, variations in drawings, and on-site accidents have a major effect. Local authority approvals and weather conditions have a lesser effect, suggesting these might be better managed or less frequent in the study area. Political interference, waste on-site, and additional work are the biggest concerns. Fluctuations in material prices and fraudulent practices seem less impactful. This suggests focusing on project transparency, waste reduction, and precise project scope definition. Corruption, cash flow issues, and unclear drawings/specifications are the main concerns. Design complexity and client requirements seem less critical. This highlights the importance of ethical practices, financial stability, and well-defined project plans. Setting clear deadlines, identifying project goals, and accountability are most important. Controlling the project schedule and plan management seem less impactful, suggesting these areas might be well-established. Management, labour, and external factors significantly affect cost, while finance and material/equipment factors have less influence. This suggests focusing on better coordination, a motivated workforce, and mitigating external disruptions to improve cost efficiency. Material/Equipment, Labor, and Management factors significantly affect quality, while External and Finance factors have a lesser impact

Recommendations

The recommendations of the study include:

The construction industry should implement effective project management practices, including detailed planning, scheduling, and resource allocation. Also, the Construction industry should provide ongoing training and capacity-building programs to equip workers with the latest skills and knowledge. Lastly, the Construction industry should prioritise security measures to create a safe and conducive working environment for construction workers. This can also address labour productivity challenges in Borno State, Nigeria.

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