

Impact of COVID-19 Pandemic on Construction Business in Nigeria

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Construction is one of the most important sectors in the Nigerian economy employing a large number of people in its workforce. The industry contributed 4.09% of real GDP in 2019 to the Nigerian economy. This contribution may nosedive if concerted efforts are not made as a result of the outbreak of the novel coronavirus. However, the spread of the coronavirus pandemic has continued unabated across the world, and both public and private sectors have formulated different ways of responding to the pandemic. Their responses have attendant economic impact on all sectors of the economy, but that of construction seems to be the dire. The study is therefore aimed at analysing the impact of COVID-19 pandemic on the operations of construction businesses in the Nigerian construction industry. The study adopted quantitative research approach using questionnaire survey to obtain data on construction businesses from major stakeholders' in the industry. A combination of snowballing and purposive sampling techniques were used to obtain 312 valid responses used for the analysis presented in this paper. The study reveals that the most severe impact of the COVID-19 is financial with 77% severity index, this is followed by infrastructure impact with 74.4% while quality and safety impacts is the least ranked category with 53%. These findings showed that the outbreak of the COVID-19 have significant impact on construction businesses. The study recommends that parties to construction contracts should consider providing expressly outbreak of this nature in future in their contractual arrangements with a view to dealing at the outset with the risks associated with them. Government should provide palliatives for the construction industry post COVID-19 to be able to counteract the effects of the pandemic going forward. The study has implication for the practitioners in the Nigerian construction industry as well as the policy makers to understand the significant role being played by the industry and its effect on other sectors of the economy.

Keywords: Construction business, construction industry, economy, pandemic, wellbeing

INTRODUCTION

The construction industry is among major determinants of any developing country's economy. It is the second highest employer of labour after agriculture in an emerging economy like Nigeria. The construction businesses in Nigeria has an input of 4.09% in the real gross domestic product (GDP) of the country (National Bureau of Statistics (NBS), 2019). With the tremendous contributions of the construction industry globally over the last few decades, the fear of global pandemic had constrained the industry's performance. According to Jorda, Singh and Taylor (2020), infectious diseases are a leading cause of death worldwide after cancer and heart disease, accounting for a quarter to a third of all fatalities. In fact, the outbreak of coronavirus codenamed COVID-19 has not only interrupted the world economy, it has spread like wildfire across the globe and impacted negatively on the development of infrastructure. Velde (2020) indicated that the closest to the current pandemic ravaging the world could be comparable to the 1918 Spanish flu where millions of people were infected and fatalities were also very high. This may be the reason that Jorda, Singh and Taylor (2020) asserted that the current pandemic places more urgency on trying to gauge the likely economic fallout

as there is limited knowledge about the medium to long term macroeconomic effects. In a related development, McKibbin and Fernando (2020), the mutation of COVID-19 and its economic impact is yet to be estimated because of the uncertainty that surrounds the pandemic, which makes it difficult for government and private sectors to formulate an appropriate macroeconomic policy response.

In Nigeria, COVID-19 is a pandemic of which the impact is not limited to the health sector alone but becomes increasingly obvious in the bottom line of businesses (Meintjes *et al.*, 2007) because of the lockdown of the major States where businesses such as construction works are actively taken place. The outbreak of the coronavirus is a health and safety issue which has been viewed to be very important in the sector because it culminates in occupational hazard (Cooney, 2016). In fact, Ofori (2012) asserted that Health and safety (H&S) in the construction industry is capable of impacting on the infrastructure development delivery process and the socio-economic development of any nation due to its significant contribution. Employees can be exposed to so many dangers, such as infectious diseases, poisonous chemicals, and dangerous gases (Taylor (2002). Therefore, organisations across sectors,

such as construction, that may likely experience these types of hazards, must develop methods, and follow definite policies in the event of any outbreak of pandemic or infectious diseases (Cooney, 2016). Such policies will help the stakeholders in having a clear understanding of the latent hazards employees and employers can be exposed to during the course of executing the work while on construction site. However, Jimoh *et al.* (2017) posited that construction workers before now have precautionary measures in place to protect themselves and others from the spread of any infectious diseases, which include the use of personal protective equipment (PPE), gloves, and increased hygiene. Although having a lockdown that put a halt to construction process will do a little more in protecting the health and safety related issues of workers more than these measures, but it will in a long term have economic effects as a result of deprivation of millions of construction workers their wages which will be required either during or when the lockdown is over. All together, these measures have the potential of making contractors become insolvent or bankrupt especially those who have contractual obligations to stay on schedule or risk incurring significant financial penalties. The potential impacts of COVID-19 are numerous and it includes delays of construction projects on schedule, which may occur as a result of many factors such as; disruption in labour activities, critical supply chain disruptions, a delay or inability to obtain required permits and unforeseen events impacting the availability of financing, each of which is beyond the control of the parties.

Mental health conditions according to Oswald, Borg and Sherratt (2019), have tremendous impact on individuals, their families, their places of work and in the communities where they live.

Oswald *et al.* (2019) stated that in spite the plethora of studies on health and safety, the mental health aspect which research has shown that it contributes to the high cost of construction the world over has not received much attention. According to Meintjes *et al.* (2007), the construction sector's vulnerability to infectious diseases or pandemic is unique but paucity of empirical research that focus on the industry has limited the interventions to these menace to mere 'awareness' initiatives. Carmichael *et al.* (2016) stated that health and wellbeing of individuals in the workplace is of importance to organisations and the society at large since substantial time is spent there leading to improved productivity and reduction in cost related absenteeism on account of illness. This paper thus, intends to examine the impact of the COVID-19 pandemic on the interruption of construction businesses by assessing the influence of the disruption on both the financial and operational processes and functions of businesses.

LITERATURE REVIEW

The impact of COVID-19 pandemic on the Nigerian economy and construction industry

The impact of the COVID-19 pandemic is a thing of many parts; it has health, social and economic implications. In terms of health, the COVID-19 outbreak has infected millions of people across the globe with America being the worse hit lately (WHO, 2020), it has resulted into widespread serious respiratory illness across a large population and many deaths have been recorded. According to WHO, from December 2019, to May 3, 2020, 244,988 of the 3,498,151 reported cases of COVID-19 in the world died amounting to 7.0% of those infected. The psychological impact of COVID-19 is also very serious as many people infected in Nigeria are finding it difficult to come out because of stigmatisation. However, the suffering is becoming more pronounced among the medical teams and the National Centre for Disease Control (NCDC) who were working seriously to curtail the spread of the pandemic in Nigeria. Research efforts have shown in the past that the Severe Acute Respiratory Syndrome (SARS) outbreak impacted negatively on people's mental health (Lau *et al.*, 2006).

While almost 3.5 million coronavirus cases and 244, 988 deaths have been recorded globally, the world continues to combat the COVID-19 pandemic as declared by the World Health Organisation. Although prior to the outbreak of pandemic, the world economy outlook and specifically developing countries like Nigeria was friable and challenging, as worldwide GDP growth was estimated to be only 2.5 percent in 2020 (Onyekwena & Ekeruche, 2020). The United Nations Trade and Development Agency (UNCTAD) put the cost of the outbreak at about US\$2 trillion in 2020. Although many developing countries have recorded relatively fewer cases compared to European countries, however, the number of confirmed cases in Nigeria is currently on the rise. Over 2300 confirmed cases and 85 deaths recorded, while the weak health care system in the country have been overstretched; with the ease of lockdown and people's attitudes to adhering to government directives, the spread of the pandemic may probably worsen the more and its impact on the economy will be far reaching. In fact, outside the tragic health hazards and human consequences of the COVID-19 pandemic, the economic uncertainties, and disruptions that have resulted come at a significant cost to the global economy.

Before the outbreak of COVID-19 pandemic, the government of Nigeria had been contending with weak recovery from the shock in oil price of 2014, with the stunted growth in her GDP hovering around 2.3 percent in 2019 (IMF, 2020; Onyekwena & Ekeruche, 2020). Nigeria is a country that depends largely on oil revenue for growth and the revenue assumptions of the country

are premised on increased global oil demand and stable market with oil price benchmark and oil output respectively at \$57 per barrel and 2.18 million Barrels Per Day. The COVID-19 epidemic brought great distress which is not limited to only peoples' physical and mental health, but also to the economy. The price of the crude in the world market dropped drastically from about \$57 per barrel to \$11 and for a mono economy country like Nigeria. The Coronavirus (COVID-19) has resulted in mass production shutdowns and supply chain disruptions due to port closures in China, causing global ripple effects across all economic sectors in a rare twin supply-demand shock (Spur, 2020). As a measure to curtail the spread of the pandemic, the Federal Government of Nigeria has imposed a lockdown in Lagos and Ogun States as well as Abuja (which have the highest number of coronavirus cases combined). In the same vein, State governments have quickly followed suit by imposing lockdowns in their States.

According to Ayemba (2020), all contractors operating within the construction are familiar with different types of risks, ranging from shortages in labour to rising tariffs. The industry at present is facing many uncertainties as a result of the outbreak of the COVID-19. According to the report by Wall (2020), Wuhan has 164 manufacturing facilities including 13 plants that directly manufacture construction materials which creates metal products, mechanical equipment as well as electrical construction products often used by the global construction industry. In recent years, China has remained the highest trading partner with many countries in Sub-Saharan Africa's (SSA) and the largest source of aid for construction financing; and these aids have reinforced many of Africa's most ambitious infrastructure developments in the last few years (Current Affairs Correspondent Africa [CACA], 2020).

RESEARCH METHODOLOGY

This research became necessary due to the efforts of the government to curb the spread of pandemic which is nearly being aided by human-to-human transmission and this has made the national government to impose a lockdown in Lagos and Ogun States as well as Abuja, the Federal Capital Territory for 28 consecutive days (firstly, 14 days and the extension by another 14 days). The Federal Government's efforts encouraged the State Government to take similar measure to prevent interstate spread of the disease and thus, imposed lockdown in their various States. The study therefore, employed a quantitative research approach by using questionnaire survey to obtain the required information for the study. The study evaluated the impact of COVID-19 epidemic on construction businesses, and five categories of construction businesses were selected which included: building product manufacturing; building materials merchant; professional consultancy services;

construction and contracting; and subcontracting and specialty trades. The target respondents included the contractors, consultants and other stakeholders in the Nigerian construction industry. The participants were selected using a combination of snowballing and purposive sampling techniques. Snowballing technique was applied because it was difficult to access or obtain the comprehensive list of the participants with the aforementioned physiognomies across all the professions. Therefore, the chain approach (snowball), which is efficient and cost effective to access the target audience who would otherwise have been very difficult to reach was used (Naderifar, Goli & Ghaljaie, 2017). According to Polit-O'Hara and Beck (2006), snowball technique does take little time, but it presents the researcher an opportunity to relate better with the samples, as they are associates of the first sample, and the first sample is linked to the researcher which makes this type of networking useful when respondents want to remain anonymous.

Due to the geographical dispersion and the likely difficulty that may be encountered by traversing the entire country for the administration of the questionnaires, a survey request including a link to the questionnaire was sent to the social media platform of all the target professional bodies through the researchers' contacts within each profession. The professional bodies were purposively selected and they included The Nigerian Institute of Quantity Surveyors (NIQS); Nigerian Institute of Architects (NIA); Nigerian Society of Engineers (NSE) and Nigeria Institute of Building (NIOB). The collection of data was done during the 28 days lockdown period, when people had stayed away from their respective works and the respondents were given this period to complete the questionnaires. The questionnaire design consisted of two main sections to facilitate data collection. Section A was designed to obtain the demographic information of the respondents. Section B, consisted of seven major constructs which was used to assess the business impact analysis of the pandemic on construction businesses and the respondents were requested to rate the factors on a 5 point Likert scale where 5= very severe and 1= not very severe. A total of 331 survey forms were received after the expiration of the period with only 312 validly completed questionnaires and were good enough for further analysis of data. These comprised of 159 quantity surveyors, 69 builders, 42 engineers and 29 architects.

Methods of Data Analysis

This study employed both descriptive statistics (means, standard deviations) and non-parametric statistics (severity index, Kendall's concordance test and the chi-square tests) to analyse the data obtained. The study used severity index analysis to analyse and rank the data to examine the level of severity of the pandemic on

construction businesses. The formula as used by Idrus and Newman (2002) is given as:

$$S.I. = \left\{ \sum_{i=1}^{i=n} w_i f_i \right\} \times 100\% / n$$

.....(1)

where i represents the ratings 1–5, f_i the frequency of responses, n the total number of responses and w_i the weight for each rating. After the computation of the SI, the study also examined the Coefficient of variation (COV) in order to express the standard deviation as a percentage of the mean, and which was employed in linking the relative variability of different responses obtained from the field. The Coefficient of variation (COV) as established by Elhag, Boussabaine and Ballal (2005) is given as:

$$COV = \frac{S}{\bar{X}} \times 100\%$$

.....(2)

Where COV represent the coefficient of variation, S the standard deviation and X the weighted mean of sample. Following Idrus and Newman (2002) and Elhag *et al.* (2005) approach, Kendall’s concordance test and the chi-squared test were conducted to assess if there was agreement or concordance between rankings of the factors based on the perceptions of the respondents and to also examine the level of significance of these agreements at 95% confidence level. The ranking was done using the severity indices calculated for each group of respondents and each latent variable, then Kendall’s concordance test w was calculated using the formula (Elhag *et al.*, 2005).

$$w = \frac{12 \times s}{k^2 \times n \times (n^2 - 1)}$$

From the formula, s stands for the sum of squares of deviations of factors, k is the number of respondent

groups (which is five in this study), n is the number of factors in each latent construct. Chi-squared was used in investigating whether there was the possibility of existence of association between the different set of rankings and the formula used by Idrus and Newman (2002) was employed in computing X^2 (Chi-squared value)

Therefore, Chi-squared value (X^2) = $k(N - 1)W$

Where factors k is the number of respondent groups (which is five in this study), n is the number of factors in each latent construct and w is Kendall’s concordance coefficient.

RESULTS AND DISCUSSION

Demographic Characteristics of the Respondents

The information elicited included the profession of the respondents, their positions within their organisations, academic and professional qualifications, type of construction business, size of organisation and work experience among other things. Table 1 gives the detail of the demographic information of the participants of the survey and indicates that 100% of the respondents hold tertiary education degree, and 50% of them have 10 years and above work experience in the industry. The results also showed that 74% of the respondents work in an organisation with at least 10 employees, while almost 100% of them have managerial experience in their own right. From the analysis of the demographic data, it is evident that the respondents to the survey had the required experience and managerial acumen to provide valid information on the impact of the pandemic on construction businesses in Nigeria. This provides the reliability and validity to the survey data (Adafin *et al.*, 2016). However, From Table 1, 63% of the respondents work in a construction and contracting while 30% were Professionals who run consultancy services.

Table 1: Demographic Data of Respondents

Characteristics	Frequency	Valid percent	Cumulative percent
Number of Years in business			
Less than 10 years	156	50	50
20-Nov	132	42	92
21-30	20	6	99
> 30	4	1	100

Total	312	100	
Size of organisation (Number of full-time employees)			
Micro < 10	78	26	26
Small sized firm 10-49	99	33	60
Medium sized firm 50-199	75	25	85
Large sized firm ≥ 200	44	15	100
Total	296	100	
Academic qualification of respondents			
OND	2	1	1
HND	35	11	12
PGD	39	13	24
BSc	125	40	64
MSc	100	32	96
PhD	11	4	100
Total	312	100	
Type of business			
Building product manufacturing	11	4	4
Building material merchant	7	2	6
Professional consultancy services	94	30	36
construction and contracting	196	63	99
Subcontractor & specialty trades	4	1	100
Total	312	100	
Position within the organisation			
Owner	48	15	15
Executive	50	16	31
Manager	126	40	72
Senior Manager	62	20	92
Top manager/ Director	26	8	100
Total	312	100	
Profession of respondents			
Architect	29	9	9
Builder	69	22	31
Engineer	42	13	45
Quantity Surveyor	159	51	96
Others	13	4	100
Total	312	100	

Mean Analysis and Ranking of Factors

Table 2 shows the descriptive statistics and ranking of responses for the measures of impact of pandemic on construction businesses. With respect to the impact on infrastructure, the measures put in place have severe impact on the construction process by causing delay with the overall mean value of 4.18. This finding is

tandem with the assertion of Ayemba (2020) who identified delay in project delivery as one of the effects on the COVID-19 on the construction industry. When the impact on resources was examined, absenteeism was the most ranked factor (MS = 3.91). This indicates that performance of the industry may likely be hindered because construction businesses stand to lose money as

a result absenteeism when employees have to attend to personal matters and stay at home to prevent the spread of the infectious disease (James, 2011). The impact of the pandemic on intangible resources showed that low staff morale is the overall most ranked factor with (MS = 3.61). Cooney (2016) asserted that the impact of related injuries and sickness of employees may result to lower employee morale which may affect the level of workplace productivity (Baldwin & Anderson, 2002). The spread of the pandemic is health and safety (H & S) issue within the construction industry; in evaluating the impact of the coronavirus on quality and safety, exposure of employees to health challenges is the most ranked factor. This underscores Adeogun and Okafor (2013) assertion that unhealthy exposures of employees constitute a major risk which makes it apparent that H&S legislation in Nigeria is not in place. Failure to fulfil contractual obligations was ranked as the overall impact relating to the legal issue. This is in accordance to Bailey, Bouchardie and Madalena (2020) who submitted that COVID-19 pandemic will largely impact on contractual provisions concerning the consequences of unforeseen events brought about by the outbreak which prevents so many firms from discharging the contractual obligation because of government policies to prevent the spread of the disease. Strategic impact of the pandemic on construction business was assessed and the stakeholders overall rating showed that outbreak of

infectious disease such as COVID-19 often result in delay in new business initiatives (MS = 3.75). In fact, World Economic Forum (2019) revealed that the potential economic losses from infectious disease outbreaks on businesses are massive, and this is experienced through their effects on employees, suppliers and customers. Finally, the impact of the pandemic on finances of the construction businesses indicates loss of profit as the most ranked factor with a mean value of 4.30. According to Cooney (2016), this is an indication that construction firms which are focused on tackling health and safety concerns of their employees are doing so in order to ensure a healthy workforce, which in turn will lead to enhanced profits and a greater gross domestic products (GDP) for the whole country in general. However, Investment Information and Credit Rating Agency [ICRA] (2020) argued that the impact of the Covid-19 pandemic has hindered construction activity and the interruption of the process will impact negatively on the operating income, profitability, and liquidity position of construction companies in the short term. Based on Oyewobi *et al.* (2018), all the factors used in measuring the impact of the pandemic are severe, because they have mean score values above 2.5

Table 2: Descriptive statistics results of impact of pandemics on construction businesses

Infrastructure Impacts	ARCH		BLDER		ENGR		QS		OTHER		OVERALL		REMARK
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	
Delayed construction process	4.03	3	4.26	3	4.29	1	4.30	1	4.00	1	4.18	1	Severe
Restricted access to facilities/site due to lockdown	4.17	2	4.39	1.5	4.07	3	4.23	2	3.69	2	4.11	3	Severe
Idleness of Machinery	3.41	4	4.10	4	3.50	4	3.96	4	3.38	4	3.67	4	Severe
Equipment damage	2.28	5	2.67	5	2.21	5	2.84	5	2.54	5	2.51	5	Somehow
Disruption of business process	4.45	1	4.39	1.5	4.12	2	4.10	3	3.62	3	4.13	2	Severe
Resource Impacts													
Absenteeism	3.90	1	4.14	2	3.90	1.5	3.85	2	3.77	1.5	3.91	1	Severe
Data loss	2.76	5	2.62	5	2.62	5	2.92	5	2.69	5	2.72	5	somehow
Supply chain interruption	3.69	2	4.16	2	3.90	1.5	3.86	1	3.77	1.5	3.88	2	Severe
Data corruption	2.86	4	2.90	4	3.12	4	3.01	4	2.85	4	2.95	4	somehow
Employee turnover	3.34	3	3.64	3	3.79	3	3.70	3	3.62	3	3.62	3	Severe
Intangible Impacts													
Decreased customer satisfaction	2.97	3	2.90	3	3.29	2	3.29	2	2.85	2.5	3.06	2	Somehow
Customer defection	3.03	2	2.99	2	3.02	3.5	3.00	3	2.85	2.5	2.98	3	Somehow
Loss of goodwill	2.72	6	2.77	4	3.02	3.5	2.87	4	2.31	7	2.74	4	Somehow
Negative business reputation	2.83	5	2.43	7	2.64	7	2.70	7	2.38	6	2.60	7	Somehow
Harm to brand	2.86	4	2.57	6	2.86	5	2.74	5.5	2.46	5	2.70	6	Somehow
Diminished value of intellectual property	2.62	7	2.75	5	2.81	6	2.74	5.5	2.69	4	2.72	5	Somehow
Low staff morale	3.76	1	3.84	1	3.81	1	3.39	1	3.23	1	3.61	1	Severe
Quality and Safety Impacts													
Inability to maintain product/service standards	2.93	3	2.99	3	3.05	1	3.00	3	2.23	4	2.84	3	Somehow
Compromised workers safety	2.97	2	3.17	2	3.10	2	3.03	2	2.62	3	2.98	2	Somehow

Environmental damage	2.28	4	2.62	4	2.50	4	2.88	4	2.92	1	2.64	4	Somehow
Exposure of employees to health challenges	3.03	1	3.23	1	2.83	3	3.38	1	2.77	2	3.05	1	Somehow
Legal Impacts													
Failure to fulfil contracts	3.72	1	3.90	1	3.69	1	3.63	2	2.92	2	3.57	1	Severe
Determination of contract	3.00	5	3.32	4	3.10	3	2.87	5	3.00	1	3.06	3	Somehow
Breach of warranties	3.31	3	3.33	3	2.90	4	2.95	4	2.54	4	3.01	4	Somehow
Force majeure	3.52	2	3.59	2	3.12	2	3.75	1	2.77	3	3.35	2	Somehow
Failure to comply with regulations	3.21	4	2.86	5	2.69	5	3.28	3	2.38	5	2.88	5	Somehow
Litigation	2.69	6	2.64	6	2.45	6	2.68	6	2.23	6	2.54	6	Somehow
Strategic Impacts													
Delay in new business initiatives	3.93	1	4.07	2	4.07	1	3.90	1	2.77	2.5	3.75	1	Severe
Decreased focus on new business opportunities	3.48	3	4.17	1	4.02	2	3.78	2	2.77	2.5	3.65	2	Severe
Reduced resources for innovation	3.72	2	3.93	3	3.67	3	3.64	3	2.54	4	3.50	3	Severe
Increased mechanisation	2.86	4	3.03	4	2.81	4	3.14	4.00	2.92	1	2.95	4	Somehow
Financial Impacts													
Loss of profit	4.38	1	4.29	1	4.24	1.5	4.21	2	4.38	1	4.30	1	Severe
Delayed income	4.14	5	4.07	5	4.05	5	4.04	5	4.23	3.5	4.11	5	Severe
Contractual penalties	3.83	7.5	3.78	7.5	3.76	7.5	3.77	8	3.85	8.5	3.80	9	Severe
Regulatory fines	3.62	10	3.70	10	3.76	7.5	3.75	9	3.62	10	3.69	10	Severe
Increased expenses	3.83	7.5	3.78	7.5	3.76	7.5	3.79	7	3.92	7	3.82	7.5	Severe
Loss sales	2.79	12	2.78	12	2.76	12	2.82	12	2.69	12	2.77	12	Somehow
Loss of income	3.83	7.5	3.77	9	3.76	7.5	3.69	10	4.08	6	3.82	7.5	Severe
Loss of market share	4.24	1.5	4.20	3	4.19	3.5	4.14	3	4.23	3.5	4.20	4	Severe
Decrease turnover	3.55	11	3.45	11	3.43	11	3.48	11	3.31	11	3.44	11	Somehow
Delayed sales	4.24	1.5	4.23	2	4.19	3.5	4.12	4	4.31	2	4.22	2.5	Severe
Reduction in profit	4.24	1.5	4.19	4	4.24	1.5	4.22	1	4.23	3.5	4.22	2.5	Severe
Increase cost	3.97	6	3.90	6	3.86	6	3.89	6	3.85	8.5	3.89	6	Severe

Note: 1.00-1.49 - Not very severe, 1.50-2.49 - Not severe, 2.50-3.49 Somehow severe, 3.50-4.49 Severe, 4.50-5.00 Very severe

Severity Indices and Coefficient of Variation (COV)

Table 3 (in appendix A) gives the summary of the findings of severity indices and coefficient of variation. It shows that all the 43 factors categorised under seven latent constructs exhibited a severity index between approximately 50% and 88%. This is an indication that all the factors identified were considered by the respondents as very impactful effects of COVID-19 on the construction businesses. Coefficient of variation illustrates that variation of responses from the respondents concerning the impact of the coronavirus pandemic is fairly low, as shown in Table 3. This is a good sign and it indicates a relatively high agreement among the respondents. To fully examine whether there is agreement among the respondents, the Kendall's concordance statistical method was employed. All the 43 variables analysed have coefficient of variations ranging from 14% to 55%.

Kendall's Concordance Analysis of Impacts of COVID-19 Pandemic on Construction Business

Table 4 (in appendix A) shows the assessment of Kendall's concordance coefficient between the five categories of respondents. From Table 4, Kendall's coefficient of concordance W was estimated for each construct included in the survey. However, the value of W needs to be examined for significance, to ensure that the agreement between the two rankings of the five evaluators (respondents) were accidental. For this, the chi-squared test was used in determining the chance of occurrence of a relationship between the rankings of the respondents. For the infrastructure impacts of the pandemic on construction businesses, the Kendall's coefficient estimated is 0.806 while the chi-square value is 16.12. With respect to other constructs, the W and X^2 values are given as follows: the resource impacts ($W = 0.952$, $X^2 = 19.04$, $p > 0.05$); in the case of intangible impacts of the pandemic ($W = 0.834$, $X^2 = 25.02$, $p > 0.05$), the legal impact exhibited ($W = 0.785$, $X^2 = 19.625$, $p > 0.05$). The financial impact of the pandemic was evaluated and the Kendall's concordance coefficient ($W = 0.940$, $X^2 = 51.70$, $p > 0.05$) and

strategic impacts of the pandemics ($W = 0.572$, $X^2 = 8.58$, $p > 0.05$). According to Idrus and Newman (2002), a coefficient of 0.63 is an indication that there is a moderately high degree of concordance between the sets of ranking. With respect to the quality and safety impacts ($W = 0.424$, $X^2 = 6.36$, $p < 0.05$). The Kendall's coefficient of concordance W offers a measure of agreement between respondents, and concordance between rankings of the impact of the pandemic. W ranges between "0" and "1", with value close to "0" indicating no agreement, while value closer to "1" indicating perfect concordance. From Table 4, the quality and safety impacts of the pandemic showed a W value of 0.424 which is a bit higher than '0', then it could be inferred that though the value is relatively low to become agreement, but it is not adequate to conclude that the evaluator do not agree (Kendall & Babington, 1939). Therefore, based on the significance level exhibited by the variables, it may be concluded that the ranking obtained for all the responses, as shown by the severity index analysis, was consensual among the respondents, significant and clear, and thus may be used for research.

Summary of the Main Latent Variables

Table 5 shows the summary of the main latent variables of the impact of the coronavirus pandemic on construction businesses in Nigeria with their severity indices, Kendall's concordance coefficient analysis, the chi-squared test and rank of the group. From Table 5, financial impacts have the highest severity index with significant chi-square value indicating the existence of relationship between the rankings of the respondents and the Kendall's concordance coefficient showed there was agreement in the ranking of the respondents. The impacts on infrastructure is also significant with high severity index, while quality and safety impacts exhibited the least severity index. However, the results from the table indicates that all the main categories of the factors have severe impacts on construction businesses which were above 50%.

Table 5: Summary of the main latent variables

Main group	SI	Ranking	Kendall's concordance coefficient (w)	Chi-squared value (X^2)	P value
Financial Impacts	77.13	1	0.940	51.70	>0.05
Infrastructure Impacts	74.40	2	0.806	16.12	>0.05
Strategic Impacts	69.23	3	0.572	8.58	>0.05
Resource Impacts	68.31	4	0.952	19.04	>0.05
Legal Impacts	61.36	5	0.785	19.63	>0.05
Intangible Impacts	58.28	6	0.834	25.02	>0.05
Quality and Safety Impacts	57.53	7	0.424	6.36	<0.05

DISCUSSION OF RESULTS

Financial Impacts

This latent construct contained 12 factors used in assessing its impact on construction business as shown in Table 2. These factors showed high severity indices between 55% and 86%. However, loss of profit is the most ranked factor out of the twelve factors, while loss of sales is the least ranked factor. This affirmed the suggestion of Gibson (2002) that a decrease in ill-health will increase construction companies' profitability and vice versa. This latent variable possessed coefficient of variations ranging between 16% and 37% which are relatively low and indicative of consensual level of agreement among respondents. Kendall's analysis and chi-squared test give credence to this result. Table 4 shows this category was estimated to have a Kendall's coefficient of 0.94 and chi-squared with a significance level of less than 0.05, which indicates a very strong concordance among the respondents. A careful assessment of the average severity indices as shown in Table 5; The top ranked group was also revealed to be financial impacts with an average severity index of circa 77%. This indicates that the respondents perceive that the outbreak of the pandemic have severe impact on construction businesses finances and the industry performance at large. This finding is consistent with literature views that health and safety disasters would eventually impact on the financial performance of construction companies (Haefeli, Haslam & Hsalam, 2005; WEF, 2020).

Infrastructure Impacts

This study has five factors that were included in this category as shown in Tables 2 and 3. The factors exhibited severity indices ranging between 50% and 84% approximately. Kendall's coefficient of concordance computed for this category is 0.806, with a significance level of less than 0.05 as revealed in Tables 4 and 5, which depicted strong agreement amongst respondents to the survey. In the overall ranking, infrastructure impacts factor was ranked 2nd, (Table 5) and in this category, delayed construction process and restricted access to facilities/site due to lockdown were ranked 1st and 2nd respectively. Equipment damage was the least ranked factor with average severity index of 50%. According to Rathbone, Grenfell and Wright (2020), is anticipated that COVID-19 pandemic will have severe impact on a number of infrastructure projects around the world Nigeria inclusive. Although the pandemic has impact on all sectors of the economy and it appears that the construction and infrastructure sectors are more susceptible owing to globalised supply chains and in many occasions the labour supply. Disruption of business process was ranked 3rd and this may be as a result of the global impact of the pandemic on oil price at the international market (Lashitew, Ross & Werker, 2020). This may constitute major financial

crisis that might lead to stoppage of construction projects because the country's economy is built around oil and any major projects that are not regarded as priority may be dropped according to the government. This is evident in the proposed review of budget of some of the ministries, departments and agencies during the pandemic to make funds available to the projects government deemed to be of high priority.

Strategic Impacts

This group comprised of 4 factors as illustrated in Table 3. All of these factors obtained severity indices between 59% and 75%. This shows that these variables have relatively higher degree of impact on construction businesses. From Table 4, the Kendall's coefficient of concordance for this group is estimated as 0.57 with a significance level of $p > 0.05$. This indicates a strong agreement amongst the respondents in the ranking of the factors. The most ranked factor under this group is delay in new business initiatives followed by decreased focus on new business opportunities. This finding is consistent with Onyekwena and Ekeruche (2020) that argued that the uncertainty that is surrounding the pandemic is capable of impacting negatively on the profit outlook on possible investment projects, as construction companies may likely to hold off on long-term investment decisions. This is corroborated by Lee and McKibbin (2004) who contended that the existence of pandemics reduces the desirability of investment or business initiatives.

Resource Impacts

There are five factors clustered in this group as illustrated in Table 3. This category has severity indices ranging between 55% and 78% approximately. This category possessed Kendall's coefficient of 0.952 as shown in Table 4, which shows high agreement among respondents in the ranking of factors. From the results of the Kendall's coefficient and the Chi-square test presented in Tables 4 and 5, it is obvious that respondents regarded the factors clustered on to this category as having severe impact on construction businesses. The top ranked factors in this category are absenteeism which ranked 1st; the supply chain interruption which ranked 2nd within the group, while data corruption was ranked the least severe factor. This is consistent with Wall (2020) that reported the outcome of the panel of expert put together by the Canadian Construction Association (CCA) which reiterated that the construction sector should brace up for imminent significant interruptions in the supply-chain orchestrated by the coronavirus outbreak and should also be prepared for higher costs.

Legal Impacts

This group comprised of six factors as indicated in Table 3. The severity indices obtained by this group of factors are in the range 50–72%. This category has Kendall's coefficient value of 0.785 which depicted that there is a

strong agreement among respondents in ranking this group; this is as a result of the Chi-square test of 19.625 which is significant at less than 0.05 as shown in Tables 4 and 5. The top variable in this category is failure to fulfil contracts. The next ranked factor is force majeure which is an indication of what the outbreak of the pandemic has created. This underscores Bailey *et al.* (2020) who posited that COVID-19 would have a massive impact on construction projects, but however, the legal consequences may differ from nation to nation, because the outbreak of the pandemic will trigger the contractual requirements regarding the implications of unforeseen circumstances. Furthermore, Wall (2020) revealed that the consequences of COVID-19 pandemic may result in collapse of strategic partnerships, logistics breakdowns and possible legal squabbles.

Intangible Impacts

This grouping included 7 factors as shown in Table 3. These factors exhibited severity indices between 52% and 61%. This indicated that these variables have relatively low degree of impact on construction businesses. However, there is a strong agreement amongst the respondents in the ranking of these factors. This is evident in the values of the Kendall's coefficient of concordance which is estimated as 0.834 and Chi-square test of 25.02 with a significance level value of less than 0.05 as presented in Table 4. The top ranked factors in this category are decrease in customer satisfaction which is ranked 1st within the group, customer defection is ranked 2nd while negative business reputation is ranked least.

Quality and Safety Impacts

This category contained 4 factors as indicated in Table 3 and possessed the least value of Kendall's coefficient of concordance of 0.424 which shows that this construct has the impact on construction businesses. This indicates a weak agreement amongst the respondent in the ranking of these factors (Kendall & Babington, 1939). However, the severity indices ranged between 53% and 61%. The top ranked factor in this category is the exposure of employees to health challenges and followed by compromised workers safety. Bailey *et al.* (2020) appreciated the fact that health and safety risks of COVID-19 vary from project to project and also from business to business, but however, suggested that risk assessment of health and safety need to be carried out in case of easement of the lockdown in line with medical, scientific and government strategies, because it is the responsibility of the business owner to provide a safe working environment.

CONCLUSION

While the outbreak of the COVID-19 continues unabated and the number of infected people is on the rise in Nigeria, its impact on construction businesses have not been empirically examined extensively. This paper

assessed the impact of the coronavirus pandemic on construction businesses in Nigeria. The study adapted business impact analysis questionnaire which was categorised under seven major constructs: financial impacts; infrastructure impacts; legal impacts; resources impacts; intangible impacts; strategic impacts and quality and safety impacts. The study employed some statistical tools to analyse the data obtain which in considerable instances revealed that a strong agreement amongst the respondents in the ranking of the existed with respect to the level of severity of the latent variables. This is underscored by high Kendall's coefficients of concordance obtained for five of the main categories and also by low coefficients of variation for each variable examined in each category. The study concluded that the most severe impact of the COVID-19 is financial with 77% severity index, this was followed by infrastructure impacts with 74.4% while quality and safety impacts was the least ranked category with 53%. These findings showed that the outbreak of the COVID-19 have significant impact on construction businesses. This outcome is in consonance with many literature views that the pandemic will have a dire impact on the construction industry, although the impact may be country specific since the measures put in place are not the same. The study recommends that parties to construction contracts should consider providing expressly outbreak of this nature in future in their contractual arrangements with a view to dealing at the outset with the risks associated with them. Government should provide palliative for the construction industry post COVID-19 to be able to counteract the effects of the pandemic going forward.

The study has implication for the practitioners in the Nigerian construction industry as well as the policy makers to understand the significant role being played by industry and its effect on other sectors of the economy. However, the research is cross-sectional in nature and a result a more robust methodology should be employed to examine in detail, the impact of the pandemic on individual trade or business and the industry at large.

The study concludes that the most severe impact of the COVID-19 is financial with 77% severity index, this followed by infrastructure impacts with 74.4% while quality and safety impacts is the least ranked category with 53%. These findings showed that the outbreak of the COVID-19 have significant impact on construction businesses. The study recommends that parties to construction contracts should consider providing expressly outbreak of this nature in future in their contractual arrangements with a view to dealing at the outset with the risks associated with them. Government should provide palliatives for the construction industry post COVID-19 to be able to counteract the effects of the pandemic going forward. The study has implication

for the practitioners in the Nigerian construction industry as well as the policy makers to understand the significant role being played by industry and its effect on other sectors of the economy.

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APPENDIX A

Table 3: Severity index and Coefficient of variation Analysis of impact of pandemics on construction businesses

Latent variables	ARCH			BLDER			ENGR			QS			OTHER			OVERALL
	SI	Rank	COV	SI	Rank	COV	SI	Rank	COV	SI	Rank	COV	SI	Rank	COV	SI
Infrastructure Impacts																
Delayed construction process	80.7	3.0	26.1	85.2	3.0	20.4	85.7	1.0	20.1	85.9	1.0	24.2	80.0	1.0	22.8	83.5
Restricted access to facilities/site due to lockdown	83.4	2.0	24.0	87.8	1.5	21.8	81.4	3.0	31.3	84.7	2.0	26.5	73.8	2.0	41.9	82.2
Idleness of Machinery	68.3	4.0	38.8	82.0	4.0	24.8	70.0	4.0	35.8	79.2	4.0	28.4	67.7	4.0	39.2	73.4
Equipment damage	45.5	5.0	55.0	53.3	5.0	44.4	44.3	5.0	48.4	56.7	5.0	42.1	50.8	5.0	44.4	50.1
Disruption of business process	89.0	1.0	19.5	87.8	1.5	20.7	82.4	2.0	24.1	82.0	3.0	25.0	72.3	3.0	26.6	82.7
Resource Impacts																
Absenteeism	77.9	1.0	30.9	82.9	2.0	25.6	78.1	1.5	30.4	77.0	2.0	32.0	75.4	1.5	39.3	78.3
Data loss	55.2	5.0	47.1	52.5	5.0	49.4	52.4	5.0	40.4	58.5	5.0	42.6	53.8	5.0	27.9	54.5
Supply chain interruption	73.8	2.0	33.3	83.2	1.0	23.2	78.1	1.5	26.4	77.1	1.0	27.4	75.4	1.5	26.9	77.5
Data corruption	57.2	4.0	37.0	58.0	4.0	41.5	62.4	4.0	38.3	60.3	4.0	40.0	56.9	4.0	40.2	59.0
Employee turnover	66.9	3.0	42.5	72.8	3.0	36.8	75.7	3.0	31.2	74.1	3.0	31.9	72.3	3.0	28.9	72.4
Intangible Impacts																
Decreased customer satisfaction	59.3	3.0	38.7	58.0	3.0	44.3	65.7	2.0	44.2	65.8	2.0	38.1	56.9	2.5	24.2	61.1
Customer defection	60.7	2.0	33.5	59.7	2.0	40.4	60.5	3.5	41.6	60.0	3.0	40.0	56.9	2.5	28.1	59.6
Loss of goodwill	54.5	6.0	37.9	55.4	4.0	44.3	60.5	3.5	45.3	57.5	4.0	43.0	46.2	7.0	37.0	54.8
Negative business reputation	56.6	5.0	47.3	48.7	7.0	50.5	52.9	7.0	53.4	54.1	7.0	46.1	47.7	6.0	50.0	52.0
Harm to brand	57.2	4.0	40.4	51.3	6.0	48.0	57.1	5.0	47.4	54.8	5.0	45.9	49.2	5.0	42.7	54.0
Diminished value of intellectual property	52.4	7.0	43.8	55.1	5.0	44.7	56.2	6.0	46.0	54.7	6.0	44.4	53.8	4.0	55.5	54.4
Low staff morale	75.2	1.0	33.1	76.8	1.0	27.0	76.2	1.0	29.7	67.8	1.0	37.4	64.6	1.0	33.8	72.1
Quality and Safety Impacts																
Inability to maintain product/service standards	58.6	3.0	38.6	59.7	3.0	39.2	61.0	2.0	41.6	60.0	3.0	44.1	44.6	4.0	55.4	56.8
Compromised workers safety	59.3	2.0	44.6	63.5	2.0	43.5	61.9	1.0	40.9	60.6	2.0	44.1	52.3	3.0	48.2	59.5
Environmental damage	45.5	4.0	57.4	52.5	4.0	50.3	50.0	4.0	56.0	57.6	4.0	46.4	58.5	1.0	35.5	52.8
Exposure of employees to health challenges	60.7	1.0	47.0	64.6	1.0	45.4	56.7	3.0	44.7	67.5	1.0	42.6	55.4	2.0	39.4	61.0
Legal Impacts																
Failure to fulfil contracts	74.5	1.0	31.2	78.0	1.0	30.2	73.8	1.0	36.2	72.6	2.0	37.5	58.5	2.0	43.0	71.5

Determination of contract	60.0	5.0	51.9	66.4	4.0	39.2	61.9	3.0	45.6	57.4	5.0	48.2	60.0	1.0	19.2	61.1
Breach of warranties	66.2	3.0	38.8	66.7	3.0	41.1	58.1	4.0	42.2	59.0	4.0	44.3	50.8	4.0	38.1	60.1
Force majeure	70.3	2.0	39.2	71.9	2.0	33.8	62.4	2.0	45.5	75.0	1.0	37.1	55.4	3.0	33.5	67.0
Failure to comply with regulations	64.1	4.0	33.7	57.1	5.0	45.1	53.8	5.0	46.1	65.5	3.0	41.5	47.7	5.0	40.3	57.7
Litigation	53.8	6.0	48.8	52.8	6.0	54.4	49.0	6.0	57.1	53.6	6.0	48.7	44.6	6.0	37.3	50.8
Strategic Impacts																
Delay in new business initiatives	78.6	1.0	31.8	81.4	2.0	25.0	81.4	1.0	28.9	78.0	1.0	30.6	55.4	2.5	49.2	75.0
Decreased focus on new business opportunities	69.7	3.0	41.8	83.5	1.0	25.3	80.5	2.0	27.7	75.6	2.0	30.6	55.4	2.5	36.6	72.9
Reduced resources for innovation	74.5	2.0	32.0	78.6	3.0	25.6	73.3	3.0	36.5	72.7	3.0	32.1	50.8	4.0	34.6	70.0
Increased mechanisation	57.2	4.0	47.4	60.6	4.0	44.2	56.2	4.0	44.6	62.8	4.0	40.9	58.5	1.0	21.9	59.0
Financial Impacts																
Loss of profit	87.6	1.0	18.7	85.8	1.0	18.8	84.8	1.5	19.4	84.3	2.0	19.3	87.7	1.0	17.5	86.0
Delayed income	82.8	5.0	16.7	81.4	5.0	15.9	81.0	5.0	16.3	80.8	5.0	16.5	84.6	3.5	14.2	82.1
Contractual penalties	76.6	7.5	28.8	75.7	7.0	27.9	75.2	7.5	28.6	75.3	8.0	27.6	76.9	8.5	27.8	75.9
Regulatory fines	72.4	10.0	37.9	73.9	10.0	34.5	75.2	7.5	33.1	75.1	9.0	32.5	72.3	10.0	38.4	73.8
Increased expenses	76.6	7.5	25.2	75.7	8.0	25.6	75.2	7.5	26.1	75.7	7.0	25.6	78.5	7.0	19.4	76.3
Loss sales	55.9	12.0	30.8	55.7	12.0	33.1	55.2	12.0	33.7	56.5	12.0	33.9	53.8	12.0	23.4	55.4
Loss of income	76.6	7.5	28.8	75.4	9.0	31.3	75.2	7.5	31.0	73.7	10.0	32.0	81.5	6.0	25.5	76.5
Loss of market share	84.8	2.5	16.3	84.1	3.0	15.6	83.8	3.5	16.0	82.8	3.0	18.1	84.6	3.5	14.2	84.0
Decrease turnover	71.0	11.0	37.3	69.0	11.0	37.7	68.6	11.0	38.2	69.6	11.0	36.6	66.2	11.0	39.8	68.9
Delayed sales	84.8	2.5	26.5	84.6	2.0	26.3	83.8	3.5	27.5	82.4	4.0	28.6	86.2	2.0	25.8	84.4
Reduction in profit	84.8	2.5	16.3	83.8	4.0	18.4	84.8	1.5	16.3	84.4	1.0	17.6	84.6	3.5	14.2	84.5
Increase cost	79.3	6.0	19.6	78.0	6.0	19.7	77.1	6.0	20.3	77.7	6.0	20.1	76.9	8.5	20.8	77.8

Table 4: Kendall's Concordance Analysis of Agreement/Disagreement between respondents

Latent variables	OTHERS	QS	ENGR	BLDER	ARC	ΣR	(R - M)	Sum of squares of deviations
	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5			
Infrastructure Impacts								
Delayed construction process	1.00	1.00	1.00	3.00	3.00	9.00	-6.00	36
Restricted access to facilities/site due to lockdown	2.00	2.00	3.00	1.50	2.00	10.50	-4.50	20.25
Idleness of Machinery	4.00	4.00	4.00	4.00	4.00	20.00	5.00	25
Equipment damage	5.00	5.00	5.00	5.00	5.00	25.00	10.00	100
Disruption of business process	3.00	3.00	2.00	1.50	1.00	10.50	-4.50	20.25
Total						75.00		201.5
Mean (M)						15.00		
<i>Kendall's concordance coefficient (w)</i>								0.806
Chi-squared value = $x^2 = k (N - 2) W$								16.12
Resource Impacts								
Absenteeism	1.50	2.00	1.50	2.00	1.00	8.00	-7.00	49
Data loss	5.00	5.00	5.00	5.00	5.00	25.00	10.00	100
Supply chain interruption	1.50	1.00	1.50	1.00	2.00	7.00	-8.00	64
Data corruption	4.00	4.00	4.00	4.00	4.00	20.00	5.00	25
Employee turnover	3.00	3.00	3.00	3.00	3.00	15.00	0.00	0
Total						75.00		238
Mean (M)						15.00		
<i>Kendall's concordance coefficient (w)</i>								0.952
Chi-squared value = $x^2 = k (N - 2) W$								19.04
Intangible Impacts								
Decreased customer satisfaction	2.50	2.00	2.00	3.00	3.00	12.50	-7.50	56.25
Customer defection	2.50	3.00	3.50	2.00	2.00	13.00	-7.00	49
Loss of goodwill	7.00	4.00	3.50	4.00	6.00	24.50	4.50	20.25
Negative business reputation	6.00	7.00	7.00	7.00	5.00	32.00	12.00	144
Harm to brand	5.00	5.00	5.00	6.00	4.00	25.00	5.00	25
Diminished value of intellectual property	4.00	6.00	6.00	5.00	7.00	28.00	8.00	64
Low staff morale	1.00	1.00	1.00	1.00	1.00	5.00	-15.00	225
Total						140.00		583.5
Mean (M)						20.00		
<i>Kendall's concordance coefficient (w)</i>								0.834

Chi-squared value = $x^2 = k (N - 2 - 1) W$ **25.020**

Quality and Safety Impacts

Inability to maintain product/service standards	4.00	3.00	2.00	3.00	3.00	15.00	2.50	6.25
Compromised workers safety	3.00	2.00	1.00	2.00	2.00	10.00	-2.50	6.25
Environmental damage	1.00	4.00	4.00	4.00	4.00	17.00	4.50	20.25
Exposure of employees to health challenges	2.00	1.00	3.00	1.00	1.00	8.00	-4.50	20.25
Total						50.00		53
Mean (M)						12.50		
<i>Kendall's concordance coefficient (w)</i>								0.424

Chi-squared value = $x^2 = k (N - 2 - 1) W$ **6.36**

Legal Impacts

Failure to fulfil contracts	2.00	2.00	1.00	1.00	1.00	7.00	-10.50	110.25
Determination of contract	1.00	5.00	3.00	4.00	5.00	18.00	0.50	0.25
Breach of warranties	4.00	4.00	4.00	3.00	3.00	18.00	0.50	0.25
Force majeure	3.00	1.00	2.00	2.00	2.00	10.00	-7.50	56.25
Failure to comply with regulations	5.00	3.00	5.00	5.00	4.00	22.00	4.50	20.25
Litigation	6.00	6.00	6.00	6.00	6.00	30.00	12.50	156.25
Total						105.00		343.5
Mean (M)						17.50		
<i>Kendall's concordance coefficient (w)</i>								0.785

Chi-squared value = $x^2 = k (N - 2 - 1) W$ **19.625**

Strategic Impacts

Delay in new business initiatives	2.50	1.00	1.00	2.00	1.00	7.50	-5.00	25
Decreased focus on new business opportunities	2.50	2.00	2.00	1.00	3.00	10.50	-2.00	4
Reduced resources for innovation	4.00	3.00	3.00	3.00	2.00	15.00	2.50	6.25
Increased mechanisation	1.00	4.00	4.00	4.00	4.00	17.00	4.50	36
Total						50.00		71.25
Mean (M)						12.50		
<i>Kendall's concordance coefficient (w)</i>								0.572

Chi-squared value = $x^2 = k (N - 2 - 1) W$ **8.58**

Financial Impacts

Loss of profit	1.00	2.00	1.50	1.00	1.00	6.50	-26.00	676
Delayed income	3.50	5.00	5.00	5.00	5.00	23.50	-9.00	81
Contractual penalties	8.50	8.00	7.50	7.00	7.50	38.50	6.00	36
Regulatory fines	10.00	9.00	7.50	10.00	10.00	46.50	14.00	196
Increased expenses	7.00	7.00	7.50	8.00	7.50	37.00	4.50	20.25
Loss sales	12.00	12.00	12.00	12.00	12.00	60.00	27.50	756.25
Loss of income	6.00	10.00	7.50	9.00	7.50	40.00	7.50	56.25
Loss of market share	3.50	3.00	3.50	3.00	2.50	15.50	-17.00	289
Decrease turnover	11.00	11.00	11.00	11.00	11.00	55.00	22.50	506.25
Delayed sales	2.00	4.00	3.50	2.00	2.50	14.00	-18.50	342.25
Reduction in profit	3.50	1.00	1.50	4.00	2.50	12.50	-20.00	400
Increase cost	8.50	6.00	6.00	6.00	6.00	32.50	0.00	0
Total						390		3359.25
Mean (M)						32.5		
<i>Kendall's concordance coefficient (w)</i>								0.940
<i>Chi-squared value = $x^2 = k(N-1)W$</i>								51.70