

# The Analysis of using various Scaffoldings in the Construction of Building Structures in the Fourth District of Quezon Province

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**Abstract**—The main focus of this study is to identify the various scaffoldings used in the construction projects within the 4th District of Quezon Province. Scaffold in bridges may differ in the scaffold use in residential houses and other structures thus, adopting and using the best scaffoldings in the construction should be analyze and studied in order for the project manager, architects, engineer construction workers and other allied professionals. This study will answer the question which are always in the objectives of the contractor, project manager and the other allied professionals that the use of scaffoldings is very important in the construction activities. The descriptive method of research will be use in this study.

**Keywords**— *Scaffolding, construction projects, structures*

## I. INTRODUCTION

Scaffolding [1] or scaffold or staging is a temporary structure [1] used to support a work crew and materials to aid in the construction, maintenance and repair of buildings, bridges and all other man-made structures [1] Scaffolds are widely used in the construction site to get access to heights and areas that is hard to reach or climb.

In the Philippines, there are several types of scaffoldings used in the construction industry such as Tube and Coupler [1], prefabricated modular system [1], scaffold components [1], H-frame scaffolding [1], timber [1]and bamboo [1].

There are numerous accident cases recorded regarding the unsafe used of scaffoldings. In fact, Department of Labor and Employment (DOLE) issued a working as a team in the jobsite of a construction projects to realized what is the best and safe scaffoldings to be used in the construction. Department Order (DO 13) [1] which main objectives is the welfare and protection of workers in the construction.

In addition to the safety of using the scaffoldings, the project manager and the team leaders should also manage the workers in every activities of the project and should be monitored if they are following the safety standard of using such scaffoldings.

Unsafe [1] scaffolding has the potential to result in death or serious injury. In this research work, the researchers will analyses these types of scaffoldings to be able to determine the most usable, effective and safe system used in the construction activities in the 4<sup>th</sup> district of Quezon Province.

The study aims to assess the various types of scaffoldings use in the construction projects in terms of materials such as metal, timber, bamboo and a combination of both type.

## II. MATERIALS AND METHODS

### A. Respondents

There are 26 respondents coming from the pools of construction project workers within the Fourth District of Quezon province. The respondents help us in gathering data needed for part 1 such as age, sex position or type of work and number of experience and for part 2 the datum are the frequency of the respondents in using scaffolding, the type of material used and the reason why they choose the material as scaffolding. These data are used in order to validate datum. The use of desktop, laptop or other means of digital communications are needed for proper documentation.

### B. Instruments Used

The instrument was formulated by all means, and proper survey to conform adequate and pertinent data needed from the respondents. The questionnaire is composed of two (2) parts. The first part deals on the profile of the respondents while the second part is about the use of various types of scaffolding and its reason why they choose such type of scaffoldings.

### C. Validation of the Instrument

For the authenticity of the instruments use, we used the content soundness type in which the inquiry represents the essence, topics and areas that the inquiry is designed to calculate. It includes documentary scanning. Also, the instrument was submitted to the thesis adviser for correction and approval and later we ask and consult the expert regarding this matter.

#### D. Data gathering procedures

Before administering this study, we had initiated and perform a survey in the form of questionnaire. This questionnaire composed of a letter to the respondents and asking for basic information. Prior in distributing the questionnaires, we seek the help of experts to verify so that it would be appropriate and authentic for the study. We also distributed the survey questionnaires to the respondents thru digital communications. This was done to avoid miscalculation of some items on the part of the respondents. Tallying of the answered questionnaire had done immediately after all the questionnaires was gathered from the respondents thru face book messenger and other forms of communications digitally. After all the tallying of the responses, the data were transferred to a master data sheet. Tables were prepared for the data gathered and was interpreted through the guidance of our adviser. Moreover, we also conducted a series of interviews on the same respondents by using an unstructured interview schedule for them thru face book messenger calls. Likewise, the respondents provided us some tips and guidelines in creating the plan of action as a recommendation.

### III. RESULTS AND DISCUSSION

The most remarkable parts of the study is that it presents the composed data and results of the data analysis. It gives the applicability and connection of the results based on statistically treated data from the research survey question and hypothesis as tested in the frequency and percentage distribution of the respondents.

TABLE I. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF SEX

| Sex    | Frequency Percentage |                |
|--------|----------------------|----------------|
|        | Frequency            | Percentage (%) |
| Male   | 20                   | 76.92          |
| Female | 6                    | 23.08          |
| Total  | 26                   | 100%           |

**Table I** presents the frequency and percent distribution of the respondents in terms of Sex. As shown on Table 1, 20 or 76.92% of the respondents are male followed by female with 6 or 23.08%.

The table also shows that the respondents are dominated by male population. A recent study shows a journal on Psychological Science, claims to bring a new feature gender bias. In which female are less likely to participate in Science and other Engineering related setting which they are outnumbered by men

TABLE II. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF AGE

| Age                        | Frequency Percentage |                |
|----------------------------|----------------------|----------------|
|                            | Frequency            | Percentage (%) |
| 15 years old -25 years old | 4                    | 15.38%         |
| 26 years to 35 years old   | 14                   | 53.85%         |
| 36 years to 50 years old   | 5                    | 19.23%         |
| 50 years old above         | 3                    | 11.54%         |
| Total                      | 26                   | 100%           |

**Table II** displays the frequency and percentage distribution of respondent in terms of Age. It shows that 14 or 53.85% of the respondent are at the age ranging 26-3 years old followed by 5 or 19.23% of the respondent are at the age of 36 to 50 years old while 4 or 15.38% are at the age of 15 to 25years old and lastly, 3 or 11.54% of the respondent is at the age of 50 years old and above.

The data suggest that most of the respondent in the construction industry specifically in building construction are at the age of 26 years old to 35 years old.

This is a formulation stage were typically a suitable field is selected and efforts are made to secure a long-term place in selecting a career, it tends to be a time for encouraging and build up momentum and moving up (Denham, 2010). [1]

TABLE III. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF TYPE OF WORK

| Type of Work       | Frequency Percentage |                |
|--------------------|----------------------|----------------|
|                    | Frequency            | Percentage (%) |
| Laborer            | 0                    | 0.00%          |
| Carpenter          | 0                    | 0.00%          |
| Mason              | 0                    | 0.00%          |
| Tinsmith           | 0                    | 0.00%          |
| Painter            | 1                    | 3.85%          |
| Foreman            | 3                    | 11.54%         |
| Architect/Engineer | 22                   | 84.61%         |
| Total              | 26                   | 100%           |

**Table III** depicts the frequency and percentage distribution of respondent in terms of Type of Work. As shown on table III, 1 or 3.85% of the respondent is a painter, 3 or 11.54% are foremen, 22 or 84.61% are engineers and architects.

The data suggest that in a construction projects, the foreman and painter are outnumbered by the Architects and Civil Engineers. This show an emerge on the growing demand of architects and civil engineers in the project site that comprises one of the highest percentages of recruitment and employment rate in the Philippines based on the data released in 2014 by CHED

TABLE IV. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF WORK EXPERIENCE

| Type of Work  | Frequency Percentage |                |
|---------------|----------------------|----------------|
|               | Frequency            | Percentage (%) |
| 1-5 years     | 10                   | 38.46%         |
| 6-10 years    | 6                    | 23.08%         |
| 11-15 years   | 2                    | 7.69%          |
| 16-20 years   | 3                    | 11.54%         |
| Over 20 years | 5                    | 19.23%         |
| Total         | 26                   | 100%           |

**Table IV** shows the frequency and percentage distribution of respondent in terms of length of service. It shows that 10 or 38.46% of the respondents are working for 5 years followed by 6 or 23.08% of the respondents are working for 6 to 10 years, while 5 or 19.23% are working over 20 years and above, 3 or 11.54% of the respondent has a length of service of 16 to 20 years and 2 or 7.69% of respondents work for about 11-15 years.

The data suggest that most of the respondents are working 5 years and below in their length of service. It is in this stage that when an individual move from a beginner to an expert, they are no longer relying upon a superior, but more upon peer’s interaction to further increase his knowledge and skills (Flippo,1984).

TABLE V. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF USING SCAFFOLDINGS

| Using Scaffoldings | Frequency Percentage |                |
|--------------------|----------------------|----------------|
|                    | Frequency            | Percentage (%) |
| Yes                | 23                   | 88.46%         |
| No                 | 3                    | 11.54%         |
| Total              | 26                   | 100%           |

**Table V** shows the frequency and percentage distribution of respondent in terms of using scaffoldings. It clearly stated and shows that 23 or 88.46% of the respondents are using scaffoldings, while 3 or 11.54% are not using.

The data suggest that most of the respondents are aware of the fact that by using the best scaffoldings, accidents in the construction will be lessen and allow them to follows the guidelines in the Department Order of DOLE otherwise known as DO 13.

TABLE VI. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF USE OF SCAFFOLDINGS

| Frequency of Use | Frequency Percentage |                |
|------------------|----------------------|----------------|
|                  | Frequency            | Percentage (%) |
| Not using        | 2                    | 7.69%          |
| Less Frequent    | 4                    | 15.38%         |
| Frequent         | 7                    | 26.92%         |
| Always           | 13                   | 50.00%         |
| Total            | 26                   | 100%           |

Table VI shows the frequency and percentage distribution of respondent in terms of using scaffoldings. It clearly stated and shows that 13 or 50.00% of the respondents are always using scaffoldings, while 7 or 26.92% are frequently using. There are 4 respondents or 15.38% choose the less frequent using scaffoldings and lastly 2 or 7.69% are not using at all.

The data suggest that most of the respondents are always using scaffoldings for their project activities. This means that majority of the work force in construction are aware of the fact that by using scaffoldings it will lessen the accidents brought by not using these scaffoldings in the construction. Moreover, workers can easily work comfortably with the help of these scaffoldings disregard the type of material such as wood, bamboo or metal.

TABLE VII. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF THE TYPE OF SCAFFOLDING USED

| Type of Material as Scaffolding | Not Using |       | Less frequent |       | Frequent |       | Always   |       |
|---------------------------------|-----------|-------|---------------|-------|----------|-------|----------|-------|
|                                 | <i>f</i>  | %     | <i>f</i>      | %     | <i>f</i> | %     | <i>f</i> | %     |
| Wood Only                       | 5         | 9.80  | 8             | 17.39 | 5        | 21.74 | 3        | 17.65 |
| Bamboo Only                     | 11        | 21.57 | 12            | 26.09 | 0        | 0     | 1        | 5.88  |
| Metal Only                      | 3         | 5.88  | 7             | 15.22 | 5        | 21.74 | 9        | 52.94 |
| Wood and Bamboo                 | 11        | 21.57 | 5             | 10.86 | 5        | 21.74 | 3        | 17.65 |
| Wood and Metal                  | 8         | 15.69 | 7             | 15.22 | 7        | 30.43 | 1        | 5.88  |
| Metal and Bamboo                | 13        | 25.49 | 7             | 15.22 | 1        | 4.35  | 0        | 0     |
| Total                           | 51        | 100%  | 46            | 100%  | 23       | 100%  | 17       | 100%  |

Table VII shows the frequency and percentage distribution of respondent in terms of using the type of scaffoldings. It clearly stated and shows that for the type of scaffolding, the highest percentage they always used is metal with 52.94% followed by wood and a combination of wood and bamboo with 17.65%. Lastly, the used of bamboo and combination of metal and bamboo are the least percentage with 5.88%.

For frequently used, the scaffoldings of combination of wood and metal got the highest percentage with 30.43% and the lowest percentage is the used of combination of metal and bamboo.

While for the less frequent percentage, the highest score is the used of bamboo only with 26.09% and the least score a combination of wood and metal and combination of metal and bamboo with both percentage of 15.22%.

The scaffoldings which is not using is the used of combination of metal and bamboo with 25.49% and the least is using wood only with 9.80%.

The data suggest that most of the respondents prefer to use the metal as scaffoldings because they think that using metal as scaffoldings will lessen the time duration of their work as well as the incidence of workers injury.

TABLE VIII. FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE RESPONDENTS IN TERMS OF THE REASON FOR USING THE MATERIAL AS SCAFFOLDING

| Type of Material as Scaffolding | Reasons for Using |       |          |       |              |       |                   |       |
|---------------------------------|-------------------|-------|----------|-------|--------------|-------|-------------------|-------|
|                                 | Cost              |       | Strength |       | Work Related |       | Length of Service |       |
|                                 | <i>f</i>          | %     | <i>f</i> | %     | <i>f</i>     | %     | <i>f</i>          | %     |
| Wood Only                       | 16                | 26.22 | 6        | 21.43 | 9            | 14.29 | 0                 | 0     |
| Bamboo Only                     | 15                | 24.60 | 2        | 17.14 | 9            | 14.29 | 1                 | 4.17  |
| Metal Only                      | 0                 | 0%    | 8        | 28.57 | 9            | 14.29 | 17                | 70.83 |
| Wood and Bamboo                 | 15                | 24.60 | 1        | 3.57  | 10           | 15.86 | 0                 | 0     |
| Wood and Metal                  | 8                 | 13.11 | 7        | 25    | 11           | 17.46 | 3                 | 12.5  |
| Metal and Bamboo                | 7                 | 11.48 | 4        | 14.29 | 15           | 23.81 | 3                 | 12.5  |
| Total                           | 61                | 100%  | 28       | 100%  | 63           | 100%  | 24                | 100%  |

**Table VIII** shows the frequency and percentage distribution of respondent in terms of the reasons for using the material as scaffoldings. For the cost frequency, the highest percentage is the used of wood only with 26.22% or 16 respondents while the least percentage is the used of combination with metal and bamboo with 11.48%. There is no percentage in the use of metal only.

For the strength frequency, the highest percentage is the used of metal only with 28.57% followed by the used of combination of wood and metal with 25.00% and for the least percentage is the use of wood, metal and bamboo with percentage of 3.57%.

For the work related frequency, the highest percentage is the used of combination of bamboo and metal with 23.81% followed by the used of wood and metal, with total percentage of 17.46%. A combination used of wood and bamboo with percentage of 15.86% and the least percentage is the used of combination of metal and bamboo with 14.29%.

For the length of service frequency, the used of metal has the highest percentage with 70.83% and the least is the used of bamboo with 4.17%. The used of wood and a combination of wood and bamboo has no percentage.

The data shows that the length of service in using metal as scaffoldings is the primary reason why the respondents has the highest score in choosing it considering also its strength. Thus, it only means that the best option in selecting a scaffolding is the use of metal.

#### IV. CONCLUSION

Based on the findings of this study, the following conclusions were drawn in selecting the material to be used in scaffolding;

- 1.) Most of the construction workers involved in the construction activities were male with ages range to 26- 35 years.
- 2.) Architects and Engineers play a very important role in creating the whole planning and stages in the construction and they are the one who are in charge of the whole activities including the choice of materials to be used like metal scaffoldings as the best option.
- 3.) Majority of the people working in the construction projects choose to always used scaffoldings in all of their construction activities.
- 4.) The best option in choosing the type of scaffolding is metal considering its cost, strength, work related and length of service.

With all the data shown and while having a conversation to the people working in a construction projects, it is best to recommend the used of metal as the best option in choosing it as scaffolding.

#### ACKNOWLEDGMENT

We would like to thank Polytechnic University of the Philippines for giving us the opportunity to be part of the program in the Open University and for allowing us to work on a research wherein we can explore and share our knowledge in the field of Engineering Management. To our Dear Lord who always lead us to the right path to whatever the problems encountered and believe that when God is in our hearts nothing is impossible. Lastly, to our family and colleague in the academe and profession for always believing our capacity and who has given us a never ending support.

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