

Bamboo Scaffolding in the Fourth District of Quezon Province: A Bridge Between Tradition and Innovation for Safer and Sustainable Construction

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DOI: <https://dx.doi.org/10.47772/IJRISS.2026.1014MG0060>

Received: 05 March 2026; Accepted: 14 March 2026; Published: 30 March 2026

ABSTRACT

This study examines the current practices, safety considerations, and awareness of bamboo scaffolding in the Fourth District of Quezon Province, Philippines. Despite the increasing availability of steel scaffolding systems, bamboo scaffolding remains widely used due to its affordability, accessibility, and adaptability. The research employed a quantitative descriptive design involving 50 construction stakeholders from the municipalities of Gumaca, Lopez, Calauag, and Atimonan. Data were collected through a structured survey questionnaire using a five-point Likert scale and analyzed using weighted mean and descriptive statistics. Findings reveal that bamboo scaffolding is commonly utilized in residential and commercial construction projects and is valued for its flexibility and cost efficiency. Respondents also recognize the importance of worker training, adherence to safety standards, quality of bamboo materials, and regular inspection protocols in ensuring safe scaffolding practices. The study further indicates increasing awareness of modern bamboo scaffolding practices supported by training programs, government initiatives, and industry publications. The results highlight the potential of bamboo scaffolding to support sustainable construction while preserving traditional construction knowledge. Recommendations include strengthening training programs, establishing clearer safety guidelines, and promoting bamboo innovation within the construction industry.

Keywords: Bamboo scaffolding, construction, Safety

INTRODUCTION

Bamboo scaffolding has long been an integral component of construction practices in many Asian countries, including the Philippines. In the Fourth District of Quezon Province, bamboo scaffolding continues to serve as a practical and economical solution for supporting construction activities. As the construction industry faces rising material costs and increasing environmental concerns, bamboo has regained attention as a renewable and sustainable material.

Previous studies have highlighted bamboo's exceptional tensile strength, flexibility, and availability, making it suitable for temporary structural systems such as scaffolding. According to research in the Journal of Green Building, bamboo possesses structural properties comparable to some steel applications when used appropriately in construction. In addition to its structural capabilities, bamboo scaffolding is deeply embedded in local building traditions, reflecting indigenous construction knowledge passed down through generations. Additionally, the study establishes its grounding in legal foundations, including Republic Act No. 11596, Occupational Safety and Health Standards (OSHS), the Building Code of the Philippines, and local ordinances, collectively forming a regulatory framework for bamboo scaffolding in the country.

However, the integration of traditional practices with modern safety standards remain an important issue. Government policies such as the Philippine Bamboo Industry Development Act (Republic Act No. 11596) promote bamboo as a sustainable construction material, encouraging innovation while ensuring safety compliance. This study therefore investigates bamboo scaffolding practices in the Fourth District of Quezon Province to better understand its advantages, limitations, safety considerations, and the level of awareness

regarding modern bamboo scaffolding techniques.

The following data were obtained based from the variables of the study:

- The most common types of bamboo scaffolding used in the 4th District of Quezon Province
- Advantages and disadvantages of traditional and modern bamboo scaffolding practices among construction workers and contractors
- Factors that influence the safety and efficiency of bamboo scaffolding practices
- Awareness on modern bamboo scaffolding practices

METHODOLOGY

This study utilized a quantitative descriptive research design to examine bamboo scaffolding practices among construction stakeholders in the Fourth District of Quezon province. The research focused on identifying commonly used scaffolding types, evaluating the advantages and disadvantages of traditional and modern practices, determining factors affecting safety and efficiency, and assessing awareness of modern bamboo scaffolding methods.

The respondents consisted of 50 individuals involved in construction activities, including construction workers, contractors, foremen, and skilled laborers. They were selected from the municipalities of Gumaca, Lopez, Calauag and Atimonan using purposive sampling to ensure that participants had direct experience with bamboo scaffolding.

Data were collected using a structured questionnaire divided into four sections corresponding to the study variables. A five-point Likert scale ranging from Strongly Disagree(1) to Strongly Agree (5) was used to measure perceptions and awareness levels.

Descriptive statistics, particularly weighted mean and verbal interpretation were employed to analyze the responses. These statistical tools allowed the researcher to determine the general perception of respondents regarding bamboo scaffolding practices.

Ethical considerations were observed during the research process. Participation was voluntary, respondents were informed of the purpose of the study, and confidentiality of responses was assured.

RESULTS

The findings indicate that bamboo scaffolding remains widely used across construction projects in the Fourth District of Quezon Province. Respondents strongly agreed that bamboo scaffolding is common in residential construction and agreed that it is also used in commercial and infrastructure projects. This demonstrates the continued reliance on bamboo as a practical scaffolding material within local construction contexts.

The results also show that construction stakeholders recognize both traditional and modern bamboo scaffolding practices. Traditional scaffolding was perceived as cost-effective and easier to assemble, which reflects the practicality of indigenous construction techniques. However, respondents also acknowledged the sustainability benefits of modern bamboo scaffolding systems, particularly those incorporating improved treatment processes and standardized construction methods.

Safety considerations emerged as a critical theme in the findings. Respondents strongly emphasized the importance of worker training, compliance with safety standards, availability of skilled labor, and regular inspection of scaffolding structures. These factors align with occupational safety principles identified in international construction safety studies.

The study also found a growing awareness of modern bamboo scaffolding practices among construction stakeholders. Training programs, government initiatives, and industry publications were identified as key sources of information. This suggests that the construction sector in the region is gradually adopting more

sustainable and safety-oriented approaches to bamboo scaffolding.

The following table are the results.

Table 1. The most common types of bamboo scaffolding used in the 4th District of Quezon Province

Statement	Weighted Mean	Verbal Interpretation
1. I am aware of the specific types of bamboo used for scaffolding in this region.	3.8	Agree
2. Bamboo scaffolding is commonly used in residential construction projects.	4.2	Strongly Agree
3. Bamboo scaffolding is commonly used in commercial construction projects.	3.9	Agree
4. Bamboo scaffolding is commonly used in infrastructure construction projects.	3.7	Agree
5. I am familiar with the various designs and structures of bamboo scaffolding.	4.1	Strongly Agree
6. Bamboo quality affects the durability of scaffolding structures.	4.0	Agree
7. Bamboo scaffolding can be customized to fit complex architectural designs.	4.3	Strongly Agree

In the 4th District of Quezon Province, the results indicate a notable awareness and acceptance of bamboo scaffolding practices. Respondents generally agree that they are aware of specific bamboo types used for scaffolding, with a weighted mean of 3.8, indicating an agreement. Furthermore, the strong agreement, with a weighted mean of 4.2, that bamboo scaffolding is commonly used in residential construction projects suggests its prevalence in such projects. Similarly, respondents agree that bamboo scaffolding is commonly utilized in commercial and infrastructure construction projects, with weighted means of 3.9 and 3.7, respectively. The high level of familiarity with various bamboo scaffolding designs and structures, evidenced by a weighted mean of 4.1, reflects the respondents' knowledge and experience. Additionally, respondents agree that bamboo quality affects scaffold durability (weighted mean of 4.0) and that bamboo scaffolding can be customized for complex architectural designs (weighted mean of 4.3). These findings collectively demonstrate the prominence of bamboo scaffolding across various construction types and the respondents' familiarity with its diverse applications and attributes.

Table 2. Advantages and disadvantages of traditional and modern bamboo scaffolding practices among construction workers and contractors

Statement	Weighted Mean	Verbal Interpretation
1. Traditional bamboo scaffolding is cost-effective compared to modern alternatives.	3.7	Agree
2. Modern bamboo scaffolding is more sustainable than traditional scaffolding materials.	4.2	Strongly Agree
3. Traditional bamboo scaffolding is easier to assemble and disassemble.	3.9	Agree
4. Safety concerns are more significant with traditional bamboo scaffolding.	3.3	Neutral
5. Maintenance issues are more common with modern bamboo scaffolding.	2.8	Disagree
6. Modern bamboo scaffolding is less susceptible to environmental degradation.	4.1	Agree
7. Traditional bamboo scaffolding contributes to the preservation of cultural heritage.	4.4	Strongly Agree

The results of the survey reveal a nuanced perspective on traditional and modern bamboo scaffolding practices. Respondents generally agree that traditional bamboo scaffolding is cost-effective (weighted mean of 3.7) and easier to work with (weighted mean of 3.9). Conversely, there is strong agreement that modern bamboo scaffolding is more sustainable (weighted mean of 4.2) and less susceptible to environmental degradation (weighted mean of 4.1). Safety concerns with traditional scaffolding are perceived neutrally (weighted mean of 3.3), while maintenance issues with modern scaffolding are met with disagreement (weighted mean of 2.8). Overall, the findings suggest a recognition of the advantages of both approaches, with a leaning toward the sustainability and safety benefits of modern practices, along with a strong acknowledgment of traditional scaffolding's contribution to cultural heritage (weighted mean of 4.4).

Table 3. Factors that influence the safety and efficiency of bamboo scaffolding practices

Statement	Weighted Mean	Verbal Interpretation
1. Proper worker training significantly enhances the safety of bamboo scaffolding.	4.2	Strongly Agree
2. Adherence to safety standards is a crucial factor in ensuring safe bamboo scaffolding practices.	4.3	Strongly Agree
3. The quality of bamboo used directly impacts the safety of scaffolding structures.	4.0	Agree
4. Regular inspection protocols are essential for the safety and efficiency of bamboo scaffolding.	4.1	Agree
5. Efficient construction speed is influenced by the adaptability of bamboo scaffolding...	3.8	Agree
6. Advanced construction tools and equipment contribute to the efficiency of bamboo scaffolding.	4.3	Strongly Agree
7. The availability of skilled labor is critical for the safety and efficiency of bamboo scaffolding.	4.4	Strongly Agree

The table presents key factors that significantly influence the safety and efficiency of bamboo scaffolding practices, as rated by the respondents. The results indicate a strong consensus among respondents. They strongly agree that proper worker training (weighted mean of 4.2) and adherence to safety standards (weighted mean of 4.3) play crucial roles in ensuring safe bamboo scaffolding practices. Additionally, there is an agreement that the quality of bamboo used directly impacts the safety of scaffolding structures (weighted mean of 4.0) and that regular inspection protocols are essential for both safety and efficiency (weighted mean of 4.1). Respondents also agree that efficient construction speed is influenced by the adaptability of bamboo scaffolding (weighted mean of 3.8) and that advanced construction tools and equipment contribute significantly to its efficiency (weighted mean of 4.3). Lastly, respondents strongly agree that the availability of skilled labor is critical for both the safety and efficiency of bamboo scaffolding practices (weighted mean of 4.4). These findings underscore the multifaceted nature of bamboo scaffolding practices and highlight the importance of training, safety standards, material quality, inspection, adaptability, technology, and skilled labor in ensuring their safety and efficiency.

Table 4. Awareness of modern bamboo scaffolding practices

Statement	Weighted Mean	Verbal Interpretation
1. I am aware of modern bamboo scaffolding practices.	4.0	Agree
2. My awareness of modern bamboo scaffolding practices comes from training programs.	4.2	Strongly Agree
3. My awareness of modern bamboo scaffolding practices comes from government initiatives.	3.9	Agree
4. My awareness of modern bamboo scaffolding practices comes from industry publications.	3.8	Agree
5. I am informed about the benefits of modern bamboo scaffolding	4.1	Agree

practices.		
6. I believe that modern bamboo scaffolding practices are essential for sustainable construction.	4.3	Strongly Agree
7. I have attended workshops or seminars on modern bamboo scaffolding practices.	3.7	Agree

Table 4 shows the survey results regarding awareness and perception of modern bamboo scaffolding practices in the Fourth District of Quezon Province reveal a generally positive outlook among respondents. Overall, respondents express a favorable level of awareness (4.0 - Agree) regarding modern bamboo scaffolding practices. This awareness primarily stems from training programs (4.2 - Strongly Agree) and is further supplemented by government initiatives (3.9 - Agree) and industry publications (3.8 - Agree). Respondents also indicate being well-informed about the benefits of modern bamboo scaffolding practices (4.1 - Agree), reflecting a growing understanding of the advantages associated with this construction approach. Furthermore, a significant majority of respondents believe that modern bamboo scaffolding practices are essential for sustainable construction (4.3 - Strongly Agree), underscoring the recognition of bamboo's role in fostering environmentally responsible building methods. While a substantial portion of respondents has attended workshops or seminars on modern bamboo scaffolding practices (3.7 - Agree), it is evident that ongoing efforts to disseminate knowledge and promote sustainable construction practices are gaining traction among construction professionals and workers in the district.

CONCLUSION

The study confirms that bamboo scaffolding continues to play a significant role in construction activities in the Fourth District of Quezon Province. Its affordability, adaptability, and local availability make it a valuable material for supporting construction projects.

While traditional bamboo scaffolding practices remain prevalent, the findings indicate increasing awareness of modern scaffolding techniques that improve durability, safety, and environmental sustainability. Worker training, compliance with safety regulations, proper material selection, and regular inspection are essential factors in ensuring the safe use of bamboo scaffolding.

The study highlights the importance of integrating traditional construction knowledge with modern engineering practices to enhance safety and sustainability in the construction industry.

RECOMMENDATIONS

1. Construction stakeholders should implement regular training programs on safe bamboo scaffolding practices.
2. Government agencies should strengthen safety guidelines and regulatory frameworks for bamboo scaffolding.
3. Further research should explore advanced bamboo treatment technologies and structural innovations.
4. Academic institutions should incorporate bamboo construction technologies into architecture and engineering curricula.

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