

# Project Management And COVID - 19 Pandemic: Managing An Extraordinary Crisis, Council For Regulation Of Engineering In Nigeria (COREN) Benin City, Edo State, A Case Study

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**Abstract:** *The aim of this study is to use Project management to manage crisis such as COVID -19 pandemic and implement an effective project management style that will curb extraordinary crisis using Council for Regulation of Engineering in Nigeria (COREN), Benin City, Edo state as a case study. Project management style, six-sigma applied in this study, helped to reduce mistakes, improve the process, maximize values for COREN with transparency in the project dealings, and provided a solid foundation for proper decision-making. Concurrent Triangulation Model was used to arrive at conclusions to the research questions. SPSS was employed in analyzing data from questionnaires and in-depth interviews conducted from COREN registered Engineers. Demographic statistics of frequency tables, pie charts, and one-sample T-Test tables were used to observe correlations between questions and answers to help in recording proper conclusions. Results from the hypotheses Test, showed that 98% of respondents were aware of the disease COVID-19 with only 2% unaware of the disease. 95.92% of respondents were of the opinion that COREN applied stringent measures to curb COVID 19 with only 4.08 % declining. 97.78% of respondents asserted that COREN have laid down futuristic plans in the invent of another outbreak with only 2.22 % declining. COREN adopted protective behavior methods of which 97.78% of respondents were in full support with only 2.22 % decline. In conclusion, providing a room for work digitization, using the six-sigma project management style with the crisis response team and involving professionals and multi nationals, will help manage extraordinary crisis now and in the future.*

**Keywords:** *Project management, six sigma management style, Concurrent triangulation Model, COREN and COVID-19 pandemic.*

## I. INTRODUCTION

Crisis management refers to a rapid and unforeseen event which leads to a major event which eventually leads to a major unrest among individuals, groups, organizations or society as a whole. It also refers to the art of managing sudden and unexpected events which affects employees, organizations as well as external clients. In recent times, many researchers have had a thing or two to say about crisis management. According to Kienzle et al. (2010), there was a discussion on crisis management systems, where aspect-oriented modelling was

adopted as a case study. The focus of the case study was crisis management systems, i.e., systems that assist in categorizing, evaluating, and handling a crisis situation by orchestrating the communication between all the parties involved in handling the crisis, by allotting and managing resources, and by providing access to relevant crisis-related information to authorized users. Informal requirements of crisis management systems (CMSs) in general, a feature model for a CMS product line, use case models for a car crash CMS (CCCMS), a domain model for the CCCMS, an informal physical description of the CCCMS, as well as some design models of

a possible object-oriented implementation of parts of the CCCMS backend. Unlu et al. (2010) wrote on the disaster and crisis management in Turkey: a need for a unified crisis management system. Crisis management has acquired significance in the approach plans of numerous countries around the planet because of the expansions in the quantity of cataclysmic events and psychological oppressor assaults. Thus, the paper had two purposes. The first was to delineate how the Turkish Government's Disaster and Crisis Management System has been created. The subsequent design was to make a subjective assessment of the current catastrophe faced by Turkey as a country.

#### A. AIM AND OBJECTIVES

The aim of this study is to manage extra ordinary crisis such as COVID 19, using a project management style and taking COREN Benin city Edo state as a case study. To achieve this, the following objectives were pursued:

To develop questionnaires and conduct in-depth interviews from COREN certified engineers in order to gather data.

To use Concurrent Triangulation Model to analyze data collected with the aid of a CAD software SPSS IBM 25.

#### B. RESEARCH HYPOTHESIS

To reach the purpose, the following research hypothesis emerged:

There is no significant relationship between Distributing questionnaires and conducting in-depth interviews from COREN certified engineers to provide quality insight to arresting the spread COVID 19. If the P- Value is less than 0.05, the null hypothesis is rejected ( $H_0$ ) hence, it can be concluded that there is a significant relationship between Distributing questionnaires and conducting in-depth interviews from COREN certified engineers to provide quality insight to arresting the spread COVID 19 using COREN as a case study.

There is no significant relationship between Using concurrent triangulation design to analyze data collected with the aid of a CAD software (SPSS) and arriving at concrete decisions that can assist organizations in curbing the spread of COVID 19 using COREN as a case study. Whilst delivering projects on scheduled time.

## II. METHODOLOGY

### RESEARCH DESIGN: CONCURRENT TRIANGULATION MODEL (CTM)

The concurrent triangulation model used an analysis that involved both quantitative and qualitative phases. The quantitative phase used the closed ended questions method where questionnaire surveys were distributed to COREN engineers, answered, retrieved and analyzed. The qualitative phase used the in-depth interview method. The results obtained were analyzed using a software known as Statistical

Package for Social Sciences (SPSS) IBM 25. Figure 1 shows the Concurrent Triangulation Model.

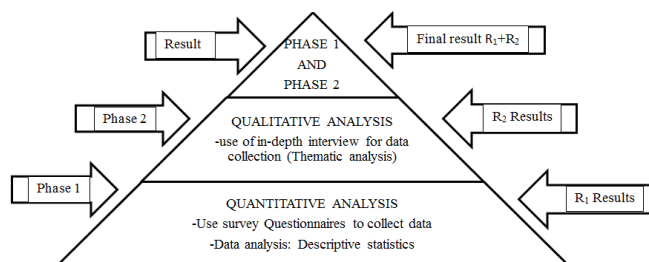


Figure 1: Concurrent Triangulation Model (source of figure design: Engr. Dr. Kingsley-Omoyibo Queeneth, 2020)

#### C. STUDY POPULATION

The population used comprised of all elements (individuals, objects and events) that met the sample criteria for inclusion in this study. The study population consisted of all adults (graduates and undergraduates) pursuing a degree majorly in engineering. A convenient population of 50 respondents were selected from the office of COREN for this project.

#### D. INSTRUMENT USED FOR DATA COLLECTION

Questionnaires were distributed and the ones found useable were analyzed and recorded. For the second phase, the qualitative analysis was done using the in-depth interview method. A sample size of fifty (50) was chosen. The model was validated using SPSS. Questionnaires were distributed and interviews were carried out. The results of both the Questionnaires distributed and that of the in-depth interview, were collected, analyzed, merged and recorded.

#### E. DATA ANALYSIS

After the data was retrieved it was organized and analyzed. For analysis of closed-ended questions, descriptive statistics was used. Frequency tables were drawn and from these data. The open-ended questions were analyzed through quantitative content analysis was carried out with the aim of quantifying and emerging characteristics and the concepts. Concept analysis was used to analyze verbal or written communications in a systematic way to measure variables quantitatively. IBM SPSS version 25 was used.

## III. RESULTS AND DATA ANALYSIS

The sample size questionnaires given out were 50 and all were recovered. Also, the sample size if in-depth interviews conducted was 50. All recovered data were duly analyzed.

Descriptive statistics was used to summarize the given data set, which is a representation of the entire sample of a population.

N		Gender	Age Group	Educational Status	Employment	Occupation
		Valid	50	50	50	50
	Missing	0	0	0	0	0
	Mean	1.30	3.20	2.82	1.10	1.34
	Median	1.00	3.00	3.00	1.00	1.00
	Mode	1	3	3	1	1
	Std. Deviation	.463	.670	.523	.364	.479
	Variance	.214	.449	.273	.133	.229
	Range	1	2	3	2	1
Percentiles	25	1.00	3.00	3.00	1.00	1.00
	50	1.00	3.00	3.00	1.00	1.00
	75	2.00	4.00	3.00	1.00	2.00

Table 1: Biodata Of Respondents

Std. Error of Mean	.020	.028	.050	.061	.029	.022	.022	.053
Median	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mode	1	1	1	1	1	1	1	1
Std. Deviation	.141	.198	.351	.431	.200	.147	.147	.335
Variance	.020	.039	.123	.186	.040	.022	.022	.112
Range	1	1	1	1	1	1	1	1
Percentiles	25	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	75	1.00	1.00	1.00	1.25	1.00	1.00	1.00

Table 2: Table showing data obtained from questions regarding Crisis Management and Covid-19

PIE CHART

PIE CHART

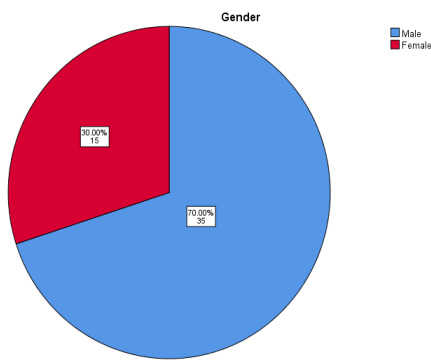


Figure 1: Demographic statistic of respondent's gender showing 70 % male respondents and 30 % female respondents

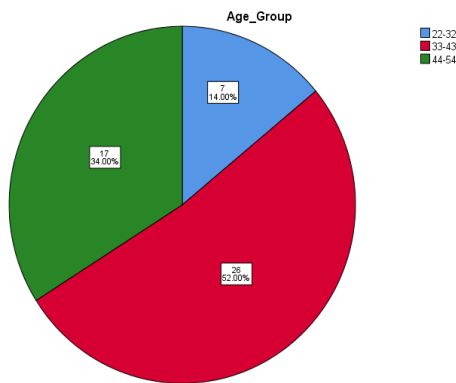


Figure 2: Demographic statistic of respondent's age group

Table 1 and pie charts shown above, the total sample size was observed to be fifty (50). It is also observed that 70% of the respondents were male and 30% were female. 52% of the respondents fall within an age range of 33-43, 34% fall within 44-54 years of age and 14% fall within 22-32 years of age. 76% of the respondents were graduates, 18% were National diploma holders, 4% were postgraduates and 2% were secondary school students. 92% of the respondents were employed on a full-time basis, 6% were employed on contract, and 2% were casual staffs. 66% of the respondents were academic staffs and 34% were non-academic staffs.

N		CMC1	CMC2	CMC3	CMC4	CMC5	CMC6	CMC7	CMC8
		Valid	50	50	50	50	49	46	46
	Missing	0	0	0	0	1	4	4	10
	Mean	1.02	1.04	1.14	1.24	1.04	1.02	1.02	1.13

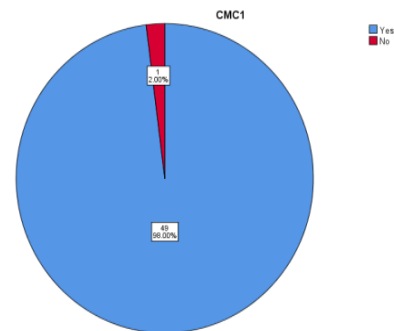


Figure 3: Demographic statistic of respondent's familiarity with covid-19

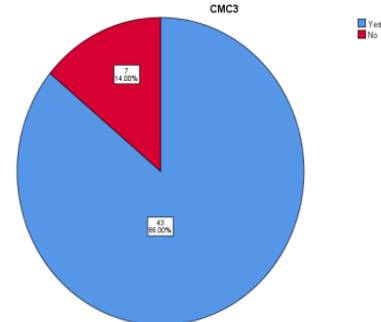


Figure 5: Demographic statistic of covid-19's negative effects in respondent's workplace

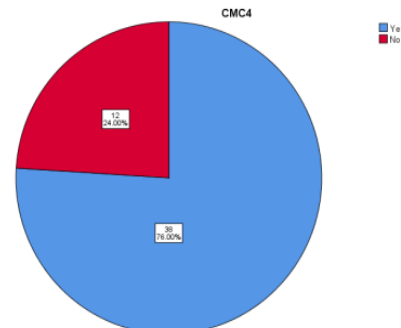


Figure 6: Demographic statistic of recorded cases of covid-19 in respondent's workplace

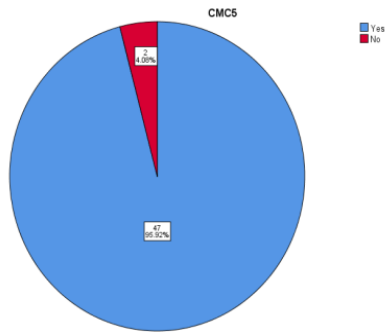


Figure 7: Demographic statistic of drives embarked by respondent's organizations to help curb covid-19

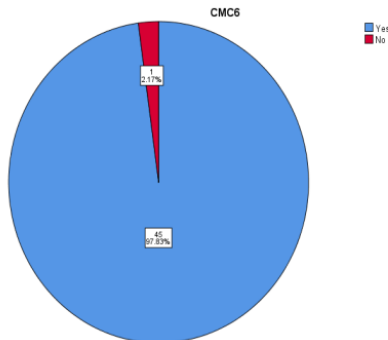


Figure 8: Demographic statistic of project acceptance

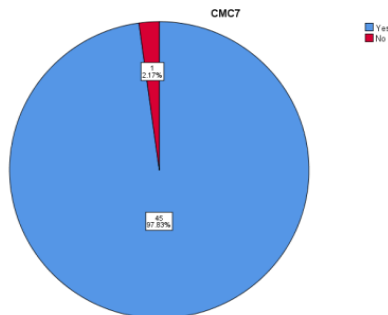


Figure 9: Demographic statistic of projects functionality

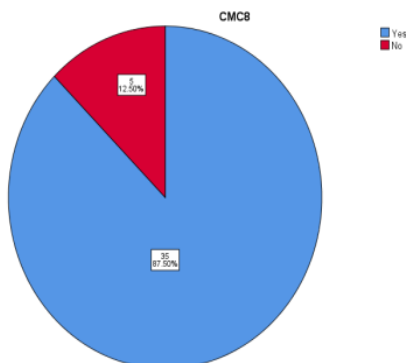


Figure 10: Demographic statistic of project adoption by external bodies

From Table 2, and pie charts shown, it was observed that the total number of respondents was majorly 50 for all questions with missing answers to few questions. 98% of respondents are familiar with Covid-19 and its negative effects with only 2 % decline. 96% of respondents also had cases of covid-19 outbreaks in their organizations, and they also embarked on projects such as hand washing in basins, nose masks and face shield etc. that helped curb the spread of the COVID 19 Pandemic.

FUNDING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	42	84.0	97.7	97.7
	No	1	2.0	2.3	100.0
	Total	43	86.0	100.0	
Missing	System	7	14.0		
Total		50	100.0		

Table 3: Table showing data obtained from questions regarding Funding

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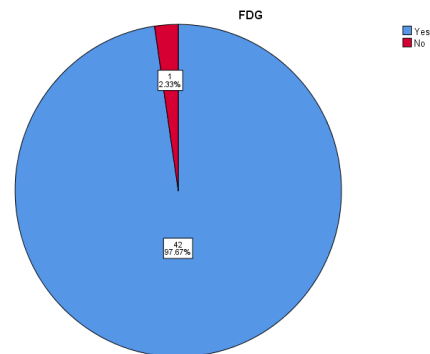


Figure 11: Demographic statistic of project funding

According to table 3, and pie chart shown above, 97.7% of respondents affirmed that most of these projects were mainly funded by the organizations from their official accounts with only 2.3 % decline. The survey took a week to actualize. Many of these studies was accepted by the board, functional, and external bodies also adopted the results.

FUTURISTIC PLAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	44	88.0	97.8	97.8
	No	1	2.0	2.2	100.0
	Total	45	90.0	100.0	
Missing	System	5	10.0		
Total		50	100.0		

Table 4: Table showing data obtained from questions regarding Futuristic plan

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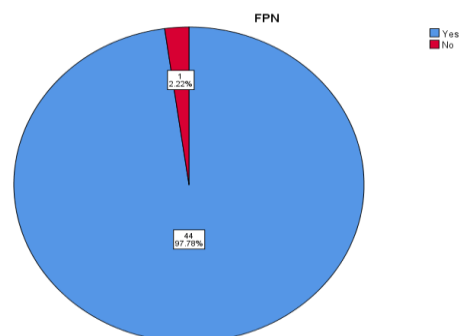


Figure 12: Demographic statistic of futuristic plan

From Table 4, and pie chart shown above, it was observed that with the advent of covid-19, the massive drive to eradicate and curb the virus caused organizations to come up with protocols to follow in the advent of another crisis as a plan for the future.

LOCKDOWN MEASURES AS OBSERVED BY ENGINEERS

		LMOE1	LMOE2	LMOE3	LMOE4	LMOE5	LMOE6
N	Valid	48	46	45	39	47	45
	Missing	2	4	5	11	3	5
Mean		1.10	1.02	1.07	1.05	1.04	1.09
Median		1.00	1.00	1.00	1.00	1.00	1.00
Mode		1	1	1	1	1	1
Std. Deviation		.309	.147	.252	.223	.204	.288
Variance		.095	.022	.064	.050	.042	.083
Range		1	1	1	1	1	1
Percentiles	25	1.00	1.00	1.00	1.00	1.00	1.00
	50	1.00	1.00	1.00	1.00	1.00	1.00
	75	1.00	1.00	1.00	1.00	1.00	1.00

Table 5: Table showing data obtained from questions regarding lockdown measures as observed by engineers

97.8% of respondents were of the view that COREN have put in place futuristic plans to curb extraordinary crisis like COVID 19 with only 2.2 % decline.

PIE CHART

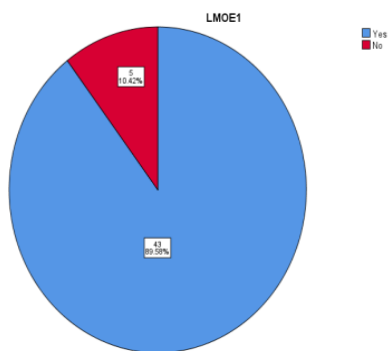


Figure 13: Demographic statistic of lockdown experience in areas of COREN engineers

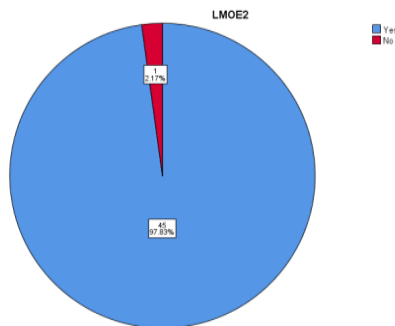


Figure 14: Demographic statistic of engineer's observance to the physical distancing measure

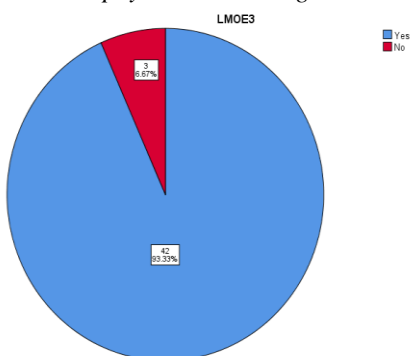


Figure 15: Demographic statistic of project managers assigned by COREN to store data related to curbing covid-19

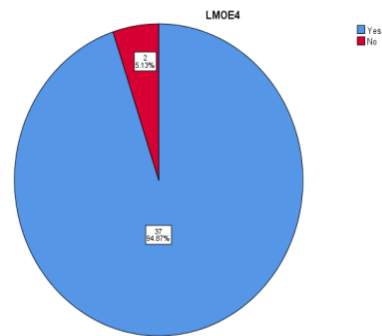


Figure 16: Demographic statistic of planning programs set up by COREN to curb COVID-19

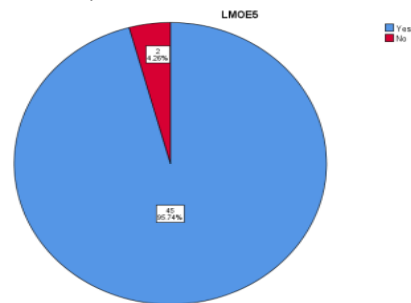


Figure 17: Demographic statistic of officers mandated by COREN to organize all activities lined up to curb the virus

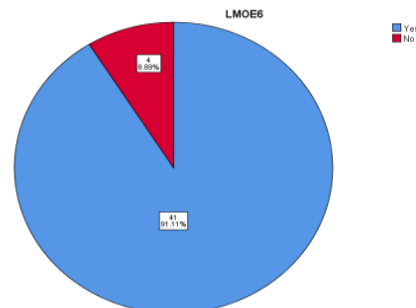


Figure 18: Demographic statistic of officers mandated by COREN to direct all activities lined up to curb the virus

Table 5, and pie charts shown above, over 90% of respondents; most of which were COREN registered engineers, confirmed that they all experienced the lockdown at their various areas which lasted for several months, and they all diligently observed physical distancing. Also, COREN assigned project managers to store data related to covid-19, set up planning programs to curb the spread of the virus, and officers were mandated to organize and direct all activities lined up by COREN to help prevent the spread of the covid-19.

SAFETY MEASURES/STRATEGIES TO ERADICATE COVID-19

		SMEC1	SMEC2	SMEC3	SMEC4	SMEC5
N	Valid	44	45	43	45	41
	Missing	6	5	7	5	9
Mean		1.34	1.02	1.05	1.00	1.15
Median		1.00	1.00	1.00	1.00	1.00
Mode		1	1	1	1	1
Std. Deviation		.479	.149	.213	.000	.358
Variance		.230	.022	.045	.000	.128
Range		1	1	1	0	1
Percentile	25	1.00	1.00	1.00	1.00	1.00



s	50	1.00	1.00	1.00	1.00	1.00
	75	2.00	1.00	1.00	1.00	1.00

Table 6: Table showing data obtained from questions regarding safety measures/strategies to eradicate COVID-19

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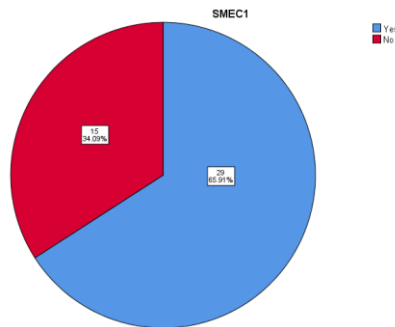


Figure 19: Demographic statistic of COREN adoption of mitigation methods to eradicate covid-1

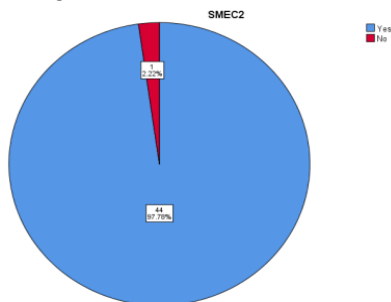


Figure 20: Demographic statistic of COREN adoption of protective behavior methods to eradicate covid-19

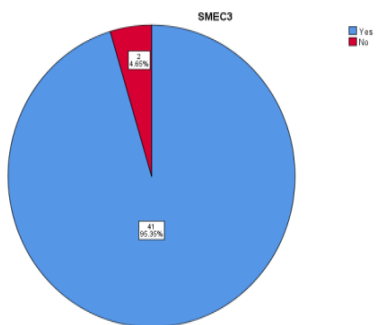


Figure 21: Demographic statistic of COREN adoption of collaboration methods to eradicate covid-19

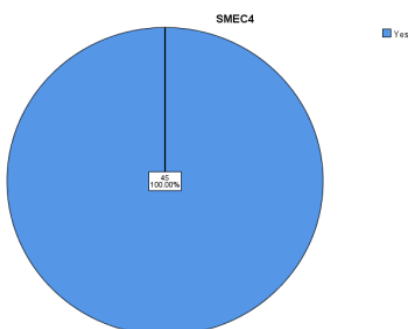


Figure 22: Demographic statistic of provision of safety materials against covid-19 by COREN. A 100% of the respondents agreed that COREN provided safety materials during the lockdown

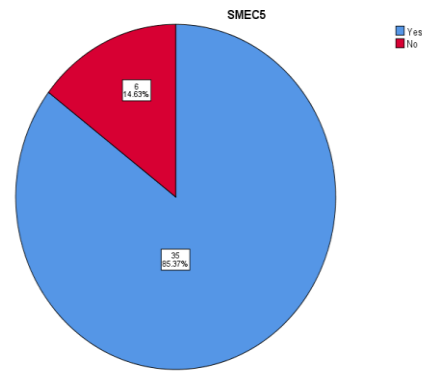


Figure 23: Demographic statistic of gadgets manufactured by COREN engineers to curb the spread and effectively manage infected patients

With reference to Table 6, and pie charts shown above, 58% of respondents affirmed to the fact that COREN adopted mitigation methods. Meanwhile 100% of respondents acknowledged that COREN adopted protective behavior methods, they also adopted collaboration with social workers, and medical doctors to play their part in combating the spread of the virus. It was also observed that over 90% of respondents confirmed that provisions were made for safety materials and gadgets such as face shields etc. against covid-19 by COREN to engineers to help mitigate the spread of the virus and manage infected patients.

HYPOTHESIS TESTING

In this study, Project management and managing extraordinary crisis such as COVID-19, Two hypotheses were drawn using a one sample T-Test of SPSS to find correlations between demographic indicators. For hypothesis testing, each listed hypothesis had different sections in the questionnaires and these sections contained multiple questions which were referred to as indicators. Each indicator included related questionnaires.

FOR TESTING EACH HYPOTHESIS

There is a null hypothesis against an alternative hypothesis. For the null hypothesis (H<sub>0</sub>), I suppose that said indicators has not negatively affected the management of the crisis (covid-19), while for an alternative hypothesis (H<sub>1</sub>), I suppose implementing said indicators has positively affected the management of the current crisis (covid-19).

Conclusions were drawn according to the result of the test. if the Significance is less than 0.05 the null hypothesis will be rejected, meaning that said indicators positively affected the management of the crisis (covid-19). But if the mean in the T-Test is less than 3 based on the Likert scale in the questionnaire (1=strongly agree, 2= agree, 3=disagree, 4=strongly disagree, 5=undecided), it means most of the respondent's answers were below disagree=3, thus: we have only (1=strongly agree, 2=agree). Hence, H<sub>A</sub>: the alternative hypothesis will be accepted.

Hypothesis 1: Distributing questionnaires and conducting in-depth interviews from COREN certified engineers and the public at large to gather data on the spread of the virus.

Questionnaires survey assist in collecting the opinion of a selected few or the general public. Without distributing questionnaires and conducting in-depth interviews from COREN certified engineers, it would prove difficult to gather data that may provide quality insight to curbing the spread of the virus.

Null hypothesis (H<sub>0</sub>): Distributing questionnaires and conducting in-depth interviews from COREN certified engineers to gather data will not provide quality insight to arresting the spread of the virus. (mean>=3)

Alternative hypothesis (H<sub>1</sub>): Distributing questionnaires and conducting in-depth interviews from COREN certified engineers to gather data will assist in providing quality insight to arresting the spread of the virus. (mean < 3)

**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
Gender	50	1.30	.463	.065
Age Group	50	3.20	.670	.095
Educational Status	50	2.82	.523	.074
Employment	50	1.10	.364	.052
Occupation	50	1.34	.479	.068

Table 10: One sample T-Test of hypothesis 2

**One-Sample Test**

Test Value = 3

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
Gender	-25.968	49	.000	-1.700	-1.83	-1.57
Age Group	2.111	49	.040	.200	.01	.39
Educational Status	-2.436	49	.019	-.180	-.33	-.03
Employment	-36.888	49	.000	-1.900	-2.00	-1.80
Occupation	-24.530	49	.000	-1.660	-1.80	-1.52

According to Table 10, the average significance is 0.0118, since 0.0118 < 0.05 so the null hypothesis (mean > = 3) will be rejected.

So, the alternative hypothesis (H<sub>1</sub>) will be accepted; It means that distributing questionnaires and conducting in-depth interviews from COREN certified engineers and the public at large to gather data will assist in providing quality insight to arresting the spread of the virus.

Hypothesis 2: Using concurrent triangulation design to analyze data collected with the aid of a CAD software (SPSS) in arriving at concrete decisions.

Several design methods have proven to be useful in analyzing data. Concurrent triangulation design method combines both results obtained from questionnaires and in-depth interviews conducted to arrive at concrete decisions. This method is perhaps the most efficient method used in analyzing data.

Null hypothesis (H<sub>0</sub>): Using concurrent triangulation design to analyze data collected with the aid of a CAD software (SPSS) will not help in arriving at concrete decisions that can assist organizations in curbing the spread of the virus whilst delivering projects on scheduled time. (mean>=3)

Alternative hypothesis (H<sub>1</sub>): Using concurrent triangulation design to analyze data collected with the aid of a CAD software (SPSS) will help in arriving at concrete

decisions that can assist organizations in curbing the spread of the virus whilst delivering projects on scheduled time. (mean<3).

**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
IDI1	50	1.42	.575	.081
IDI2	50	1.48	.544	.077
IDI3	50	1.52	.614	.087
IDI4	50	2.02	.937	.132
IDI5	50	1.48	.789	.112
IDI6	50	1.58	.731	.103
IDI7	50	1.44	.705	.100
IDI8	50	1.46	.579	.082
IDI9	50	1.56	.884	.125
IDI10	50	1.42	.499	.071

**One-Sample Test**

Test Value = 3

	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
IDI1	-19.442	49	.000	-1.580	-1.74	-1.42
IDI2	-19.772	49	.000	-1.520	-1.67	-1.37
IDI3	-17.041	49	.000	-1.480	-1.65	-1.31
IDI4	-7.399	49	.000	-.980	-1.25	-.71
IDI5	-13.628	49	.000	-1.520	-1.74	-1.30
IDI6	-13.737	49	.000	-1.420	-1.63	-1.21
IDI7	-15.658	49	.000	-1.560	-1.76	-1.36
IDI8	-18.811	49	.000	-1.540	-1.70	-1.38
IDI9	-11.514	49	.000	-1.440	-1.69	-1.19
IDI10	-22.409	49	.000	-1.580	-1.72	-1.44

According to table 10, the average significance is 0.00, since 0.00<0.05 so the null hypothesis (mean>=3) will be rejected.

So, the alternative hypothesis (H<sub>1</sub>) will be accepted; It means that Using concurrent triangulation design to analyze data collected with the aid of a CAD software (SPSS) will help in arriving at concrete decisions that can assist organizations in curbing the spread of the virus whilst delivering projects on scheduled time.

**IV. CONCLUSION**

In the Table below, a summary of the hypothesis's testing is presented.

Hypothesis 1

Distributing questionnaires and conducting in-depth interviews from COREN certified engineers to gather data will assist in providing quality insight to curbing the spread of the virus.	<0.05	SUPPORTED
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Hypothesis 2	Using concurrent triangulation design to analyze data collected with the aid of a CAD software (SPSS) IBM 25, will help in arriving at concrete decisions that can assist organizations in curbing the spread of the virus whilst delivering projects on scheduled time.	<0.05	SUPPORTED
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Table 11: Summaries of research hypothesis results

Conclusions drawn from empirical data and results from hypothesis testing in order to answer the research questions, adhering to the preventive steps put in place by the government to help mitigate the crisis. Organizations can adopt protective behavior methods, collaboration with professionals of different facets of life that can assist in the fight against the current crisis. Project management style such as the six-sigma project management style, on-time project delivery with no hinderance depends mostly on the religious application of project management style used during times of extraordinary crisis.

## V. RECOMMENDATION

For the effective implementation of project management styles, the major thing to remember is that a project manager should be flexible with his project management styles as the virus changes its course. A PMO should always put the safety of his colleagues first at all times, and develop good leadership

skills to be applied in managing the adverse effects of covid-19 as a complex project requires expertise and professionalism.

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