

Impact of the Pandemic on the Construction Projects of DPWH Nueva Ecija 2nd District Engineering Office

Estrelita L. Bernardo¹, Jenina Marie S. De Belen², Edwin Roey P. Pineda³, Rick Donald S. Manzon⁴

^{1,4}Nueva Ecija University of Science and Technology, Cabanatuan City, Nueva Ecija

^{2,3}DPWH Nueva Ecija 2nd District, Cabanatuan City, Nueva Ecija

ABSTRACT: Several countries have ordered a complete national lockdown after the World Health Organization (WHO) labeled the coronavirus 2019 (COVID-19) outbreak a pandemic. These judgments have limited people's mobility and forced the closure of several firms in various industries. Without exception, the construction industry is a substantial growth driver for the economy. This study attempted to investigate the impact of the pandemic on the construction projects of DPWH Nueva Ecija 2nd District. The researcher provided checklists to various positions among project personnel to garner data from different sectors of the construction projects. Respondents agreed that the pandemic affected the construction projects in terms of workforce, time management, supply chain shortages, and communication. Meanwhile, the most significant concern is the health and safety on-site.

KEYWORDS: Pandemic, Impact, Constructions Projects, DPWH, COVID-19

1. INTRODUCTION

1.1 Background

In 2020, the World Health Organization declared the novel SARS-CoV2 infection a pandemic, and it has become a significant public health concern around the world (World Health Organization, 2020). The virus spreads mainly through droplets released from coughs and exhales, where the droplets may disperse on surrounding surfaces and infect people nearby (Wang, 2020), as cited by Hatoum (2021). More than 120 million people worldwide had tested positive for COVID-19 as of March 2021, resulting in a death toll of more than 2.7 million people (Unnikrishnan, 2021).

To halt the virus's spread, governments had to put preventative measures, such as establishing medical services, designating hospitals for COVID-19, establishing isolation zones and testing facilities, and distributing public relief packages and financial aid (Nawaz et al., 2020a). In many countries where community transmission has led to outbreaks with near exponential growth, countries have introduced widespread population-level physical distancing measures and movement restrictions to slow spread and set in place other control measures. Physical distancing measures and movement restrictions, often called "shutdowns" and "lockdowns" can slow COVID-19 transmission by limiting contact between people. However, these measures can profoundly negatively impact communities and societies by bringing social and economic life to a near stop (WOH, 2020). The virus's spread

and the steps used to stop it halted significant industries around the world, causing global financial markets to plummet and the global economy to contract by 4.4 percent in 2020, the worst since the Great Depression of the 1930s (Szmigiera, 2021) cited by Hatoum, 2021. There is no exception in the building sector. The construction industry, which is notorious for being sensitive to economic cycles, was particularly vulnerable to the pandemic's severe drop in economic activity (International Labor Organization, 2021)

Before the COVID-19 pandemic, there was a pressing need in the construction industry to increase productivity, improve project performance, address the labor shortage, reduce fragmentation, introduce standardization, and increase collaboration (Oesterreich, 2016) cited by Hatoum (2021). Furthermore, the construction business is one of the most dangerous sectors globally due to the labor-intensive nature of construction projects and the dynamic character of construction sites (OSHA, 2019). Unsafe work practices, lack of information, hazardous working conditions, lack of technical and material assistance, failure to follow safety regulations and laws, and lack of communication have contributed to construction sites' poor safety and health situation (Nawaz, 2020). When the pandemic struck, construction projects deteriorated: more projects experienced cost and schedule overruns, disrupted material supply chains, unemployment rose, worker availability fell, and health and safety became an even greater worry. (International Labor Organization, 2021)

1.2 Significance of the Study (Knowledge Gap)

One of the most severe challenges governments face globally is the COVID-19 pandemic and the lack of sufficient research regarding this problem (Pirouz, 2020), as cited by Sarvari (2022). COVID-19 has a significant impact on the construction industry, as it is in other industries. As the COVID-19 situation progresses, other issues are likely to emerge. While COVID-19 does not prevent projects from being completed, it can slow them down, causing delays and disruptions owing to significant supply chain disruptions, among other things. It has resulted in a temporary halt in many projects, often to restart the work at a later date Sarvari (2022). Thus, this study will aim to provide a qualitative descriptive analysis of the impact of COVID-19 in the construction projects of the Department of Public Works and Highways (DPWH) Nueva Ecija 2ND District Engineering Office on the perception of different sectors. The data in this study will help identify the areas that need help in facing challenges brought by the pandemic and understand the nature of concerns of the workforce. The officers and the management may use the study results as a reference in formulating programs and other interventions that can improve the experience of the workforce and the status of construction projects.

1.3 Objectives of the Study

The study was conducted to determine the impact of the pandemic on the construction projects of the DPWH in Nueva Ecija 2nd District Engineering office. It has the following specific objectives:

1. How may the profile of the respondents be described in terms of:
 - Age; and
 - Gender?
2. How may the impact of COVID on the respondents be described based on the following aspects:
 - Manpower
 - Time Management
 - Supply Chain Shortages
 - Communication
 - Health and safety on-site

1.4 Scope and Limitation

This study focused on the challenges faced by officials and laborers caused by COVID and its impact on the construction projects of DPWH. The respondents encompass project engineers, project managers, workers, contractors, stakeholders, and suppliers/manufacturers to view these challenges in various aspects.

2. METHODOLOGY

2.1 Description of the study area

The study was conducted in the DPWH Nueva Ecija 2nd District Engineering Office which is located in Cabanatuan City. Cabanatuan is an official component city of the first class in Nueva Ecija, Philippines. It has 302,231 inhabitants, making it the most populated city in Nueva Ecija and the fifth-most populous in Central Luzon, according to the 2015 census (Philippine Statistics Authority, 2015). Cabanatuan is the economic center of the province of Nueva Ecija. Many Nueva Ecija residents commute to the city each day as a hub. This leads the city's daytime population to increase to roughly a million (Globalpost 2015). Students who reside outside Cabanatuan choose to study in Cabanatuan due to the high-quality education the university in the city offers. DPWH Nueva Ecija 2nd District Engineering Office has various ongoing construction in Cabanatuan City projects that may be impacted when the pandemic strikes. Some of these projects are the Expressway Connecting Tarlac-Cabanatuan, Barangay and local roads, multi-purpose buildings and schools in different Barangays, improvement of national roads such as Daang Maharlika and Jose Abad Santos Ave, and the construction of DPWH building in Cabanatuan City.

2.2 Data Collection

The descriptive research method was used in this study. The descriptive research technique is a fact-finding investigation that includes adequate and accurate interpretation of data, as is widely accepted. Calderon (2006), as referenced by Rillo (2018), defined descriptive research as the process of gathering, analyzing, classifying, and tabulating data about prevailing conditions, practices, processes, trends, and cause-and-effect relationships, and then making adequate and accurate interpretations of such data with or without or occasionally with minimal assistance from statistical methods. The qualitative method, which is often employed to explore acquired data according to population reaction, was applied in a descriptive study. The credibility of the findings and conclusions depends on the quality of the research design, data collection, data administration, and data analysis. The participants of this study were 30 project personnel composed of project engineers, project managers, workers, contractors, stakeholders, suppliers, and manufacturers.

2.3 Checklist

A checklist is a collection of statements that define a respondent's work experience during the pandemic. The checklist technique is a behavior-based approach to performance evaluation that involves raters watching rates actions and making performance-related judgments about them.

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Items on a checklist might be organized into groups of similar tasks or randomly placed throughout the checklist.

2.4 Data Analysis

After distributing questionnaires to the respondents, the researchers collected the data and information needed in the study. Then the researchers tabulated, tallied, ranked, and analyzed the gathered data using statistical tools. In this study, the frequency distribution.

The numerical and verbal interpretations in the table below were used to further analyze the data.

Range	Numerical Response	Verbal Interpretation
4.2-5.0	5	Strongly Agree
3.4-4.19	4	Agree
2.9-3.39	3	Slightly Agree
1.8-2.59	2	Disagree
1.0-1.79	1	Strongly Disagree

Statistical Treatment of Data

Frequency Distribution

This is a systematic way to test a series of observations. Categories do it, then tabulate the frequency of its occurrence.

Percentage

It was used to determine the percentage of the respondents according to their age and gender and the percentage of the factors according to their types.

The percentage was computed by dividing the frequency by the total number of cases and the quotient multiplied by one hundred.

$$P = F/N \times 100$$

Where:

P = Percentage

F = Frequency

N = Total number of respondents

The distribution of the respondents by sex is shown in Table 3. The majority of the respondents are male, with the frequency of 24 (80%), while the remaining 20% or six respondents are female. This proves that construction is a male-dominated industry. A variety of factors could be to blame. Many people believe that the construction business does not give enough parental leave, making it more difficult for women to advance in their jobs after having children. Others feel the main culprit is informal, substandard recruitment methods that favor men over women unconsciously (or possibly consciously) (George,2022)

100= Constant multiplier

Weighted Mean

The weighted mean was used for the statistical treatment of data and information. It was also used to describe the degree of the respondents' responses on the five-point rating scale in the questionnaire. The formula for the extraction of Weighted Mean is as follows:

Formula:

$$WF = W \times F$$

Where:

WF = Weighted frequency

W = Degree of response

F = Frequency

3. RESULT and DISCUSSION

3.1. Profile of Respondents

The respondent's personal data considered in the study were sex and age.

Table 1 shows that 30% of the respondents fell at the age of 24-28 and 29-33 years old while 26% of the respondents fell at the age of 34-38 years old and 13% of the respondents fell at the age of 39-44. This was expected because the largest number of employed persons in the Philippines consists of the age group 25 to 34 years (Philippine Statistics Authority)

Table 1. Age of the Respondents

Age	Frequency	Percentage
24-28	9	30%
29-33	9	30%
34-38	8	26%
39-44	4	13%
Total	30	100 %

Table 2. Respondents' Profile Variable on Sex

Sex	Frequency	Percentage
Male	24	80%
Female	6	20%
Total	30	100%

3.2 Analysis of the impact of COVID-19 on the construction projects of DPWH Nueva Ecija 2ND District Engineering Office

Table 3 presents the interpretation of the data gathered by the researchers on how COVID-19 impacted the Manpower in construction projects.

Table 3. Impact of COVID- 19 on Manpower

Manpower	Weighted Mean	Verbal Interpretation
Worker’s absenteeism increases	3.86	Agree
Recruiting and retaining dependable skilled labor becomes more difficult	3.50	Agree
Due to the cancellation of projects, there is a labor shortage.	3.76	Agree
There is an excessive layoff	3.36	Agree
Reduced crew size with social distancing	3.76	Agree
Average Weighted Mean	3.64	Agree

Table 3 shows the result of the responses of the respondents on the impact of COVID on the manpower of construction projects which garnered an average weighted mean of 3.64 with a verbal interpretation of Agree. The highest weighted mean on manpower was 3.86, where most of the respondents agreed that worker absenteeism increases. On the other hand, the lowest weighted mean was 3.50 where the majority of the respondents agreed that it is difficult to recruit and retain dependable skilled labor.

The results imply that manpower was greatly affected by the pandemic. According to Pamidimukkala (2021), there have been fewer employment openings, in part as a result of work disruptions caused by limits enforced to slow the spread of the virus and a lack of personal protective equipment (PPE) as a result of an increase in demand among healthcare personnel. Gamil (2020) claimed that job losses are a massive disaster during the pandemic's rising crisis. During the COVID 19 crisis, millions of people lost their employment all around the world. All employees in the construction industry have lost their employment, and most small businesses are unable to pay salaries during lockdowns. Furthermore, the construction industry has always had a labor shortage, but the pandemic has exacerbated it because a substantial percentage of construction workers have tested positive for the coronavirus (Karimi, 2018).

Table 4. Impact of COVID- 19 on Time Management

Time Management	Weighted Mean	Verbal Interpretation
New health protocols such as cleaning, disinfecting, and sanitizing workplaces consume work time.	4.0	Agree
Deadlines are not met with the movement and measure control period.	3.96	Agree
Restrictions on financing affect the completion of the project.	3.90	Agree
Government order and permit delays hold up the operation.	3.83	Agree
Reduced daily working hours.	3.60	Agree
Average Weighted Mean	3.83	Agree

Table 4 presents the impact of COVID- 19 on time management of construction projects which garnered an average weighted mean of 3.83 with a verbal interpretation of AGREE. Most respondents agreed that new health protocols such as cleaning, disinfecting, and sanitizing workplaces consume work time as they acquired the highest weighted mean of 4.0. Meanwhile, the lowest weighted mean was 3.60 where the majority of the respondents agreed that the daily working hours have been reduced due to the pandemic.

This indicates that the time management in construction projects was heavily impacted by the pandemic. Construction employers use a set of guidelines released by major agencies like the Centers for Disease Control and Prevention (CDC), the Associated General Contractors of America (AGC), and the Occupational Safety and Health Administration (OSHA) to safely resume work on projects as they weather the pandemic storm (OSHA, 2020). These guidelines include training for employees on the spread of the disease in the geographic areas where they work and screening calls when scheduling indoor construction work to assess potential exposures and circumstances prior to worker entry, which consumes a portion of the work period.

Based on the data presented in Table 5, respondents agreed that the pandemic had caused supply chain shortages with a weighted mean of 3.86. The highest weighted mean on Supply Chain Shortages was 4.30, where respondents agreed

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that the price of material in construction had increased. On the other hand, the lowest weighted mean was 3.53, where respondents agreed that there is a lack of access to necessary tools for their tasks.

Table 5. Impact of COVID- 19 on Supply Chain Shortages

Supply Chain Shortages	Weighted Mean	Verbal Interpretation
Lack of access to necessary tools and equipment for the task	3.53	Agree
Material delivery delays	3.73	Agree
Material price fluctuations	4.30	Agree
Projects have been halted due to supply shortages and transit restrictions.	3.96	Agree
Funding restrictions and limited resource availability	3.80	Agree
Average Weighted Mean	3.86	Agree

Based on the results gathered by researchers, the supply chain in construction projects was struck by the pandemic. The restrictions imposed by the authority decreased mobility, leading to the closure of numerous businesses and the loss of essential commodities such as food and medicine, resulting in a socioeconomic impact on each individual (Abdullah, 2021). Ivanov (2020) as cited by Gamil (2020), investigated the effects of the outbreak on the supply chain and discovered that the industry has been significantly damaged and that recovery may take longer.

Table 6 shows the result of the responses of the respondents on the impact of COVID in communication in construction projects which garnered an average weighted mean of 3.88 with the verbal interpretation of AGREE. The highest weighted mean on manpower was 4.06, where most of the respondents agreed that conversing on-site becomes difficult while wearing a mask. On the other hand, the lowest weighted mean was 3.66 where the majority of the respondents agreed that online meetings have benefited the communication between workers and officials involved in the project.

Table 6. Impact of COVID- 19 in Communication

Communication	Weighted Mean	Verbal Interpretation
Online meetings benefited the communication between workers and officials involved in the project.	3.66	Agree
Inspections and obtaining licenses are taking longer than expected.	3.76	Agree
Disputes, litigation, and claims are projected to rise.	3.76	Agree
Conversing on-site becomes difficult while wearing the mask.	4.06	Agree
Learning new communication tools and dealing with technical difficulties	3.96	Agree
Average Weighted Mean	3.88	Agree

The results imply that the pandemic affected communication in construction projects. All corporate activities have been halted unless they fall into crucial categories such as essential supplies and medical sectors, as well as a few critical projects that are required to sustain the health system and people's safety. It has constrained business globally, and organizations have turned to a Work-From-Home (WFH) model to accommodate and run their businesses and services remotely. In the construction sector, however, all workers and technical engineers are required to work on-site, either to perform tasks or to ensure that the work is completed appropriately. Construction differs from other businesses in that it often demands the on-site participation of all project partners. Meanwhile, Gamil (2020) claimed that project participants who work off-site are required to be prepared with a complete list of tasks, maintain constant communication with all subcontractors, establish daily video meetings, manage all the orders, constantly review shop drawings, coordinate with all the stakeholders for updates, and maintain proper communication with people on-site. Furthermore, the pandemic has given people "the opportunity to improve on virtual alternatives," with digital platforms allowing meetings that were previously held only face-to-face to continue (Ogunnusi, 2020).

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Table 7 presents the health and safety on-site of construction projects during the pandemic which garnered an average weighted mean of 3.83 with a verbal interpretation of AGREE. Most respondents agreed that they have concerns about the spread of the virus in the workplace as it acquired the highest weighted mean of 4.63. Meanwhile, respondents also agreed that the health and safety guidelines are ineffective as they got the lowest weighted mean of 3.76.

Table 7. Impact of COVID- 19 on Health and safety on-site

Health and safety on-site	Weighted Mean	Verbal Interpretation
Concerns about the spread of viruses in the workplace	4.63	Agree
Wearing a mask and/or face shield affect the efficiency of the workers	4.53	Agree
Thinking of personal and family while working	4.13	Agree
The health and safety guidelines is not effective	3.76	Agree
The masks, rubbing alcohol and other sanitizing products are not sufficient.	3.93	Agree
Average Weighted Mean	4.19	Agree

The data shows that the respondents' health and safety on-site is a concern. Workers and workplaces worldwide have been severely hit by the coronavirus 2019 (COVID-19). It has completely transformed the workplace and raised workers' concerns about economic insecurity, mental health and physical well-being, loneliness, the problems of working remotely, and securely returning to work (Pamidimukkala, 2020). Workers have had to adjust to social distance standards, follow the newest sanitation and PPE policies, and, if possible, use technology to accomplish work remotely. The need for cleanliness, health, and safety has never been more evident. Providing a safe working environment and procedures is a huge problem, especially when numerous entities of all sizes are working together. Because of the transient nature of such

arrangements, safety leadership might be complex, which is crucial for involving employees in their own safety.

CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

Most of the respondents were male as construction is considered a male-dominated field.

The most significant impact of COVID on the manpower of construction projects is the absenteeism of the worker. Meanwhile, new health protocols such as cleaning, disinfecting, and sanitizing workplaces consume work time are the most significant impact of the COVID in terms of time management of products. Furthermore, the pandemic has heavily affected the supply chain shortages in terms of material price fluctuation. On the other hand, respondents find conversing on-site difficult while wearing masks as it is the most significant impact of the pandemic on communication among project personnel. Lastly, health and safety on-site were also a concern as respondents fear the spread of viruses in the workplace.

RECOMMENDATIONS

Based on the findings and conclusions presented, the following recommendations are suggested.

There should be programs and benefits for female workers to make the construction industry more accepting of female workers.

The project personnel should have a reasonable income, work hours, and access to paid vacation to lessen absenteeism and retain dependable, skilled labor.

Screening work assignments before sending a worker to perform construction activities in an indoor environment can be digitized to minimize the time taken while answering the forms.

Disinfecting and sanitizing workplaces may be done while workers are on break to avoid consuming work time.

Maximize the benefits of online meetings to have smooth communication between project personnel and avoid miscommunication delays.

Safety and health protocols should be part of the planning of construction projects to ensure the safety of all the project personnel.

Psychological issues and mental health problems are recommended to be checked to ensure the workers can perform efficiently and avoid labor shortages. They must be provided with enough masks, rubbing alcohol, and other sanitizing products.

Further research may be conducted to examine the impact of the COVID on a specific position among the

project personnel.

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