Business Fora: Business and Allied Industries International Journal
2025, Vol. 6, No.1, 73 – 89 | ISSN Online: 3028-1326 | ISSN Print: 3028-1334
DOI: https://doi.org/10.62718/vmca.bf-baiij.5.1.SC-0525-007

Enhancing Construction Labor Productivity in NIA Projects: The Impact of Key Personnel and Strategic Evaluation Reforms in CALABARZON

Article History:
Received: 11 May 2025
Accepted: 23 October 2025
Published: 20 November 2025

Winston C. Pamisaran, ORCID No. 0009-0003-8848-0212
Master of Science in Construction Management, Polytechnic University of the Philippines-OUS, Sta. Mesa, Manila, Philippines

Abstract

The present study aims to identify the level of key personnel affecting construction labor productivity based on the perception of NIA employees and its contractors, the researcher also seeks the construction labor productivity of NIA. A total of 121 participants assessed the level of management of NIA key personnel, while 57 respondents provided insights into NIA's construction labor productivity. Findings indicate that the level of management among the NIA personnel gained an overall mean of 4.11 from the agency while an overall mean of 4.17 was gained from the contractor (Agree). Meanwhile, under construction labor productivity, an overall mean of 3.70 was achieved, and interpreted as Agree. Correlational tests reveal no significant links between Manpower Recruitment and any productivity factors. However, several weak inverse associations appeared: Presence/Absenteeism with Motivation ($r = -0.263$, $p = .048$); Communication with Motivation ($r = -0.228$, $p = .033$) and with External Factors ($r = -0.274$, $p = .039$); Labor Turnover with Motivation ($r = -0.309$, $p = .019$); and Trust & Relationship with Motivation ($r = -0.339$, $p = .010$) and with External Factors ($r = -0.262$, $p = .049$). Furthermore, the association between overall management level and overall labor productivity is not significant ($r = -0.151$, $p = .261$). This indicates that, management ratings do not translate into a linear, aggregate shift in reported productivity conditions. As a recommendation, the study suggests to investigate different dimensions or specific management practices rather than overall management scores, as certain practices (e.g., target setting, monitoring) may influence productivity more directly.

Keywords: key personnel, contractors, construction labor productivity, National Irrigation Administration (NIA), CALABARZON

INTRODUCTION

Effective construction supervision, monitoring, and quality control significantly impact labor productivity (Mahamid, 2020), particularly in public-sector projects such as those undertaken by the National Irrigation Administration (NIA). The productivity of construction labor is influenced by various factors, including the expertise and presence of key personnel (Alaghbari et al., 2017). However, inconsistencies in project execution due to personnel inefficiencies, such as aging workforce, skills gaps, duplication of roles, lack of skilled labor, weak project management (Manaois & Mercado, 2023), have raised concerns over project delays. In its annual report on the NIA, the Commission on Audit (COA) noted "significant delays" ranging from one month to 780 calendar days or more than two years for irrigation projects programmed for completion by 2020, 2021 and 2022 (Reyes, 2023) directly impacting farmers who rely on irrigation for productivity. Furthermore, the cause of delays includes unworkable sites (e.g., flooding), poor contractor performance, insufficient manpower and equipment, design modifications or variation orders, unresolved right-of-way issues, presence of standing crops, weather, quality deviations such poor maintenance and delays in procurement, and other external factors (Manaois & Mercado, 2023).

The National Irrigation Administration (NIA) faces several issues that negatively impacts labor productivity. According to Rola (2019) there is a significant duplication of roles and responsibilities between central and regional offices, as well as among field divisions. This

overlap leads to confusion, inefficiency, and a lack of clear delegation of authority. In turn, this slows down project preparation, implementation, and maintenance activities. Also, aging workforce and lack of recruitment which more than 90% of NIA employees are above 40 years old, with an average age of 50. The agency has struggled to recruit younger, more competitive staff due to funding constraints and government attrition policies (Palacol, 2024). This has resulted in a workforce that may lack the energy, adaptability, and up-to-date skills needed for high productivity. Next, unaddressed operational issues as attempts for organizational streamlining have failed to address core operational challenges, such as decentralization, autonomy, and financial viability. As a result, inefficiencies persist and continue to affect productivity. Lastly, factors like work motivation, job satisfaction, leadership style, organizational culture, and the physical work environment significantly influence productivity. Poor management of these factors can lead to reduced work quality and output (Palacol, 2024).

Statement of the Problem. The Philippine construction sector, including government-led infrastructure initiatives, has long contended with systemic productivity constraints. These include poor management practices, insufficient supervision, skills shortages, high labor turnover, and low worker motivation – further exacerbated by ineffective planning, outdated methods, and external disruptions such as weather and political instability. Within this landscape, the National Irrigation Administration (NIA) projects in CALABARZON have faced similar operational inefficiencies, prompting the need for a focused inquiry into personnel management and labor productivity. To address these concerns, the study was guided by the following research questions:

1. What is the level of management among the personnel of NIA in terms of:
   1.1 Manpower recruitment;
   1.2 Project oversight;
   1.3 Expertise;
   1.4 Communication;
   1.5 Labor turnover; and,
   1.6 Trust and relationship
2. What is the labor productivity of NIA towards its construction projects in terms of:
   2.1 Manpower;
   2.2 Management;
   2.3 Motivation;
   2.4 Work condition; and,
   2.5 External factors?

3. Is there a significant relationship between the level of management and construction labor productivity among the NIA personnel?

4. What mechanism could be proposed to enhance the construction labor productivity of the NIA projects in CALABARZON?

This structured inquiry enabled the study to systematically evaluate internal management dimensions and their influence on productivity outcomes, ultimately informing strategic reforms for improved project performance.

Conceptual Framework. Anchored from the independent and dependent variable model, the conceptual framework posits on the relationship between the two major variables of the study. The independent variables are the Key Personnel responses from NIA and its contractors. The measures are composed of manpower recruitment, presence, expertise, communication, trust and relationship. Meanwhile, construction labor productivity of NIA acts as the dependent variable. Measures are manpower, management, motivation, work condition, and external factors.

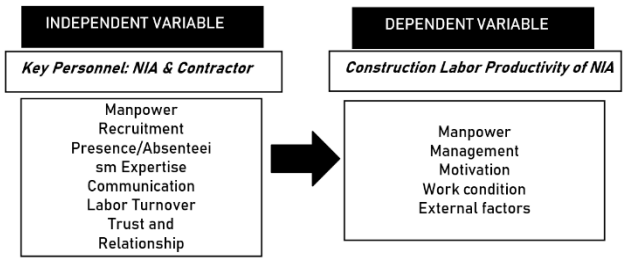

Figure 1
Research Paradigm

LITERATURES

Key Personnel in Construction Projects. Key personnel are individuals whose roles and

expertise are critical to the successful execution of a construction project. Their absence can significantly hinder project progress and performance. They are often designated in contracts and possess specialized skills, knowledge, or authority essential for achieving project objectives. NIA requires that contractors' key personnel, such as managers and chief engineers, must have sufficient experience in relevant aspects of the project. This ensures that only qualified personnel oversee critical phases, directly impacting the quality and timeliness of irrigation infrastructure projects.

Manpower Recruitment. Under industry practice, the construction faces increasing demand for skilled labor, prompting companies to modernize recruitment strategies, including sourcing talent internationally (e.g., from the Philippines) to fill skill gaps and meet project demands (Venture Management, 2024). NIA mandates the employment of Filipino labor in all phases of construction where Filipino skills are available, even for foreign contractors. This supports local workforce development and ensures compliance with national labor policies.

Project Oversight and the Impact of Absenteeism. Effective project oversight in construction hinges on the consistent presence and performance of both managerial and labor personnel. Absenteeism – defined as habitual absence from work – undermines this oversight by disrupting coordination, delaying decision-making, and weakening on-site supervision. In the context of NIA infrastructure projects, elevated absenteeism rates among key personnel compromise the monitoring of work progress, quality assurance, and timely resource allocation.

This absence of oversight can cascade into reduced productivity, inflated costs, and missed project milestones. As Patil and Morey (2021) emphasize, absenteeism is a critical barrier to construction efficiency, necessitating proactive attendance monitoring and strategic interventions to safeguard project delivery and operational continuity.

Expertise. Expertise in construction now extends beyond traditional skills to include digital literacy, sustainability, safety, and project management. Specialized knowledge is vital for adapting to new technologies and industry standards (Worldwide Recruitment Solutions, 2025). NIA explicitly requires that key personnel possess sufficient experience and expertise relevant to the project. This ensures technical competence in planning, execution, and oversight, which is crucial for the complex requirements of irrigation systems.

Communication. Effective communication is foundational in construction. It reduces errors, enhances safety, improves efficiency, and boosts team morale. Clear communication channels and regular meetings are essential for aligning all stakeholders and managing expectations (CIC Construction Group, 2025). In NIA projects, strong communication among contractors, NIA officials, and workers is vital to coordinate activities, ensure compliance with standards, and address issues promptly, thereby safeguarding project outcomes.

Construction Labor Productivity. Productivity in construction is typically measured as the ratio of output (e.g., work completed) to input (e.g., labor hours). Key metrics include effectiveness (quality of work) and efficiency (quantity of work per time unit) (KanBo, 2024). For NIA, high labor productivity is essential to meet project deadlines and budget constraints. Productivity is directly affected by the quality of manpower recruitment, expertise of personnel, absenteeism rates, and communication effectiveness.

METHODS

Research Design. The study employed a descriptive-correlational research design to examine management practices and labor productivity in NIA Calabarzon projects. The researchers collected quantitative data through structured surveys administered to key personnel, focusing on recruitment, oversight, expertise, and trust. Concurrently, productivity indicators – manpower, motivation, and external factors – were measured. Statistical

analyses, including Pearson's r and regression techniques, were used to determine the strength and direction of relationships between personnel management and productivity outcomes. This design enabled the benchmarking of existing practices and supported the formulation of strategic recommendations to enhance labor efficiency in public infrastructure projects.

Population and Sampling. The study's population comprised of 121 key personnel affiliated with the National Irrigation Administration (NIA), including division managers, resident engineers, supervising managers, senior engineers, and project-in-charge engineers. Additionally, the study recognized the relevance of contractor personnel – such as project managers, site engineers, office engineers, materials engineers, geodetic engineers, foremen, skilled workers, and laborers – though only 57 NIA-affiliated respondents participated in the assessment of construction labor productivity.

To ensure methodological rigor, the researcher employed cluster sampling as the primary technique for respondent selection. As defined by Alex et al. (2024), cluster sampling is a form of unbiased random sampling wherein subjects are drawn from naturally occurring groupings or clusters that represent distinct segments of the population. In this study, Region IV-A (CALABARZON) served as the geographical scope and was strategically divided into three clusters: Quezon, Cavite-Batangas, and Laguna-Rizal. The distribution of responses across these clusters was anticipated to vary, reflecting the heterogeneity of field operations and personnel deployment.

Ethical considerations were duly observed throughout the research process. Prior to data collection, the study secured approval from an Ethics Review Board, ensuring adherence to protocols on participant confidentiality, informed consent, and the right to withdraw. These safeguards underscore the researcher's commitment, transparency and compliance to ethical integrity and responsible data stewardship.

Instrumentation. The primary data collection tool utilized in this study was a structured survey questionnaire, administered both digitally via Google Forms and through direct distribution to target respondents. The instrument was developed based on established literature and underwent validation process to ensure its reliability and construct integrity. Specifically, the questionnaire was reviewed by a panel of experts, including a statistician, a psychometrician, and seasoned research professionals, who assessed its content relevance and alignment with the study's objectives.

To further establish the instrument's psychometric soundness, a pilot test was conducted, yielding a Cronbach's alpha coefficient of 0.84, indicative of good internal consistency. This reliability index affirms the instrument's suitability for measuring the constructs under investigation.

The questionnaire was designed to capture respondents' perceptions on two core dimensions: organizational management practices and construction labor productivity within selected National Irrigation Administration (NIA) projects. A four-point Likert scale was employed to quantify levels of agreement, ranging from 1 (Strongly Disagree) to 4 (Strongly Agree), thereby facilitating nuanced analysis of attitudinal responses.

Structurally, the instrument was divided into two (2) sections. Part I consisted of twenty-four (24) items aimed at evaluating the management competencies of key personnel, while Part II is composed of forty (40) items designed to measure the labor productivity of the NIA-affiliated respondents.

Data Analysis. To address the study's research questions, descriptive statistics such as mean and standard deviation were used to determine the levels of management (Q1) and construction labor productivity (Q2) across specified dimensions. For the third question (Q3), Pearson's correlation coefficient was employed to examine the relationship between key personnel management and labor productivity

indicators. These statistical tools enabled quantifiable insights into organizational practices and workforce outcomes. Findings from these analyses informed the development of a proposed mechanism (Q4), which was synthesized through thematic interpretation of quantitative trends and aligned with sectoral benchmarks for productivity enhancement in NIA construction projects.

RESULTS AND DISCUSSION

Level of Management among personnel of NIA And NIA's contractor. Table 1 presents the mean distribution of responses regarding manpower recruitment among NIA personnel. From NIA Key personnel, recruitment processes are viewed as generally sound, respondents agree that standards guide hiring (M=4.21) and that recruits are equipped for their tasks (M=4.09). Flow is described as good (M=3.92) and staffing is largely sufficient (M=3.78). The average mean of 4.00 interpreted as "Agree" suggests a functional hiring pipeline with room to strengthen end-of-line adequacy, that is, ensuring the last mile of deployment routinely matches project needs at peak periods. These findings underscore the importance of harmonizing recruitment expectations across institutional and contractual stakeholders to ensure consistent workforce quality (Uniyal, 2024). Contractor recruitment is also assessed favorably, showing that, standards are observed (M=4.23), recruits are equipped (M=4.12), and staffing suffices (M=4.07), with an overall sense of good recruitment flow (AM=4.14). This mirrors the NIA pattern and suggests alignment in entry-level quality expectations.

Table 1
Mean Distribution of Management among NIA Personnel in terms of Manpower/Recruitment

No	Indicators	Mean	Agency Interpretation	Mean	Contractor Interpretation
1	There is a good flow in recruiting people	3.92	Agree	4.14	Agree
2	Recruiting people to do the job has standards	4.21	Strongly Agree	4.23	Strongly Agree
3	The recruit people are equipped and knows what they doing	4.09	Agree	4.12	Agree
4	They suffice the needed people to do the job/task	3.78	Agree	4.07	Agree
Average Mean		4.00	Agree	4.14	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51–3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51–3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

The emphasis on harmonizing recruitment expectations between institutional and contractual stakeholders aligns with insights that recruitment success depends on alignment and collaboration among stakeholders to avoid misalignment that can lead to suboptimal hiring decisions, candidate dissatisfaction, and operational inefficiencies (Leonteva, 2024). Harmonized processes also help create a consistent and inclusive experience across agency and contractor pipelines, improving the overall quality and fit of recruits (Halliwell, 2024). This underscores the importance of aligning entry-level quality expectations and maintaining clear standards across different recruiting entities within an organization or project.

Table 2 presents the mean distribution of responses regarding project oversight among NIA personnel. NIA key personnel, Attendance and on-site visibility of key personnel are consistently rated high: regular site visits (M=4.19), noticeable presence (M=4.04), and hands-on involvement (M=4.24) support perceptions that oversight is active. These ratings signal a management culture that values physical presence and inspection, both of which are foundational for timely technical clarifications and short feedback loops in construction. On contrary, contractors affirm strong presence and inspection practices (M=4.18) and emphasize hands-on involvement (M=4.30). The combined pattern reinforces the interpretation that site oversight is both routine and valued across parties.

Table 2
Mean Distribution of Management among NIA Personnel in terms of Project Oversight

No	Indicators	Mean	Agency Interpretation	Mean	Contractor Interpretation
1	The presence of key personnel is felt in the site	4.04	Agree	4.18	Agree
2	Appearances of key personnel makes the task well executed	4.20	Agree	4.18	Agree
3	Key personnel visit the site regularly for inspection	4.19	Agree	4.18	Agree
4	There is a hands-on job done by key personnel in ensuring the good flow of construction	4.24	Strongly Agree	4.30	Strongly Agree
Average Mean		4.17	Agree	4.21	Strongly Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51–3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

The project oversight mentioned was supported by the study of Okeke and Umeokana (2025) that consistent and active site oversight by key personnel positively influences construction project outcomes through physical presence, regular site visits, and hands-on involvement. Direct site visits allow management and

contractors to gain firsthand insights into project progress, quality, and potential issues not easily detectable from reports, fostering timely technical clarifications and short feedback loops critical to effective construction management. Studies and expert guides emphasize that visible and routine site supervision enhances communication, builds trust among stakeholders, and increases operational efficiency and quality adherence. Moreover, both management and contractors value hands-on involvement as it improves control over project execution, minimizes risks of errors, and contributes to better alignment with project specifications and timelines. This shared emphasis on on-site presence and inspection reinforces a culture where site oversight is a routine and highly regarded across parties, leading to more efficient, reliable and successful project outcomes (Schwartz, 2024).

Table 3 demonstrates the respondents' assessment on the Level of Key Personnel in terms of Expertise. The table shows that NIA key personnel expertise emerges as a core strength. Credentials are perceived as valuable (M=4.28), background is "on point" (M=4.19), and professional competence contributes to project success (M=4.41). The strong average mean of 4.21 underscores confidence in the technical judgment of key personnel and suggests that, when issues arise, they are unlikely to stem from skill deficits. In addition, expertise among contractor key personnel is judged strong, with high marks for credentials (M=4.23), background alignment (M=4.21), and contribution to success (M=4.34). The profile implies that technical capacity on the contractor side can meet National Irrigation Administration's expectations when planning and supervision are clear.

Table 3

Mean Distribution of Management among NIA Personnel in terms of Expertise

No	Indicators	Mean	Agency Interpretation	Mean	Contractor Interpretation
1	The expertise of key personnel is beyond the standards.	3.94	Agree	4.16	Agree
2	The credentials and degree of key personnel are present and valuable to the project	4.28	Strongly Agree	4.23	Strongly Agree
3	Key personnel background in project is on point and correct	4.19	Agree	4.21	Strongly Agree
4	The expertise key personnel make the project success	4.41	Strongly Agree	4.34	Strongly Agree
Average Mean		4.21	Strongly Agree	4.23	Strongly Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

The results highlighting the core strength of NIA key personnel expertise and the strong technical capacity of contractor key personnel is well justified. Studies reveal that the expertise, credentials, and background alignment of key personnel significantly influence effective project implementation and outcomes (Borges et al., 2024). For instance, research in government-funded projects and construction sectors consistently identifies the competency and capability of project staff as essential for meeting project goals, ensuring quality, and preventing skill-related issues in project execution. Staff competence combines knowledge, skills, and professional attributes that drive performance and confidence in technical judgment, which aligns with the findings of high scores for NIA and contractor personnel expertise contributing decisively to project success. Also, according to Briones and Azis (2025), there is a strong belief that the expertise of key personnel directly contributes to successful project outcomes. Their knowledge and skills are seen as essential for navigating the complexities of irrigation management and implementation. Moreover, the presence and active participation of key personnel are also highlighted as vital for ensuring tasks are executed effectively. This suggests that not only their skills but also their engagement in the field could influence project success positively (PIDS, 2025). Thus, these attributes underpin reliable planning, supervision, and handling of project challenges, reinforcing the confidence in technical capacity from contractor perspectives.

Table 4 shows that among NIA key personnel, Communication is evaluated positively across clarity (M=4.21), plan dissemination (M=4.19), delegation (M=4.22), and availability for clarification (M=4.18). The pattern indicates that channels exist and are used, with senior staff perceived as accessible. Sustaining this strength will require continuing emphasis on timely documentation and cross-team briefings to keep dispersed crews aligned. Same with contractor key personnel, communication is rated positively across clarity (M=4.14), plan dissemination (M=4.20), delegation (M=4.18), and availability for clarifications (M=4.23).

Results suggest that contractors maintain responsive lines with their teams which is a necessary complement to NIA communication.

Table 4
Mean Distribution of Management among NIA Personnel in terms of Communication

No	Indicators	Mean	Agency Interpretation	Mean	Contractor Interpretation
1	There is good communication of key personnel to its people to deliver quality service	4.21	Agree	4.14	Agree
2	The key personnel make sure the plan is well communicated to the people	4.19	Strongly Agree	4.20	Agree
3	The key personnel know how to communicate and delegate	4.22	Strongly Agree	4.18	Agree
4	The communication is always available in clarification and correction in the project among key personnel	4.18	Agree	4.23	Strongly Agree
Average Mean		4.20	Agree	4.19	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

This shows that the National Irrigation Administration (NIA) emphasizes effective communication and delegation among its key personnel to enhance service delivery. The communication and delegation reflect the following. First, NIA's key personnel are trained to communicate effectively with both their colleagues and the public. This ensures that plans and projects are clearly articulated, allowing for better understanding and execution of tasks among staff and stakeholders (The National Irrigation Master Plan, 2020). Second, the organizational structure of NIA supports delegation with various levels of management overseeing specific functions. This includes the Office of the Administrator, Regional Irrigation Offices (RIOs), and Provincial Irrigation Offices (PIOs), each responsible for different aspects of project implementation and management. Third, communication channels are established to allow personnel to seek clarifications and corrections regarding projects. This open line communication is crucial for addressing concerns and ensuring that all team members are aligned with project goals (National Irrigation Master Plan, 2020).

Meanwhile, under organizational structure, NIA consists of a central office, regional offices, project management offices, and provincial offices. This hierarchy facilitates clear lines of authority and responsibility, which are essential for effective communication and project management (Japan International Cooperation Agency, 2001). Also, key personnel, including division managers and project managers, play a vital role in ensuring that information flows smoothly throughout the organization. They are responsible for not only implementing projects but also for ensuring that their teams understand their roles and expectations within these projects (National Irrigation Administration, 2016).

Table 5 shows the NIA personnel labor turnover. Generally, it is viewed as acceptable showing that employees are kept through project completion (M=3.76) and staffing are adequate to finish tasks (M=3.97), with positive relationships between employees and key personnel (M=4.01). While near the "Agree" threshold, the slightly lower means compared with other dimensions hint that staffing continuity and depth remain practical concerns at certain phases of work. On the other hand, contractor key personnel signals acceptable retention and staffing sufficiency. While positive, it is among the lower management averages (AM=4.16), subtly indicating that stability and depth of crews should be monitored, especially during occurrence of critical tasks.

Table 5
Mean Distribution of Management among NIA Personnel in terms of Labor Turnover

No	Indicators	Mean	Agency Interpretation	Mean	Contractor Interpretation
1	There is a good retention of employee to the project	4.06	Agree	4.16	Agree
2	Employee stays in the project until it is done	3.76	Strongly Agree	4.16	Agree
3	There is good relationship of contract among employee to its key personnel	4.01	Strongly Agree	4.16	Agree
4	There are adequate people or employee doing the project up until the project is done	3.97	Agree	4.16	Agree
Average Mean		3.95	Agree	4.16	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

The results show that the National Irrigation Administration (NIA) has demonstrated effective employee retention and project commitment. In the study of Palacol (2024), it was shown that employees tend to remain with projects until completion, indicating a strong commitment to their work and the organization. This is likely influenced by various factors, including job satisfaction and organizational culture. Also, the NIA's structure supports sustained employee involvement throughout the project lifecycle, which is crucial for the successful execution of irrigation projects. Employees are engaged in both the operational and maintenance phases, ensuring continuity and expertise in project management.

There is a noted good relationship among employees and key personnel, fostering a collaborative work environment. This relationship is essential for maintaining morale and productivity within teams (National Irrigation Administration, 2023). Furthermore, the dynamics of contract relationships among employees contribute to a supportive atmosphere that enhances teamwork and project execution. These relationships are crucial for effective communication and coordination during project implementation.

Lastly, NIA ensures that there are adequate personnel assigned to projects until their completion. This staffing strategy is vital for managing the complexities of irrigation projects, which often require diverse skills and sustained effort over time (International Labour Organization, 2021). Aside from that, the organization has mechanisms in place to manage its workforce effectively, ensuring that employees are not only retained but also utilized efficiently throughout the project's duration (National Irrigation Administration, 2023).

Lastly, Table 6 shows the trust and relationship among NIA personnel. NIA key personnel shows that there is a cooperative atmosphere in their workplace with harmony (4.04), trust across sectors (4.09), good relationships (4.03), and trust aiding success (4.21). These perceptions indicate a broadly constructive working relationship across organizational boundaries. And among contractor personnel, trust, harmony, and constructive relationships appear to be shared strengths across NIA and contractors. These relational assets likely cushion the system against everyday friction and aid in quick resolution of site-level issues.

Table 6

Mean Distribution of Management among NIA Personnel in terms of Trust and Relationship

No	Indicators	Mean	Agency Interpretation	Mean	Contractor Interpretation
1	There is a union or harmony in key personnel to its employee or subordinate	4.04	Agree	4.07	Agree
2	Trust is present among key personnel and its other sectors or department	4.09	Agree	4.07	Agree
3	The relationship of key personnel towards its people are in good shape	4.03	Agree	4.18	Agree
4	Trust and relationship of key personnel and other people are present and helps the project succeed	4.21	Strongly Agree	4.27	Strongly Agree
Average Mean		4.09	Agree	4.15	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51–3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

These surveyed results showed that there is a strong sense of unity among the key personnel at NIA, which fosters effective collaboration and communication across various departments. This unity is crucial for achieving organizational goals and ensuring smooth operations (Japan International Cooperation Agency, 2001). Trust is a fundamental element that exists not only among the key personnel but also extends to other sectors and departments within NIA. This trust enhances cooperation and facilitates the sharing of resources and information, which is vital for project success (National Irrigation Administration, 2022). Also, the relationship between key personnel and their subordinates is reported to be in good shape. This positive dynamic contributes to a supportive work environment where employees feel valued and motivated. Lastly, the combination of trust and strong relationships among key personnel and other staff members significantly contributes to the success of projects undertaken by NIA. When personnel trust each other, it leads to better teamwork, increased morale, and ultimately, more effective project outcomes (NIA, 2024).

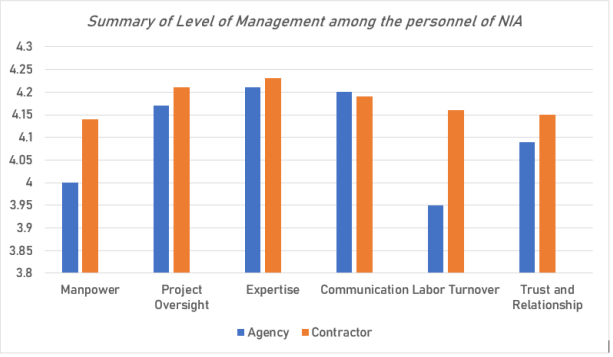

Figure 2

Summary of the Level of Management among the Personnel of NIA

Figure 2 shows that there is a big gap in aspects of manpower and labor turnover constructs between NIA key personnel and contractors. However, they are still in the range, thus, level of management is still present among the personnel of NIA. All of the constructs for level of key personnel of agency got 4.11 overall mean which is interpretated as Agree: manpower (M=4.00), project oversight (M=4.17), expertise (M=4.21), communication (M=4.20) labor

turnover (M=3.95), and trust and relationship (M=4.09). Meanwhile, for contractor personnel, the overall level of management gained a mean of 4.17, and interpreted as Agree: manpower (M=4.14), project oversight (M=4.21), expertise (M=4.23), communication (M=4.19), labor turnover (M=4.16), and trust and relationship (M=4.15). Thus, the existence of constructs for both agency and contractor both presents.

Construction labor productivity of NIA towards its projects. Table 7 presents the assessment of construction labor productivity in terms of manpower. Overall, the assessment of respondents gained a grand mean of 3.70, with a verbal interpretation of "Agree."

Table 7
NIA's Assessment of Level of Construction Labor Productivity in terms of Manpower

Manpower	Mean	Verbal Interpretation
The absenteeism of employees is very visibly affecting the production.	3.97	Somewhat Agree
The age of employees constrains the production.	3.06	Somewhat Agree
The labor's education level affects the production	3.53	Agree
Laborers' personal problems impact their productivity	3.78	Agree
The physique or strengths of workers affect the production	3.89	Agree
The work discipline among laborers is present and being followed.	3.94	Agree
Grand Mean	3.70	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

The result is supported by the study of Palacol (2024) affirming that the education level of laborers plays a significant role in their production capabilities. Higher educational attainment often correlates with better job performance, as educated workers tend to possess more skills and knowledge necessary for efficient work, while laborers' personal problems, including family issues or financial stress, can adversely affect their productivity. Such personal challenges may distract employees from their work, leading to decreased efficiency and output. The physical condition of workers is another critical factor affecting productivity. Laborers with better physical health and strength are generally more capable of handling demanding tasks, which directly influence their output levels. Discipline among laborers is also essential in maintaining productivity levels. When employees adhere to workplace protocols and demonstrate commitment to their roles, it positively impacts their performance.

Furthermore, high levels of absenteeism among employees significantly hinder production rates. Frequent absences disrupt workflow and can lead to delays in project completion. Lastly, the age of employees can also constrain production capabilities. Older workers may face physical limitations that affect their ability to perform certain tasks efficiently compared to younger counterparts (Palacol, 2024).

Table 8
NIA's Assessment of Level of Construction Labor Productivity in terms of Management

Management	Mean	Verbal Interpretation
The ability of construction management is high and can be dependable	4.08	Agree
Equipment or tools are available	4.03	Agree
Materials are available	4.06	Agree
Communication between top to bottom employees are well	3.72	Agree
Construction methods are properly managed and well formed	4.00	Agree
Agency budget or financial capability suffice the project demands and needs	3.67	Agree
There is a lack of supervision in the construction project	2.64	Somewhat Agree
Supervisors' or person-in-charge lack of experience	2.28	Disagree
There is a lack of on-site storage	2.78	Somewhat Agree
A lot of reworks in the project delays the productivity	4.00	Agree
Site management is not established that cause delay and problem	3.56	Agree
Overtime work is seen in the project	3.50	Somewhat Agree
Grand Mean	3.53	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

In Table 8, the overall assessment of the respondents on the level of construction labor productivity in terms of management had a grand mean of 3.53 with a verbal interpretation of "Agree."

The results reveal a mixed performance in its construction management and project execution. According to the Philippine Institute for Development Studies [PIDS] (2019), strengths are high construction management ability, availability of equipment and tools, material accessibility, effective communication, well-managed construction methods, and sufficient financial capability. PIDS (2019), also reveal that challenges captured are reworks causing delays, lack of site management, supervision deficiencies, and overtime work.

In general, while NIA exhibits strong capabilities in several operational aspects, it

must address the identified challenges to enhance productivity and efficiency in its irrigation projects.

Table 9
NIA's Assessment of Level of Construction Labor Productivity in terms of Motivation

Management	Mean	Verbal Interpretation
The amount of remuneration or salary is competitive to make employees pursue the work	3.72	Agree
The company creates healthy competition that thrives employees to do better at work	3.42	Somewhat Agree
Recognition programs for the employees are not present	3.19	Somewhat Agree
The company promotes opportunities for all to strive for their roles.	3.44	Somewhat Agree
There is a reward and punishment for the work discipline	3.39	Somewhat Agree
Job satisfaction is part of the company motives for its employees	3.67	Agree
Grand Mean	3.47	Somewhat Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

As shown in Table 9, the overall assessment of the respondents on the level of construction labor productivity in terms of motivation had a grand mean of 3.47 with a verbal interpretation of "Somewhat Agree."

The perceptions of the National Irrigation Administration (NIA) personnel reflect a mixed landscape of job satisfaction and motivational factors. Employees at NIA generally agree that remuneration is competitive, which encourages them to pursue their work. This aligns with the idea that adequate compensation is a fundamental motivator for job performance and satisfaction (Palacol, 2024). Furthermore, job satisfaction is highlighted as a significant aspect of the organizational motives, suggesting that NIA recognizes the importance of employee contentment in maintaining productivity (Soricelli, 2025).

However, several areas indicate only somewhat of positive responses from employees like healthy competition or employees feel that while there is some competition, it may not be effectively fostering an environment where they can excel (Palacol, 2024). Next, recognition Programs which there is a notable absence of structured recognition programs, which could enhance motivation and job satisfaction by acknowledging individual and team achievements (Opeña & Olua, 2023). Also, opportunities for advancement which employees perceive those opportunities for growth and advancement are not uniformly promoted across the organization, which can impact overall morale and motivation. Lastly, the presence of reward and punishment systems for work discipline suggests a structured approach to performance management, but it may also indicate a need for balance to ensure it does not lead to a punitive work environment (Opeña & Olua, 2023).

Table 10
NIA's Assessment of Level of Construction Labor Productivity in terms of Work Condition

Work Condition	Mean	Verbal Interpretation
The work environment is not safe and prone to accidents	3.42	Somewhat Agree
There are healthy and safety conditions applies and follow at the site	3.19	Somewhat Agree
Job task is being carried out a vertical and horizontal working or walking surface	3.44	Somewhat Agree
Work or the job has assurance or continuing work, or the job is foreseeable long lasting.	3.39	Somewhat Agree
Working space is not critical and not limited to cause the production and quality	3.67	Agree
Grand Mean	3.42	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51– 3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

Overall assessment of the respondents on level of construction labor productivity in terms of work condition (Table 10) had a grand mean of 3.42 with a verbal interpretation of "Somewhat Agree."

Concerns regarding workplace safety at the National Irrigation Administration (NIA) are a bit high based on the results of the study, emphasizing the need for improved health and safety conditions. In support, under safety concern, the nature of the job involves tasks performed on both vertical and horizontal surfaces, which can present unique risks, particularly related to falls or slips if proper safety measures are not implemented (as cited in eSafety, 2023).

Meanwhile, under health and safety measures the Occupational Safety and Health Administration (OSHA) has established standards that apply to walking-working surfaces, which include ensuring that these surfaces are free from hazards such as clutter, spills, or structural defects. Regular

inspections and maintenance are crucial to uphold these standards (Lapeyre Stair Inc., 2021). Also, given the risks associated with working at heights, implementing fall protection systems such as guardrails or personal fall arrest systems is essential. These measures are designed to minimize the risk of serious injuries from falls, which can occur even from relatively low heights (Health and Safety Solutions, 2024). Ongoing training for employees about recognizing hazards and utilizing personal protective equipment (PPE) is also critical. This includes ensuring workers are aware of proper footwear for different surface conditions and the importance of maintaining a clean work environment (NIA, 2025).

Lastly, under job security, employees have expressed that their jobs are expected to be long-lasting, which implies a need for ongoing commitment to improving workplace safety to ensure a sustainable work environment. While the working space is described as not critical, it is still essential to maintain high standards for production quality and employee safety. This requires a proactive approach to safety management rather than reactive measures after incidents occur (NIA, 2023).

Table 11
NIA's Assessment of Level of Construction Labor Productivity in terms of Project

Project	Mean	Verbal Interpretation
The design changes that affect the project deadline	4.19	Agree
Complexity of design hinders the project production	2.50	Disagree
The quality of drawing comprehensively matters to the project	3.43	Somewhat Agree
Location of the project also hinders the productivity	3.47	Somewhat Agree
The type of the project creates constraints or struggle in all workers that delay	3.42	Somewhat Agree
The sub-contractor roles and contribution are exceptional	2.94	Somewhat Agree
Grand Mean	3.33	Somewhat Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51–3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

In Table 11, the overall assessment in terms of project had a grand mean of 3.33 with a verbal interpretation of "Somewhat Agree."

The results of the study reflect various perspectives on project management and execution challenges within irrigation projects. Under design changes affecting project deadline, there is an expressed agreement among the general samples. Employees noted that the roles and contributions of sub-contractors are exceptional, indicating a positive view on the support provided by these external parties (Boykin, 2014). Meanwhile, the quality of drawings was viewed as somewhat important, suggesting that while it is a factor, there may be other overriding issues affecting project success. The location of the projects was also rated as somewhat hindering productivity, indicating that geographical and logistical factors play a role in project efficiency, The type of project was seen as creating constraints or struggles for workers, which can lead to delays. This suggests that certain project types inherently come with more challenges (PIDS, 2015).

In contrast, the complexity of design was interpreted as having a disagreeable impact on production, suggesting that while complexity exists, it is not perceived as a significant hindrance to overall productivity (PIDS, 2025).

Table 12
NIA's Assessment of Level of Construction Labor Productivity in terms of External Factors

External Factors	Mean	Verbal Interpretation
The economic condition during the project contributes to the production and efficiency of the project	3.78	Agree
Geological and hydrological condition gives an impact to the production to be done in the deadline.	4.03	Agree
Law and regulation also take effect for the construction project success	4.11	Agree
The social culture of the company, its values, habits and its beliefs. affects the construction productivity	3.75	Agree
The weather conditions overdue the productivity.	4.50	Agree
Grand Mean	4.03	Agree

Legend: "Strongly Agree (4.51 – 5.00)," "Agree (3.51 – 4.50)," "Somewhat Agree (2.51–3.50)," "Disagree (1.51– 2.50)," "Strongly Disagree (1.00 – 1.50)

Table 12 demonstrates the respondents' assessment on the level of construction labor productivity in terms of external factors. The table shows that all statement obtained a verbal interpretation of agree. These results reflect that NIA employees recognize the economic conditions during project implementation directly affecting production and efficiency. Improved economic stability can lead to better resource allocation and project management, ultimately enhancing productivity. While PIDS

(2020) reiterated that geological and hydrological conditions are vital for determining the feasibility and success of irrigation projects. These factors impact water availability, soil quality, and the overall timeline for project completion. For instance, adverse weather conditions such as typhoons and heavy rains can limit the operational window for project implementation, leading to delays (as cited in NIA, 2021).

Also, compliance with laws and regulations is essential for the successful execution of construction projects. The NIA must adhere to environmental impact assessments and other regulatory requirements to mitigate risks associated with construction activities (National Irrigation Administration-Region 02, 2018). While the social culture within the NIA, including its values, habits, and beliefs, affects construction productivity, strong organizational culture that promotes collaboration and accountability can enhance teamwork and efficiency among employees (Praiwan et al, 2022). Lastly, weather plays a significant role in agricultural productivity. Unfavorable weather conditions can lead to delays in project timelines and affect crop yields (PIDS, 2020).

The overall assessment on the level of construction labor productivity in terms of external factors had a grand mean of 4.03 with a verbal interpretation of "Agree (Figure 3).

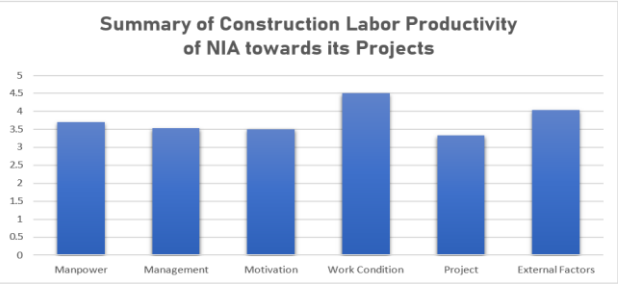

Figure 3
Summary of Construction Labor Productivity of NIA towards its Projects

Based on the figure, the construction labor productivity of NIA gained lower values as indicated by the following mean values: manpower (M=3.70), management (M=3.53), motivation (M=3.47), work condition (M=3.42), project (M=3.33 somewhat agree), and external factors (M=4.03). Though, most of constructs gained agreeable interpretation but to relate it to one another. The discrepancy among these factors likely arises because while external factors are somewhat beyond direct control and scored relatively higher, internal factors like manpower, management, motivation, and work conditions are more directly impactful yet currently less optimized. The interplay between these elements means that weaknesses in management and workforce capabilities can amplify the negative effects of project complexity and work conditions, leading to overall lower productivity. Improving skilled labor availability, enhancing management practices, motivating workers, and optimizing work conditions are critical to reducing this discrepancy and improving labor productivity in NIA projects (University of Latvia, 2023; Bautista et al., 2023).

Relationship between the level of management and construction labor productivity among the NIA personnel.

In Table 13, the correlational tests reveal no significant links between Manpower Recruitment and any productivity factor. Several weak inverse associations appear elsewhere: Presence/Absenteeism with Motivation ($r = -0.263$, $p = .048$); Communication with Motivation ($r = -0.228$, $p = .033$) and with External Factors ($r = -0.274$, $p = .039$); Labor Turnover with Motivation ($r = -0.309$, $p = .019$); and Trust & Relationship with Motivation ($r = -0.339$, $p = .010$) and with External Factors ($r = -0.262$, $p = .049$). Given item wordings mix facilitators and hindrances, these small negative coefficients are best read cautiously. They likely reflect those higher ratings in management quality coincide with slightly lower reports on motivation/external-factor pressures (or vice versa), but the magnitudes are weak and not uniform across dimensions. Practically, the pattern suggests that improvements in relational and presence-based management may modestly buffer motivation-related frictions and perceived external constraints, albeit with limited effect sizes.

Overall, the association between management level and labor productivity is not significant (r = −0.151, p = .261). This indicates that, based on the dataset, variability in management ratings does not translate into a linear, aggregate shift in reported productivity conditions. Given the strong means on expertise and communication, the null overall link suggests that productivity is being shaped by a broader constellation of factors especially weather and other externals, while specific management practices may exert only on a localized or conditional influence state (e.g., on attendance discipline or site coordination).

Table 13

Pearson r Test Analysis Between the Level of Management and Construction Labor Productivity among NIA Personnel

Pearson's Correlations			Pearson's r	p	Interpretation
Manpower Recruitment	-	Manpower	0.198	0.139	No Significant
	-	Management	0.071	0.6	No Significant
	-	Motivation	-0.216	0.106	No Significant
	-	Work Condition	-0.081	0.547	No Significant
	-	Project	0.14	0.299	No Significant
	-	External Factors	0.002	0.987	No Significant
Presence or Absenteeism	-	Manpower	0.107	0.43	No Significant
	-	Management	-0.173	0.199	No Significant
	-	Motivation	-0.263*	0.048	**Weak Inverse**
	-	Work Condition	-0.146	0.28	No Significant
	-	Project	-0.083	0.539	No Significant
	-	External Factors	-0.203	0.13	No Significant
Expertise	-	Manpower	0.019	0.89	No Significant
	-	Management	-0.083	0.541	No Significant
	-	Motivation	-0.236	0.077	No Significant
	-	Work Condition	-0.115	0.395	No Significant
	-	Project	-0.009	0.948	No Significant
	-	External Factors	-0.151	0.263	No Significant
Communication	-	Manpower	0.021	0.874	No Significant
	-	Management	-0.144	0.286	No Significant
	-	Motivation	-0.282*	0.033	**Weak Inverse**
	-	Work Condition	-0.18	0.18	No Significant
	-	Project	-0.043	0.752	No Significant
	-	External Factors	-0.274*	0.039	**Weak Inverse**
Labor Turnover	-	Manpower	-0.009	0.948	No Significant
	-	Management	-0.214	0.111	No Significant
	-	Motivation	-0.309*	0.019	**Weak Inverse**
	-	Work Condition	-0.191	0.154	No Significant
	-	Project	-0.022	0.873	No Significant
	-	External Factors	-0.247	0.064	No Significant
Trust and Relationship	-	Manpower	0.128	0.342	No Significant
	-	Management	-0.094	0.487	No Significant
	-	Motivation	-0.339**	0.01	**Weak Inverse**
	-	Work Condition	-0.163	0.225	No Significant
	-	Project	0.042	0.756	No Significant
	-	External Factors	-0.262*	0.049	**Weak Inverse**

* p < .05, ** p < .01, *** p < .001

Overall:

Pearson's Correlations			Pearson's r	p
Level of management among the personnel of NIA	-	Labor Productivity of NIA towards its construction	-0.151	0.261

* p < .05, ** p < .01, *** p < .001

Proposed measures to enhance the construction labor productivity of the NIA projects in CALABARZON. Improving construction labor productivity in National Irrigation Administration (NIA) projects within CALABARZON requires a comprehensive, multifaceted approach that strengthens project supervision, optimizes workforce management, and reinforces quality control measures. The study findings indicate several areas for improvement, particularly among contractors, necessitating immediate action and strategic reforms to ensure efficiency and quality in project implementation.

Creation of Additional Standard Positions for NIA Employees. NIA must restructure its workforce by creating additional technical and supervisory roles to address project backlogs and monitoring gaps. This includes assigning specialized personnel to oversee project timelines, ensure compliance with standards, and manage field operations efficiently.

Intensive Training for NIA Technical Key Personnel with PRC Accreditation. Current in-house training lacks professional accreditation. Introducing CPD-accredited programs for engineers and technical staff will enhance competencies and fulfill licensing requirements. Collaboration with agencies such as DPWH can further enrich these training initiatives by incorporating best practices.

Establishment of a More Stringent Independent QA/QC Unit. Unlike DPWH's independent Quality Assurance Unit, NIA's current project-based inspection system lacks a dedicated QA/QC division. Establishing an autonomous QA/QC unit will ensure objective evaluation of construction quality, with third-party consultants deployed to assess material compliance, workmanship, and structural integrity at critical project milestones.4.

Strengthening the Contractor Performance Evaluation System (CPES). While NIA utilizes the Contractor Performance Evaluation System, its enforcement remains weak. Strengthening this system through stricter criteria, transparent performance tracking, and clear

sanctions will deter poor performance and ensure that only capable contractors are engaged for future works.

Limitations of the Study. This study focused on the perspective of 121 key personnel of NIA and its contractor and 57 NIA employees participated to answered construction labor productivity. Also, the researcher only scoped selected projects of National Irrigation Administration (NIA) of Region IV-A that has been done in the year 2022-2023. Furthermore, the researcher only relied on self-reported data, to frame the applicability of the results. The study only aimed in knowing the least to the highest impacting factors among key personnel of NIA and its contractor and the relationship between the management and construction labor productivity among NIA personnel. The results were used as bases in proposing a strategic approach for the enhancement of construction labor productivity of NIA.

Recommendations. Based on the findings of the study, the following recommendations are hereby given:

1. The key personnel needs improvement in people retention and its turnover. The human resource and management should emphasize the value of people and maintain its good relationship.

2. The construction labor productivity shall have a great plan to improve its various segments. The project itself shall have a better communication and implementation to uplift the other fields of NIA construction labor productivity.

3. The contractor and NIA key personnel should establish communication to be aligned with project goals thus achieving project success. This could be done by strengthening their relationship and establishing stringent independent QA/QC to one another.

4. The relationship and alignment of contractor and NIA shall be established to fully achieved the productivity of the NIA as government agency. Intensive training and seminar are needed, and regular technical knowledge and evaluation are seen to be influential for the success of this goal.

5. The implementation of the proposed strategic measures of this study shall be forwarded and be presented to concerned agencies, such as public and private organizations, to gain support and have a positive evaluation towards the NIA. The measures can also be adapted or used by other institutions not only in construction industry but in other industries and businesses.

6. To conduct a qualitative type or mixed method approach research of this topic to gain the sentiments thus strengthening the claims of the quantitative report as resulted in this current study. The qualitative response among significant people in the organization or by key personnel will uplift the government concerns in the projects of the National Irrigation Administration and its partners.

REFERENCES

Alaghbari, W., Al-Sakkaf, A. A., & Sultan, B. (2017). Factors affecting construction labour productivity in Yemen. *International Journal of Construction Management, 19*(1). https://doi.org/10.1080/15623599.2017.1382091

Alex, D., (2024, July 29). *What is Cluster Sampling? Definition, Method, and Examples.* Researcher Life. https://researcher.life/blog/article/what-is-cluster-sampling-definition-method-and-examples/

Bautista, J., Malonzo, A.S., Cunanan, J.R., Lingayo, J.T., et al. (2023). Analysis of factors affecting labor productivity on construction projects in the City of San Fernando, Pampanga: A quantitative study. *Iconic Research and Engineering Journal, 6*(12).

Briones, R., Azis, A., (2025, January 15). *Repurposing rights to expand public access to water: the case of the National Irrigation Administration.* Philippines Institute for Development Studies. https://www.pids.gov.ph/publication/policy-notes/repurposing-rights-to-expand-public-access-to- water-the-case-of-the-national-irrigation-administration

Borges, D., B., Soares, C., A. P., Najjar, M., Costa, B. B. F. da, Tam, V. W. Y., & Haddad, A. N. (2024). Project success and critical success factors of construction projects from the perspective of a multicultural team: a case study in Guyana. *International Journal of Construction Management, 25*(10), 1115–1129. https://doi.org/10.1080/15623599.2024.2397626

CIC Construction Group. (2025). *10 strategies for effective communication everyone in construction should know.* https://cicconstruction.com/blog/strategies-for-effective- communication-everyone-in-construction-should-know/

eSafety (2023, February 27). *Your guide to walking-working surfaces: definitions, types, hazards & safety tips.* eSafety. https://esafety.com/your-guide-to-walking-working-surfaces/

Halliwell, C., (2024, January 12). *Transforming workforce recruitment with harmonization of channels.* Allegis Global Solutions. https://blog.allegisglobalsolutions.com/transforming-workforce-recruitment-with-harmonisation-of-channels

Health and Safety Solutions (2024). Because workplace safety is mandatory, not an option. Health and Safety Solutions. https://hssphilippines.com/

International Labour Organization [ILO]. (2021). *Guidance for operation and maintenance (O&M) of irrigation systems: Maximizing local resources and community participation, Nepal and the Philippines.* International Labour Organization. wcms_823804.pdf

Japan International Cooperation Agency. (2001). *The study on strengthening NIA's management system: Final report, Volume I – Main report.* National Irrigation Administration, Republic of the Philippines. https://openjicareport.jica.go.jp/pdf/11661436_01.pdf

KanBo. (2024). *Productivity in construction-what is it and how to improve it?.* https://kanboapp.com/en/blog/productivity-in-construction-what-is-it-and-how-to-improve-it/

Lapeyre Stair Inc. (2021, May 5). *OSHA walking-working surfaces fact sheet PDF & checklist.* Lapeyre Stair Inc. https://www.lapeyrestair.com/blog/osha-walking-and-working-surfaces-checklist/

University of Latvia. (2025). *Latvia's productivity report.* LV PEAK Think Tank. https://www.lvpeak.lu.lv/en/scientific-projects/latvias-productivity-report

Leonteva, L., (2024, April 3). *Harmonizing the recruitment process for success.* SinnRec. https://www.sinnrec.com/blog/harmonizing-the-recruitment-process-for-success

Mahamid, I. (2020). Study of relationship between rework and labor productivity in Building Construction Projects. *Revista de la construcción, 19*(1):30-41. http://doi.org/10.7764/rdlc.19.1.30-41

Manaois, G.C., Mercado, R., (2023). Operational variables determining project implementation delays. *Iconic Research and Engineering Journal, 6* (12).

National Irrigation Administration [NIA]. (2022). *Executive Order No. 168.* https://www.nia.gov.ph/content/overview

National Irrigation Administration [NIA]. (2016). *Quality Management System Manual (ISO 9001:2015).* https://www.nia.gov.ph/sites/default/files/pdf_reader/nia-qms-manual-rev2.pdf

National Irrigation Administration [NIA] (2023). *NIA Memorandum Circular No. 124.* https://www.nia.gov.ph

National Irrigation Administration. National Irrigation Administration [NIA] (2025, January 3). *Construction workers and staff undergo safety in the workplace training.* https://region7.nia.gov.ph/content/construction-workers-and-staff-undergo-safety-workplace- training

National Irrigation Administration [NIA] (2024, December 20*). PH needs P220B annually to achieve rice sufficiency.* https://www.nia.gov.ph/

National Irrigation Administration-Region 02 (2018, September). *Environmental Impact Statement: Tumauini River Multipurpose Project. Vol. 1 Main Report.* TRMP-EIS-08.18.2018-volume-1.pdf

National Irrigation Administration [NIA]. (2023, March 02). *Memorandum Circular NO. 25. Memorandum Circular NO. 149.*

National Irrigation Master Plan. (2020). *The National Irrigation Master Plan (NIMP) 2020-2030 Abridged Version.* https://www.nia.gov.ph/sites/default/files/_NIMP%20Abridged_per%20page.pdf

Boykin, D. (2014, July). *How managers deliver project success. PE Magazine.* National Society of Professional Engineers. https://www.nspe.org/career-growth/pe-magazine/july-2014/how-managers-deliver-project-success

Okeke, C.E., Umeokana, C.S., (2025). Comparative analysis of construction project outcomes: Supervised vs. unsupervised execution. *International Journal of Engineering and Modern Technology*. https://doil:10.56201/ijemt.vol.11.no5.2025.pg51.59

Opeña, J.G, Olua, E., (2023). *Work-related stress among National Irrigation Administration (NIA).*

Palacol, P.L., (2024). Factors influencing job performance among employees of the National Irrigation Administration (NIA) Region IV: Basis for intervention enhancement formulation. *EPRA International Journal of Multidisciplinary Research, 10*(5). https://eprajournals.com/IJMR/article/13129

Patil, R.S., Morey, N.N., (2021). Absenteeism in construction industry: Causes correlation and remedies exploring the impact of absenteeism on construction industry productivity. *Ignited Minds Journal, 18* (3), 171-175.

Reyes, D. (2023, August 5). *COA flags ₱1.2-B worth of delayed, scrapped irrigation projects.* Philippine Daily Inquirer. https://newsinfo.inquirer.net/1812445/coa-flags-p1-2-b-worth-of-delayed-scrapped-irrigation-projects

Rola, A.C., (2019). *Strengthening institutional links for irrigation water governance.* Philippine Institute for Development Studies. No.209-09. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidspn1909.pdf

Praiwan, P.D., Tadeo, J.C., Manzon, R.D., Jocson, J., (2022). Risk factors affecting project implementation in the National irrigation administration: a basis for an updated risk register. *International Journal of Progressive Research in Science and Engineering, 3*(12): 199-210. https://journal.ijprse.com/index.php/ijprse/article/view/764

Soricelli, A., (2025) *Remuneration: defining employee compensation.* The Investopedia Team. https://www.investopedia.com/terms/r/remuneration.asp

Schwartz, B., (2024, February 28). *Construction site management: a guide to site inspection and site planning.* Project Manager. https://www.projectmanager.com/blog/construction-site-planning-inspection

Uniyal, P., (2024, September 26). *Importance and purpose of recruitment and selection in driving business results.* Peoplebox. https://www.peoplebox.ai/blog/importance-and-purpose-of- recruitment/

Venture Management. (2024, April 19). *How to effectively hire construction workers amid shifting industry processes.* Venture Management. https://venturemanagement.net/construction-workers-recruitment-philippines/

Worldwide Recruitment Solutions. (2025, November 13). *WRS-Worldwide Recruitment Solutions: Credit Risk Assessment.*