

# Risk Reduction Management: The Importance of Inspection of Equipment, Machineries and Manpower of Constructors in DPWH Nueva Ecija and Pampanga Projects

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**Abstract:** - Inspecting equipment and machines is becoming an innovation today in the World as every year a lot of workers in the workplace are experiencing accident at work that's why we need to come up with a solution on how to manage it and Constructors must know the importance of it. This study aims to describe the importance of inspecting equipment and machinery to the health of Constructors. We can say that the word Inspecting can make the workers safe and they can work well to further finish their tasks without getting hurt. Inspecting equipment and machines can reduce the risks in Constructors every year. By using questionnaire in gathering data, the information was gathered from 50 Constructor respondents in Nueva Ecija and Pampanga, Philippines. We used percentage technique in computing the gathered data of the respondent's age and sex. The obtained data has been thoroughly examined and analyzed in order to provide the researchers with the most precise findings. Based on the results of the researchers gathered, inspecting equipment and machines can reduce the risks nor accident in the workplace. Because the equipment and machine that they are using is functioning well. The researchers concluded that there's a lot importance of equipment and machinery inspection. Since the majority answer of the following respondents is always agree to the questions we provided, we already get the importance of inspecting equipment and machines. It will keep their health safe at work, reduce their anxiety at work, it will protect them from injury, it will reduce the number of injuries that could occur, and most importantly, it will reduce their doubt about the equipment or machinery that they use.

**Key Words—** *Inspection, Constructors, Equipment and Machinery, Accidents, Workplace.*

## I. INTRODUCTION

In more than two million construction workers in the Philippines, a lot of them are getting involved in a different kind of accidents, but there's undoubtedly a way to prevent them; therefore, inspecting equipment and machines may be the solution to help constructors avoid catastrophe, hence, they would be more careful due to equipment and machine inspection.

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In accordance with the goals of national development, the Department of Public Works and Roadways is currently in charge of planning, designing, building, and maintaining infrastructure, particularly the system for developing flood control and water resources and national highways. Many employees today are at risk of being injured, especially construction workers, because their jobs can be dangerous due to the use of equipment and machinery. Construction workers' welfare would be jeopardized if there were broken machinery in the facility, which could result in injury, sickness, or even death. Constructors must use Personal Protective Equipment (PPE) so it can reduce the risk of injuries when performing their job and can also keep them safe from disasters. To conclude, most construction employees are mindful of the possibility of accident and it is part of their profession. However, they should

be more cautious when performing their duties; as a result, equipment and machinery inspection is required to ensure that the welfare of all construction workers is covered.

Undeniably, the perfect solution for constructors' safety is equipment and machinery inspection. However, not all of the constructors are inspecting their equipment and machines or even wearing a complete Personal Protective Equipment (PPE) that's why it can probably cause harmful events in doing the tasks. Aside from that, a good workplace can also be constructors' protector in their job. Often, constructors do not have time to inspect their equipment, particularly if they are running late. Correspondingly, here is an inspection that can assist constructors in working well, having a comfortable workplace, equipment, and machines to keep them safe. Constructors will always have to inspect their machinery and equipment to prevent accidents and the delay of unfinished work, since this is the primary cause of project negligence. Furthermore, injuries may have an effect on their coworkers because they can feel uncomfortable at work. Equipment and machinery inspections are becoming a global phenomenon in order to avoid or prevent incidents, as well as to have their plans and preparations in place. Equipment and Machinery inspection can lead a project in a success at the same time if the workplace is safe because it has a big impact in every project. In order to have a safe project, Equipment and Machines to be use is not damaged or else, it can be a cause of a project failure.

This research aims to establish the value of equipment and machinery inspection to the health of construction workers. The researchers aim to demonstrate the effects of equipment and machinery inspections, as well as determine if they have a positive impact on workplace wellbeing today. This research also helps to teach constructors how to properly test machines and equipment. The research study is important because the researchers can assess the various effects of equipment and machinery inspection to the health of constructors. Aside from that, this study will also know how constructors cope with the risks that they are taking while working.

## II. BACKGROUND OF THE STUDY

### 2.1 Theoretical Framework

The applicable theory that the researchers conducted was related and discussed by Richard Johnstone called "Equipment Inspection" as he finds out the importance of equipment

inspection to the health of workers along with the workplace. This theory clarifies on how constructors can take risks in their work as they experience the injuries and accidents while working or even checking/inspecting their equipment and machines.

According to (Johnstone, 2011), Inspection reports are essential because they aid in decision making based on previously recorded incidents. They also distinguish between fields that are routinely inspected and those that are not. They draw attention to possible workplace hazards.

Through analysis of the inspection reports is essential in identifying the need for training in certain areas, explaining why certain types of accidents are prone in certain areas and establishing an order or priority for the corrective actions. In addition, it aids in establishing healthy work methods or improving the existing methods, as well as identifying areas equipment and tasks, which require more in-depth risk analysis. As Johnstone stated, the more we check the equipment in every workplace, an injury and accidents will be avoided. Inspecting equipment and machinery is always important in constructions as it is the main reason of injuries to constructors and project failure or having a delay in every projects.

The aim of this research is to determine the significance of equipment and machinery inspection to constructors' safety, as well as to learn about their experiences and challenges with their projects. From this concept, it can show the effects of inspecting equipment and machines to every constructor on how it helps to speed up the execution of their projects and specifically how it affects their health and safety.

### 2.2 Review of Related Literature and Studies

As stated by (Johnstone, 2011), During inspection, it is important to use the relevant equipment to come up with accurate results. This process can start from determining what kinds of machinery or equipment are available in the workplace. When in the inspection process, the technical safety date sheets should be reviewed and the manufacturers' safety manuals guide followed to avoid injuries and other poor results that may jeopardize the outcome of the exercise.

Inspection records are significant because they help in decision making from the previous incidents identified. They also identify the areas frequently inspected and those not visited. They draw concentration to budding hazards in the workplace

(Johnstone, 2011). It is also important for the senior administrators or the managements to demonstrate their commitment to performing inspections and the goals that they intend to achieve. One of the most important moves to make this a reality is by developing and disseminating a prevention policy, which emphasizes on inspection. Through analysis of the inspection reports is essential in identifying the need for training in certain areas, explaining why certain types of accidents are prone in certain areas and establishing an order or priority for the corrective actions. In addition, it aids in establishing healthy work methods or improving the existing methods, as well as identifying areas equipment and tasks, which require more in-depth risk analysis.

According to (Hopwood, 2006), The elements to focus on in a workplace during the inspection routines include the environment, the equipment inside and outside the buildings in the working environment and the whole process. The environment, therefore, should be inspected regularly to ensure these hazards are not present and in cases they are, the proper actions are taken to reduce the risks of the workers and improve their morale. Equipment in the workplace include the materials, apparatuses, and tools that are used to come up with a product or a service. This equipment is liable to get damaged and end up causing danger to the workers. Routine inspections are an imperative aspect of programs in place to cater for accident prevention, occupational disease and fire prevention. The inspectors should wear protective equipment before getting into high-risk areas and if this equipment is not available, the inspectors should not get into these risky areas. As a backup plan, the management should develop “floor plan guides” to facilitate their efforts in the identification of the major pieces of equipment, storage compartment and traffic regions.

It is also necessary to take note of any information, which may be of relevance to the purposes of inspection, like the location of first aid kits, fire extinguishers, ventilation outlets, among others. The members of the team may be determined by the work areas that need inspection and the particular technical necessities. Prior to a concrete examination process, the inspectors should engage in a discussion about the planned route of inspection. A review of what is to be searched and the route to be taken by all members of the inspection team is crucial before the process begins. For instance, before starting to inspect noisy areas, it is important for a group discussion on what is expected to avoid the use of unsatisfactory methods of communication such as arm waving and unnecessary shouting

during the processes. Work area records are also very significant because they give the inspectors a familiarity with the injury and illness potential of the materials. The inspector should use drawn layout of the workplace, stairs, alarms, fire exists, and other locations illustrated and divide the workplace into sections based on the processes carried out. The activities in the workplace should be visualized and movement of equipment and workers shown (Hopwood, 2006).

Construction firms are often faced with problems related to high rate of equipment failure or breakdown and accident resulting from unskilled operator’s abuse. Poor training of equipment operators is often claimed as a major cause of equipment related accidents (John and Herman, 2009; Schenayder et al., 2002). The only way to avoid this huge amount of loss that usually led to accompanies equipment breakdown or failure is to adopt proper equipment maintenance management strategy. This will keep construction equipment fit at all times and allow timely completion of construction project, thereby increasing construction project profitability. Thus, to understand effective construction equipment management, one must also understand effective construction equipment maintenance.

During inspections, other personnel such as engineers, health and safety professors, maintenance personnel, managers, supervisors, or occupational hygienists may be called to be part of the inspecting team, to help with explanations of equipment or processes. Large workplaces

can have different teams inspecting different areas because it is important to have the entire place inspected at once during all the routines (Eaton, 2000). It is sometimes important to have supervisors in the inspection team because they have prior familiarity with the environment, equipment and the workers. The work of supervisors involves taking necessary action to prevent accident and injury to the workers. The advantage of having prior familiarity with the workplace and the workers can be of much help to the inspection team.

Results obtained from the inspection programs are crucial because information on how to monitor and control hazards is presented to the workers and other personnel in the environment.

People are provided with, and encouraged to use protective equipment to avoid any looming danger (Dikshith, 2013). In addition, engineering control is carried out to ensure that the hazards do not cause any harm to the workers.

Work place safety is considered by World Health Organization (WHO) a priority setting for health promotion in the 21st century (Takala, 1999; WHO, 2010). International Labor Organization (ILO) and WHO reports indicated that in manufacturing industries many employees suffer from workplace injuries and property damage resulted in economic crisis (ILO, 2010; WHO, 2010).

Every 15 seconds, a worker dies from a work-related accident or disease. Every day, 6,300 people die as a result of occupational accidents or work-related diseases – more than 2.3 million deaths per year. Annually, 317 million accidents occur on the job; many of these resulting in extended absences from work. As a result of the ever-increasing pace of worldwide liberalization of trade and economies, as well technological progress, the problem of occupational accidents and diseases are becoming more and more global concern, particularly in developing countries (Soehod and Laxman, 2007).

The problems emanate from different angles of the workplace environment in industrial sectors. Alli (2008) and WHO listed out some of several problems of occupational safety and health problems as psychological stress of employees, physical body damages, socio economic dissatisfaction, property damage, family disorder, and sever accidents.

According to D. B. Phadatare, S. B. Charhate [2016] The equipment management system and equipment policy always has a huge impact on the profitability of the contractors with more investment in equipment. In civil engineering construction projects, the cost of equipment can vary from 25-40% of the total project cost.

Inspecting a workplace helps the inspector gain further knowledge concerning the nature of the job and the tasks. This is important because it helps them to familiarize with situations so they would identify any impending risk during their inspection programs in the future. In addition, the inspection programs help the health and safety committee to identify and record the present and prospective hazard (Collins, 2001).

It is important for the management of any organization to carry out an inspection of the workplace because the results of these inspections are recorded when identified, and this helps in planning on taking action and determining the best actions to prevent any injury or illness from the harmful situation. These activities of monitoring and reporting the inspection can be

done by joint efforts from the occupational health and safety committee. These programs demand that the workplace gets inspected on a regular basis so that the workers can be saved from any impending risks.

For effectiveness of inspection in any prevention program, the information gathered must be analyzed and rightfully utilized. Given the differences in organizations, the skill levels of the persons tasked with the responsibility of reporting will vary, but there are factors that should be constant among such individuals (Collins, 2001).

Every inspection is scheduled, and the topics to be covered revolve around the people (who), the place/location (where), the time (when), the what, and the how. These elements are also important in providing reliable information and preparing the most appropriate steps to take. Items in the workplace are examined so closely, especially those likely to develop unsafe and unhealthy conditions, likely to arise in time because of situations such as misuse, impact, chemical reaction, stress, heat, wear corrosion or vibration (Collins, 2001). The entire place of work should be inspected during the normal routines of the program to ensure that no chances are taken that can pose a danger to the workers. These programs should be extended even to areas that are rarely active and where no work is carried out regularly, such as locker rooms, parking lots, office storage, and rest areas.

### 2.3 Research Paradigm

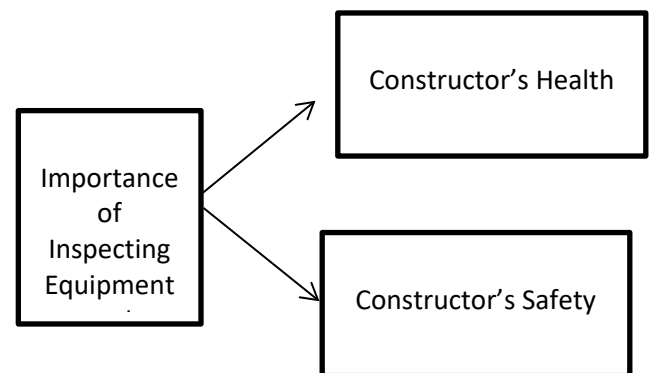


Fig.1. Statement of the Problem

The current research sought to answer the following questions;

- What is the importance of equipment and machinery inspection to the health of constructors?

- How does equipment and machinery inspection impact the health of construction workers?
- How does equipment and machinery inspection help constructors to be protected?

### III. METHODOLOGY

#### 3.1 Research Design

To determine and analyze the problems encountered, the researchers used quantitative approach in their study and used descriptive in terms of research design. The technique of gathering data will be systematic, consequently, the researchers chose quantitative as their approach. Moreover, the design used is descriptive as the researchers aim to study and describe the importance of inspecting equipment and machinery to constructors' safety.

#### 3.2 Research Locale

This study will be conducted and designated from Region III, in Nueva Ecija and Pampanga, Central Luzon depending on the places of the randomly selected respondents. Each and every one can be participant to the study but the researchers chose this locale as it is the accessible and a great deal of feasible respondents can contend with. The study is predicted to show the importance of inspecting equipment and machinery to constructors' safety.

#### 3.3 Population and Sampling

The researchers will use Cluster Random Sampling Technique in finding respondents, wherein only constructors will be selected from the whole population of Region III, in Nueva Ecija and Pampanga, Central Luzon. In this technique, the participants are chosen based on the group/location they belong to. Exclusively 50 constructors with age ranging 20-65 years old will be selected by the researchers from the whole population to know the importance of inspecting equipment and machinery to constructors' safety.

#### 3.4 Research Ethics

In this study, the researchers first established a title suggestion for Professor Rick Donald Sy. Manzon. The researchers would write a letter of approval to perform the study in the relevant

venue, as well as a consent letter for the participants to participate in this study.

#### 3.5 Research Instrument

To collect data for this quantitative analysis, the researchers would use questionnaires to collect the appropriate information. This would assist the researchers in understanding the significance of examining construction equipment and machinery for the welfare of the workers.

Questionnaire is used to collect information regarding experiences that involves a structured way aiming to organize the data will be gathered. The survey will be taken down for superior analysis of data.

The respondent will be given a set of questions that they are required to answer. The questionnaire will produce four sections that include the demographic profile of the respondents. Each section will have five questions that can be answered by way of checking their response on the applicable scale (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, and Strongly Disagree).

#### 3.6 Data Collection

In terms of data collection, a questionnaire is the simplest and most straightforward process, particularly in this quantitative approach. After the respondents have completed their responses, the researchers will build a percentage technique based on each answer to the following questions. Following that, the researchers would graph the collected data based on the constructors' responses.

#### 3.7 Data Analysis

Each and every data will be statistically analyzed with the use of percentage technique. This technique is used to quantify and calculate the knowledge collected in this study based on the responses of the respondents. This is often used to measure the average percentage of each detailed answer to a single question. The formula to be used is:  $\% = F/N \times 100$ .

Where,

F = answer

% = percentage

**IV. RESULTS AND DISCUSSION**

**4.1 Presentation, Analysis, and Interpretation of Data**

Table.1. This table shows the number of respondent’s gender that answered the survey questionnaire. Thirty-six is Male (72%) and Fourteen is Female (28%).

Gender	No. Of Constructors	Percentage
Male	36	72%
Female	14	28%
Total	50	100%

Table.2. This table shows the age of the following Employees answered the survey questionnaire. Six employee is 20-25 years old (12%); twenty-two employee is 26-30 years old (44%); six employee is 31-35 years old (12%), and twenty employee is 36 years old above (32%).

Age	Number of Constructors	Percentage
20-25 years old	6	12%
26-30 years old	22	44%
31-35 years old	6	12%
36 years old above	16	32%
Total	50	100%

Table 3. Based on the answer of the Constructors (Strongly disagree-1, disagree-2, nor disagree nor agree-3, agree-4, strongly agree-5)

Question	Mean	Interpretation
1. When equipment and machines are inspected, the constructors’ health is far from danger.	4.36	Strongly Agree
2. When the equipment and machineries are not functioning/available, the	3.04	Nor Disagree Nor Agree

workers are also not be able to do the works.		
3. Inspecting equipment and machines keeps our health safe while working.	4.46	Strongly Agree
4. Workers of the constructors had seminar and trainings for the safety before getting the works.	4.42	Strongly Agree
5. During inspection, my health is danger when equipment/machine has a problem.	3.92	Agree
6. Equipment and Machinery inspection releases my fear in doing tasks.	3.88	Agree
7. Inspecting equipment and machines maintains my health safe.	4.00	Agree
8. Constructors are required to get unsafe equipment and machines repaired to ensure their safety.	4.18	Strongly Agree
9. Equipment and machinery inspection can cause harm when equipment/machine is damaged.	3.96	Agree
10. When equipment and machines are not inspected, it may cause us accident when it is damaged.	4.54	Strongly Agree
11. Constructors must ensure that their equipment is used and maintained correctly to reduce the risk of accidents or to be protected.	4.58	Strongly Agree
12. By wearing appropriate safety equipment, workers can decrease the accident that may occur in the workplace.	4.62	Strongly Agree
13. Inspection can protect me in any harm when using an inspected equipment and/or machine carefully.	4.42	Strongly Agree
14. Equipment and machinery inspection helps me to lessen my nervousness in doing my tasks.	4.28	Strongly Agree

15. After inspecting equipment and machines, it helps me to speed up my work as it reduces the risks in doing my work.	4.26	Strongly Agree
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Based on the answers of the employee, this table displays the most and least to do in Construction Projects. The highest possible outcome is (4.62), while the lowest possible outcome is (3.04). According to the table, contractors firmly accept that by wearing appropriate safety equipment, workers can decrease the accident that may occur in the workplace. In the least possible outcome, employees nor disagree nor agree that equipment and machineries are not functioning/available, the workers are also not be able to do the works.

#### 4.2 Summary

This analysis displays the data that the researchers have been collecting over the last few weeks is all about the importance of equipment and machinery inspection to the health of Constructors. The first section of this research includes the following sections: Background of the Study, Objectives and Significance of the Study, Literature Review, Definition of Terms, Research Locale, and the Conceptual Framework.

This study presented how Constructors and Employees cope up with the risks that they are taking if the equipment and machines are fully inspected. This result aims to determine the most and least to do in inspecting equipment and machines before and after the project.

The second chapter of the study focuses in Research Method, for this research, we preferred Quantitative and technique used is Cluster Random Sampling since the researchers want to collect data around their places and it is also consisting of Data analysis and Data collection. This chapter also focuses on the research instrument's arrangement and construction.

#### 4.3 Summary of Findings

After the survey conducted, the researchers concluded that the most important thing to do in Constructors' inspection is by wearing appropriate safety equipment, workers can decrease the accident that may occur in the workplace with (4.62) mean and Strongly Agree interpretation. Additionally, the least mean in the respondents answer to the question When the equipment and machineries are not functioning/available, the workers are also not be able to do the works with (3.04) mean nor disagree nor agree interpretation, obviously, the workers are not be able

to do their works when the equipment and machines are not functioning well especially the heavy operators who only use the equipment for their work responsibilities. With the respondents' computed responses, this result will already classify the most and least to do in Constructor's work and how it impacts their health and safety.

#### 4.4 Discussion

The main objective of this research is to know the importance of inspection of Equipment, Machineries and manpower of constructors' safety. The findings obtained from the data collected from the following respondents are interpreted in this chapter. This chapter will explain the importance of inspection to the health of Constructors.

According to (Hopwood, 2006), The elements to focus on in a workplace during the inspection routines include the environment, the equipment inside and outside the buildings in the working environment and the whole process. Through this, inspection can release accident may occur in workplace and it can lead to a project success especially when workers are keep concentrated.

Inspection is now a daily routine in some workplace but others not doing it regularly because it causes time as they said. But they don't know when or how the accident can occur at work that's why there is an Inspection that workers or team can do. As the results collected, majority of the Constructors strongly agree by wearing appropriate safety equipment, workers can decrease the accident that may occur in the workplace, it will lessen their nervousness, it can protect them to any harm, it will decrease the number of accidents that may happen, and most of the time it'll reduce their doubt in the equipment or machines that they are using.

Many Constructors nor disagree nor agree that equipment and machineries are not functioning/available, the workers are also not be able to do the works. As we computed the Constructors' responses to the questionnaire, we realize that the constructors have no assurance to do their responsibilities when they only use the equipment and machine for their job.

Equipment and machinery inspection is important before starting the project since it will lessen the incidents may happen. According to (Collins 2001), It is important for the management of any organization to carry out an inspection of the workplace because the results of these inspections are recorded when identified, and this helps in planning on taking action and determining the best actions to prevent any injury or

illness from the harmful situation. Obviously, it will be their plan to avoid the accidents at work.

## V. CONCLUSION

After the survey results been analyzed, the most important thing to do in checking equipment and machines is to make Constructors far from danger to make them comfortable while working because it will help them to lessen their fear in doing tasks and it will not be a hindrance for them to do their project. In addition, constructors have no assurance to do their responsibilities when they only use the equipment and machine for their job. The importance of inspecting equipment and machines to every Constructors is to maintain their safety, to release their fear in doing task, to lessen the harm that they can encounter at work, and especially to do their tasks without any accident.

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