



THE EFFECT OF COVID-19 PANDEMIC DISRUPTIONS ON SUPPLY CHAIN MANAGEMENT IN JOS, PLATEAU STATE

Patrick Onumah Agbo

Department of Marketing

Faculty of Management Sciences

University of Jos, Nigeria

onumahpatirck@gmail.com

Abstract

Covid-19 pandemic led to a number of challenges all over the world; health, economy, businesses and even distribution especially supply chain. Global supply chains have come under unprecedented pressure. Various geopolitical and economic factors, along with the continuing pandemic, mean this pressure has come to stay. Covid-19 has effect on the movement restrictions of workers, changes in demand of consumers, closure of food production facilities, restricted trade policies, and financial pressure in supply chains. This research is an attempt to investigate if Covid-19 pandemic has equally affected supply chain in Jos metropolis. Data was collected through primary source. The questionnaire used for this study was a five-point Likert-scale. A total of 400 questionnaires was administered. Only a total of 291 were returned giving a response rate of 73.0%. The data for this study was subjected to data cleaning tests (missing values, out of range and reliability) and certified for the final analysis. The reliability result is 0.788 indicating a reliable instrument. Regression analysis was applied and the result revealed that Covid 19 Pandemic disruptions on has significant effect on Supply Chain Management in Jos, Plateau State. It specifically showed that Covid-19 Pandemic disruptions affected the transportation, warehousing, retailing, movement, suppliers and distributions of goods/services. The result from this study indicated that there is a significant effect of Covid 19 Pandemic disruptions on transportation, warehousing, retailing, movement, suppliers and distributions of goods/services. This recommended among others that movement of people can only be made possible with lifting of restrictions. Government can only be bold to

lift such restrictions with enhanced medical advancement especially vaccine availability. Explore the possibility of making Covid-19 vaccines available to all citizens as this will contain the pandemic and enhance movements of all and sundry, hence this effort will boost the transportations and retailing amongst others so as to enhance distribution efforts

Keywords: Covid-19, Pandemic, supply chain, vaccine, distribution

INTRODUCTION

Supply Chain Management (SCM) has become part of the senior management agenda since the 1990s. Executives are becoming aware that the successful coordination, integration and management of key business processes across members of the supply chain will determine the ultimate success of the enterprise (Van der Vorst, 2000). According to Christopher (1998) businesses no longer compete as solely autonomous entities, but rather as supply chains. The increased interest in SCM has been spurred by developments in Information and Communication Technology (ICT) that enable the frequent exchange of huge amounts of information for coordination purposes. Consequently, there is a need and an opportunity for a joint approach of chain partners towards the establishment of more effective and efficient supply chains.

Supply chain is seen as a sequence of decision making and execution processes, and material, information and money flows that aim to meet final customer requirements and take place within and between different supply chain stages. The supply chain not only includes the manufacturer and its suppliers, but also, depending on the logistics flows, transporters, warehouses, retailers, and consumers themselves. It includes, but is not limited to, new product development, marketing, operations, distribution, finance, and customer service (Chopra & Meindl, 2001).

Supply chain management is therefore, the handling of the entire production flow of a good or service — starting from the raw components all the way to delivering the final product to the consumer. A company creates a network of suppliers (“links” in the chain) that move the product along from the suppliers of raw materials to those organizations that deal directly with users.

Effective supply chain management systems minimize cost, waste and time in the production cycle. The industry standard has become a just-in-time supply chain where retail sales automatically signal replenishment orders to manufacturers. Retail shelves can then be restocked almost as quickly as product is sold. One way to further improve on this process is to analyze the data from supply chain partners to see where further improvements can be made.

Supply Chain Management involves various approaches to effectively integrate suppliers, manufacturers, and distributors in performing the functions of the procurement of materials, the transformation of these materials into intermediate and finished products, and the distribution of these products to customers in the right quantities, to the right locations, and at the right time in order to meet the required service level with minimal cost. Supply chain management also involves managing a connected series of activities that is concerned with planning, coordinating, and controlling the movement of materials, of parts, and of finished goods from the supplier to the customer. For this to occur, material, financial, and information flows are managed as decisions are made at strategic, tactical, and operational levels throughout the supply chain (Chandra & Grabis, 2007). The rise of businesses like amazon has helped revolutionize supply chains, particularly in a customer context.

Products being "always available" and following day delivery options are now considered standard. Moreover, since the outset of the Covid-19 pandemic, global supply chains have come under unprecedented pressure. Various geopolitical and economic factors, along with the continuing pandemic, means this pressure has come to stay for the fore seeable future. Developing an effective supply chain management system can help mitigate the risks and pressure on the entire supply chain network.

According to Kelvin (2021) the Covid-19 pandemic led to a number of challenges all over the world; health, economy, businesses and even distribution especially supply chain. For instance, manufacturers have to contend with the following supply chain issues: lack of global resilience as they continue to break down in the face of multi-country interruptions; inability to meet stakeholders' expectations for sustainability; a lack of flexibility, which tampers with the industry's demand to meet customer demands for personalization and customization; high costs of operations; talent gaps across the supply chain, creating dependency on the human workforce and, over-reliance on legacy technologies.

According to Otache, (2020), Covid-19 has done incalculable damages to social, religious, political and economic effects on the economy. Specifically, the effects of the Covid - 19 in Nigeria includes jobs losses, a sharp drop in income of the informal workers and the poor, food insecurity, business and school closures, a steep decline in oil revenues and economic uncertainties.

Darley (2021) stated that this past year has been a train wreck for global logistics. There is just no other way to put it, every piece of the supply chain puzzle has been hit by the Pandemic: labor, raw materials, and shipping. It does not matter if you are shipping via water, air, road, or rail, you name it, and there is always been a delay, a backup, a shortage. This is impacting our industry but also every aspect of our lives outside of work. According to Aday and

Aday (2020), the common point of a pandemics is their serious negative effects on the global economy. It has been seen that Covid-19 has an impact on the whole process from the field to the consumer. Covid-19 resulted in the movement restrictions of workers, changes in demand of consumers, closure of food production facilities, restricted trade policies ,and financial pressure in supply chains. This research is an attempt to investigate if Covid-19 pandemic has equally affected supply chain in Jos metropolis.

Research Questions

- a. To what extent do Covid 19 pandemic disruptions affect transportation of goods/services in Jos?
- b. How do Covid 19 pandemic disruptions affect warehousing of goods/services in Jos
- c. Does Covid 19 pandemic disruptions affect retailing of goods/services in Jos?
- d. To what extent do Covid 19 pandemic disruptions affect people movements in Jos?
- e. How do Covid 19 pandemic disruptions affect suppliers of raw materials in Jos?
- f. What is the effect of Covid 19 pandemic disruptions on distributions of goods/services in Jos

Research Objectives

- a. To identify if Covid 19 pandemic disruptions affect transportation of goods/ services in Jos
- b. To investigate if Covid 19 pandemic disruptions affect warehousing of goods/service
- c. To examine the effect of Covid 19 pandemic disruptions on retailing of goods/services in Jos
- d. To evaluate the effect of Covid 19 pandemic disruptions on people in Jos
- e. To analyse the effect of Covid 19 pandemic disruptions on suppliers of raw materials in Jos
- f. To examine the effect of Covid 19 pandemic disruptions on distribution of goods/services

Research Hypotheses

- a. Covid 19 pandemic disruptions has no significant effect on transportation of goods/service
- b. Covid 19 pandemic disruptions has no significant effect on warehousing of goods/services
- c. Covid 19 pandemic disruptions has no significant effect on retailing of goods/services
- d. Covid 19 pandemic disruptions has no significant effect on people in Jos
- e. Covid 19 pandemic disruptions has no significant effect on suppliers of raw materials in Jos
- f. Covid 19 pandemic disruptions has no significant effect on distribution of goods/services in Jos

LITERATURE REVIEW

Conceptual Review

Definition of supply chain

Supply chain management, or SCM, is the process of managing the manufacturing and movement of goods from your suppliers to your customers. If you have a supply chain manager or a team overseeing your supply chain processes, it is their job to ensure your operations are optimal from start to finish.

A supply chain is the alignment of firms that bring products or services to market. (Lambert, Stock, & Ellram 1998), A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves. (Chopra & Meindl 2003). A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers (Ganeshan & Harrison 1995), The systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole (Mentzer, DeWitt, Keebler, Min, Nix, Smith, & Zacharia 2001), Supply chain management is the coordination of production, inventory, location, and transportation among the participants in a supply chain to achieve the best mix of responsiveness and efficiency for the market being served (Michael, 2011).

There is a basic pattern to the practice of supply chain management. Each supply chain has its own unique set of market demands and operating challenges and yet the issues remain essentially the same in every case. According to Hugos (2011), companies in any supply chain must make decisions individually and collectively regarding their actions in five areas:

1. *Production*—what products does the market want? How much of which products should be produced and by when? This activity includes the creation of master production schedules that take into account plant capacities, workload balancing, quality control, and equipment maintenance.
2. *Inventory*—what inventory should be stocked at each stage in a supply chain? How much inventory should be held as raw materials, semi-finished, or finished goods? The primary purpose of inventory is to act as a buffer against uncertainty in the supply chain. However, holding inventory can be expensive, so what are the optimal inventory levels and reorder points?

3. *Location*—where should facilities for production and inventory storage be located? Where are the most cost efficient locations for production and for storage of inventory? Should existing facilities be used or new ones built? Once these decisions are made they determine the possible paths available for product to flow through for delivery to the final consumer.
4. *Transportation*—how should inventory be moved from one supply chain location to another? Air-freight and truck delivery are generally fast and reliable but they are expensive. Shipping by sea or rail is much less expensive but usually involves longer transit times and more uncertainty. This uncertainty must be compensated for by stocking higher levels of inventory. When is it better to use which mode of transportation?
5. *Information*—how much data should be collected and how much information should be shared? Timely and accurate information holds the promise of better coordination and better decision making. When there is good information, people can make effective decisions about what to produce and how much, about where to locate inventory, and how best to transport it.

SCM is a diverse business process that involves overseeing several functions and factors, including:

1. How your suppliers procure raw materials
2. You and your suppliers' warehousing capacity
3. Wider reaching logistics management to ensure suppliers meet lead times and fulfil just-in-time supply chains
4. Forecasting and supply chain planning based on both historical and real-time data to meet customer demand
5. Inventory management
6. The entire customer order process, from processing to dispatch and delivery

One of the most significant challenges in organizing and overseeing your supply chain activities is that each element can influence the other. For example, an issue with a manufacturing process at your suppliers' assembly plants can cause disruptions, bottlenecks, and shortages further down the supply chain and affect your customers. As such, you need a robust management process to maintain those relationships.

Concept of Covid-19

Corona virus disease 2019 is an infectious disease that is popularly known as Covid-19 (Moore, 2020; Ohia, Bakarey, & Ahmad, 2020). The disease is caused by severe acute

respiratory syndrome Coronavirus 2; otherwise known as SARS- CoV-2 (Adnan, Khan, Kazmi, Bashir, & Siddique, 2020; Harapan, Itoh, Yufika, Winardi, Keam, & Mudatsir, 2020; Ohia et al., 2020; Poudel, Poudel, Gautam, Phuyal, & Tiwari, 2020). Its symptoms include fever, cough, shortness of breath, sore throat, runny nose, sneezing, among others (Harapan, Itoh, Yufika, Winardi, Keam, & Mudatsir, 2020; Ohia et al., 2020; Unhale, Ansar, Sanap, Thakhre, & Wadatkar, 2020). It is a highly communicable disease (Adnan et al., 2020) and its mode of transmission is from person-to-person (Unhale et al., 2020). Transmission occurs among close contacts mostly through respiratory droplets released when the infected person sneezes or coughs (Harapan, Itoh, Yufika, Winardi, Keam, & Te, , 2020). While measures such as lockdown, social distancing, self-isolation or self-quarantine and observation of simple hygiene habits such as regular washing of hands, wearing of facemasks and covering the mouth with a handkerchief when coughing or sneezing have been recommended to contain the spread of the disease among people (Ohia et al., 2020) it is important to note that there is no any known cure or vaccine for the Covid-19 pandemic presently (Adnan et al., 2020). Nevertheless, different countries and international organizations like WHO are making efforts to develop vaccines or drugs for the Covid-19 disease.

Generally, the Covid-19 pandemic has social, religious, political and economic effects on the economy. Some people might argue that it is too early to discuss the effects of the pandemic. However, the pertinent question is, when likely will the pandemic be over? According to experts, the Covid-19 pandemic may not go away anytime soon or completely (Brito, 2020). Besides, outside the developed vaccines, there is no permanent cure for the pandemic yet. Therefore, it is important to discuss the effects now so that measures or actions can be taken to cushion the effects of the pandemic. The following are the identified effects of the Covid-19 pandemic in Nigeria.

The entry of COVID-19 in Nigeria has adversely affected businesses, households and the economy. The slowdown of retail and trade activities, as most finished goods flow through the sector to final consumers, has also affected the manufacturing sector, especially for non-essential goods.

Manufacturers and distributors have found it difficult to replace or replenish their inventory and equipment or machinery, due to supply-chain disruptions globally. Importers and exporters have also found it challenging to deliver or bring in goods across most international borders, as the seaports, which is the main route for international exchange of goods, have been impacted by restrictions and the slowdown of industrial activities of major trading partners.

The International Monetary Fund (IMF) estimated that the Nigerian economy would shrink by 5.4% by the end of 2020, a loss of about N6 trillion to the economy. Based on this

prediction, PwC estimates that trade activities in the country could experience a loss of at least N900 billion to COVID-19.

Global supply-chains have always been vulnerable to shocks that occur in the major exporting countries. Some of these shocks include trade wars, pandemics such as COVID-19, domestic and political instability. This vulnerability is especially because of factors that could impede the seamless flow of goods and services from these exporting countries to their major import trading partners.

COVID-19 has disrupted global activities across all economic sectors and industries. The disruptions are largely due to the lockdown measures adopted and implemented by countries globally as a health strategy to mitigate the impact of the pandemic's spread on the human population. Production halts, movement restrictions of people and goods, border closures, logistical constraints, as well as the slowdown of trade and business activities are fall-outs of the COVID-19 lockdown measures.

The implementation of the lockdown, the transportation sector, upon which global supply-chain activities are dependent, has remained partially closed. Statistics show that no less than 90 countries had imposed lockdowns since March 2020 and at the peak in April 2020, about 3.9 billion people were under lockdown. Consequently, there were constraints to the smooth functioning of the global supply-chains, and this has had an adverse impact on global business and industrial activities.

Theoretical Review

Protection Motivation Theory

This study is hinged on the Protection Motivation Theory, which was developed by Rogers (1975) for the health promotion and disease prevention sector, and describes how individuals are motivated to react in a protective way towards a perceived threat. Protection motivation theory has four key elements: "threat appraisal", followed by "coping appraisal", which comprises "response efficacy" - the belief that certain processes will mitigate the threat. Response efficacy concerns beliefs that adopting a particular behavioral response will be effective in reducing the diseases' threat, (Van der Velde & Van der Pligt, 1991) and self-efficacy is the belief that one can successfully perform the coping response. It is an individual's idea of their own ability to implement the required action to mitigate the treat. Threat appraisal assesses the severity of the situation and examines how serious the source of the threat and factors that increases or decrease likelihood of maladaptive behaviors, (Plotnikoff & Trinh., 2010) while coping appraisal is how one responds to the situation. The coping appraisal consist of perceived response efficacy, or an individual's expectation that carrying out the

recommended action will remove the threat, and perceived self-efficacy, or the belief in one's ability to execute the recommendation courses of action successfully,(Roger, 1975; Rogers, 1983).

Protection Motivation Theory can be applied to "any threat for which there is an effective recommended response that can be carried out by the individual" (Floyd, Prentice-Dunn & Rogers, 2000). Maddux and Rogers (1989) found self-efficacy to be "the most powerful predictor of behavioral intentions that precedes actual behavior, (Beatson & McLennan, 2011). A robust self-efficacy is more likely to (1) lead to the takings of protective action in an appropriate timeframe, (ii) influence the degree of receptivity to information and (iii) promote the likelihood of taking effective remedial action, (Paton, 2013; Floyd, et al ., 2000). Aside from personal physical health research, the application of protection motivation theory has extended to other areas. Beatson concluded by advocating the need to "stimulate targeted research which will lead to advances in commu bushfire safety practice, and to find out which of the many constructs making up the theories are more important as determinants of bushfire-safety-enhancing behaviors". In a natural hazards context, Protection Motivation Theory was used by Mulilis and Lippa (1990) in a study of a highly realistic scenario (earthquake); they concluded that further research would help define PMT's application. Thus protection motivation theory is adopted in this research to explore disease containment measures adopted by banks to secure customer engagement during the Covid-19 era. Banks protect her customers and staff through application of several measures which include social distancing, nose masking, hand sanitizing and temperature screening amongst others.

Empirical Review

Butu, Bruma, Tanasa, Rodino, Vasiliu, Dobos, and Butu (2020) investigated the impact of COVID -19 Crisis upon the consumer buying behavior of fresh vegetables directly from local producers . The study relies on the interpretation of answers received from the quarantined area (N=257) to a questionnaire applied online nationwide. The data collected was processed using Excel software (version 365, Their findings confirmed the hypothesis that the Covid -19 pandemic induced significant changes in consumer purchasing behavior of fresh vegetables. Consequently, consumers are more determined to place online orders of fresh vegetables directly delivered by producers.

Otache (2020) studied the effect of the Covid -19 pandemic on the Nigeria's Economy and possible coping strategies. This study undertook a review of the related literature regarding the Covid 19 pandemic and how Nigerians and the Nigerian government can cope with the effects of the pandemic. The reviews reveals that the effects of the Covid 19 pandemic in

Nigeria include jobs losses, a sharp drop in income of the informal workers and the poor, food insecurity, business and school closures, a steep decline in oil revenues, economic uncertainties and death toll. The coronavirus pandemic has claimed many lives across the country. The study relied on the figures released by the NCDC as at 23rd May, 2020 shows that 221 deaths were recorded since the outbreak of the disease, and the number of active cases as at 23rd May, 2020 stands at 5,123 as at the time of review.

Sue (2020) reported on a survey study embarked on by the Institute of Supply Management on COVID-19 and Supply Chains: Increasing Impacts, Decreasing Revenues. The aim of the survey was to assess the impact of the coronavirus pandemic on global supply chains. The sampling frame was made up of ISM members and customers, as well as supply management professionals unaffiliated with ISM. The sample was randomly drawn, with 559 usable responses in the final data set. The findings of the research amongst others are: The pandemic is having much greater and more far-reaching impacts than originally expected. Nearly about 95 percent respondents report that their supply chains will be or already have been impacted by COVID-19's spread. However, many do not expect impacts to be long-lasting; 67 percent say they expect them to become minimal or non-existent during the fourth quarter of 2020. The outbreak affects companies' supply chains, as well as their operations and how people work. More than half of respondents say telework/ remote work is one of the top three COVID-19 impacts to their organization. Financial impacts will be extensive. Half report that they expect their companies' annual revenue targets to be down, on average, by 22 percent, and a third expect capital expenditure spending.

Aday and Aday (2020) carried out descriptive study on impact of COVID-19 on the food supply chain. The economic chaos due to the pandemic threatens economic access and physical availability of food. Disruptions and possible problems in marketing, logistics, and trade systems may restrict access to food in some places and times; therefore, hunger and malnutrition problems may appear (FAO, 2020g). Report from World Food Program showed that the number of people facing extreme hunger can increase to 265 million in 2020 as a result of COVID-19 (WFP, 2020a).

Another study by Headey, Heidkamp, Osendarp, & Reuel, (2020) indicated that COVID-19 leads to 14.3% increase in the prevalence of wasting among children who are younger than 5 years old due to malnutrition or interruption of health and social protection in low and middle-income countries. During a pandemic, continuing the flow of the supply in agriculture and food sector, which is one of the most important sectors together with health, is vital to prevent the food crisis and reducing the negative impact on the global economy. Although no major problems have been observed in the food supply chains so far it remains unclear in the face of

an uncertain future. As a result, each country has to realize the severity of the situation and sometimes should tighten or loosen the measures according to the spread of the pandemic. The supply chain also should be flexible enough to respond to the challenges in the food supply chain.

Guandelina, Serena, Marriarosaria, Lorenzo, Greta, Andrea, & Edoardo, (2020) carried out a study on measuring Italian citizens' engagement in the first wave of the COVID-19 pandemic containment measures. The study adopts descriptive design using the questionnaire for data collection from 1000 respondents. To investigate the relationship between variables, ANOVA analysis, logistic regression and contingency tables with Pearson's chi-squared analysis were carried out. The study shows that low levels of health engagement are associated with a change in the usual purchase behavior.

METHODOLOGY

Research Design

The study adopted the survey research design to establish the relationship on the effect of Covid 19 Pandemic disruptions on Supply Chain Management in Jos, Plateau State.

Study Population

The population of the study comprises the total number of people from Jos South and Jos North LGA who are consumers, businessmen and women and students in Plateau state, who have felt the effect of the Covid-19 pandemic. In determining this population, the researcher relied on the information from total number of people from Jos South and Jos North LGA.

Sample size

The sample size of this study was determined by using the prescribed formula of Yamane (1967) based on 95% confidence level. The formula is given as:

$$n = \frac{N}{1+N(a^2)} \quad (\text{Equation 1})$$

Where

n = Sample size required

N = Population (number of registered SMEs)

α = Level of significance (0.05) i.e. allowable error

The population of total number of people from Jos South and Jos North LGA is 1,236,016 the sample size is determined as follows:

$$\text{Thus } n = \frac{1,236,016}{1+1,236,016(0.05^2)}$$

$$= 399.9$$

∴ n = 400 (rounded).

Sampling Technique

This study made use of both non-probability and probability sampling techniques. Under the non-probability sampling technique, the study used the purposive sampling technique in defining the population and distribution of questionnaire because of the emphasis on consumer, business men and women and students in Jos North and South of Plateau state that have been affect by the Covid-19 Pandemic. With regards to the probability sampling technique, the simple random sampling technique was used in state that anyone in both LGA is qualified.

Method of Data Collection and Analysis

The instrument for data collection in this study was questionnaire using a cross sectional data from primary sources. The nature of the questionnaire was used for this study was a five-point Likert-scale, ranging from “strongly agree” to “strongly disagree” (5 = ‘Strongly Agree’, 4 = ‘Agree’, 3 = ‘Undecided’, 2 = ‘Disagree’ and 1 = ‘Strongly Disagree’) to reflect the agreement of the respondents on the issues raised. The questionnaire was self-designed by the author. Tests of validity and reliability were conducted to confirm the suitability of the instrument. The data collected were analysed with SPSS version 23.0, by applying simple linear regression.

Model Specification

$$\text{TGS}_i = \beta_0 + \beta_1 \text{COV}_i + u_i \quad \dots\dots\dots (1)$$

$$\text{WGS}_i = \beta_0 + \beta_1 \text{COV}_i + u_i \quad \dots\dots\dots (2)$$

$$\text{RGS}_i = \beta_0 + \beta_1 \text{COV}_i + u_i \quad \dots\dots\dots (3)$$

$$\text{PCM}_i = \beta_0 + \beta_1 \text{COV}_i + u_i \quad \dots\dots\dots (4)$$

$$\text{SRM}_i = \beta_0 + \beta_1 \text{COV}_i + u_i \quad \dots\dots\dots (5)$$

$$\text{DGS}_i = \beta_0 + \beta_1 \text{COV}_i + u_i \quad \dots\dots\dots (6)$$

Where: TGS, WGS, RGS, PCM, SRM, DGS and COV are; transportation of goods/services, warehousing of goods/services, retailing of goods/services, people movements, suppliers of raw materials, distributions of goods/services and Covid 19 pandemic disruptions respectively.

β_0, β_1 and u_i are the constant term, slope and error term

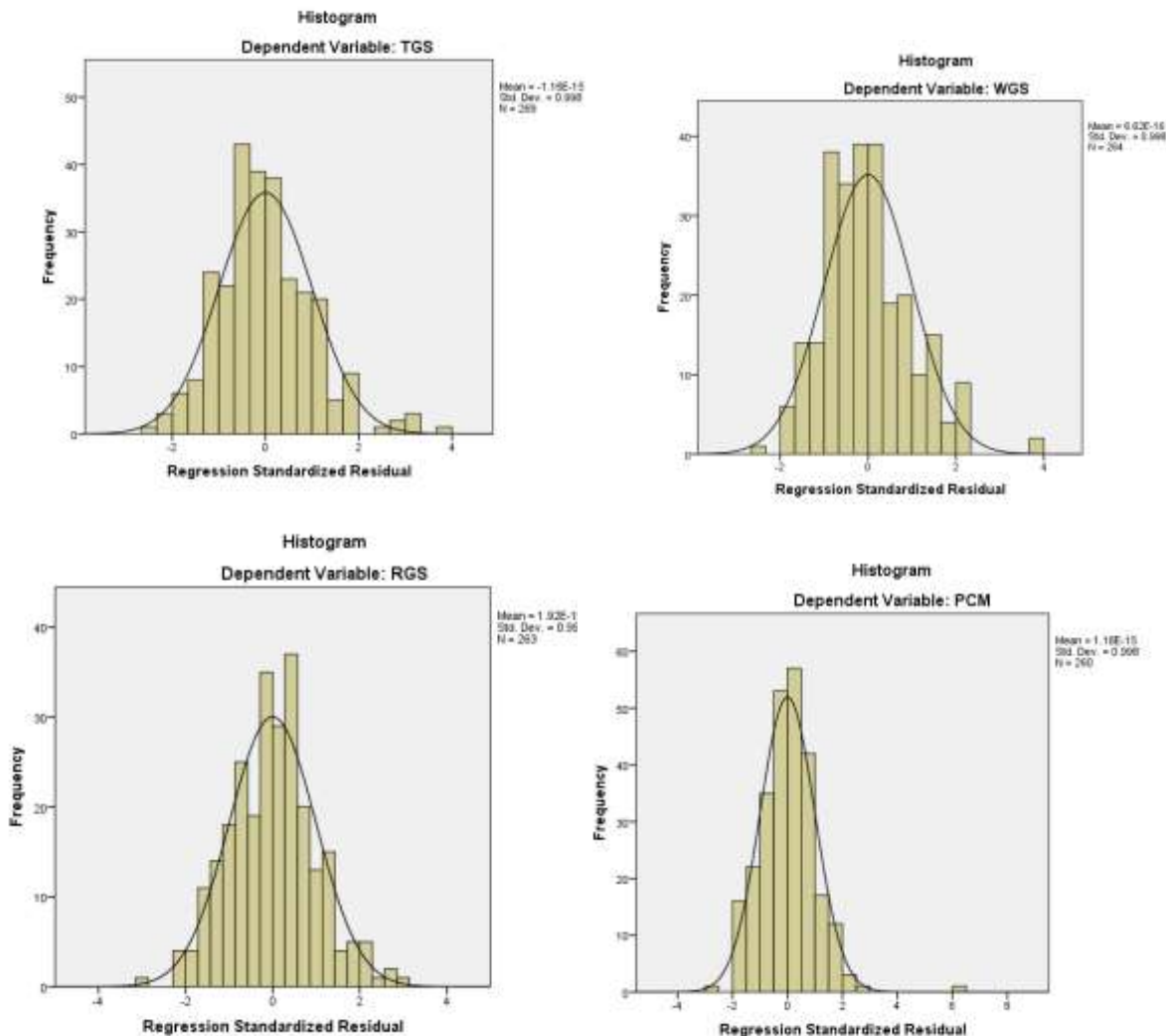
Expectation - $\beta_1 < 0$

Assumptions - Linearity in parameters, Normality, Homoskedasticity, and No autocorrelation

RESULTS AND DISCUSSION

A total of 400 questionnaires was administered. Only a total of 291 were returned giving a response rate of 73.0%. The data for this study was subjected to data cleaning tests (missing values, out of range and reliability) and certified for the final analysis. The reliability result is 0.788 indicating a reliable instrument.

The descriptive analysis revealed 162 male (56.3%) responded to the survey questionnaire, while 126 female (43.8%) responded to the questionnaire. Also, 171 (59.6%) of the respondents are singles, while 114 (39.7%) are married. From this study, 90 (33.1%) are between the ages of 26 and 33 years, 87 (32.0%) are between 18-25 years, 68 (25.0%) are between 34 and 43 years while 27 (9.9%) are 44 and above years.



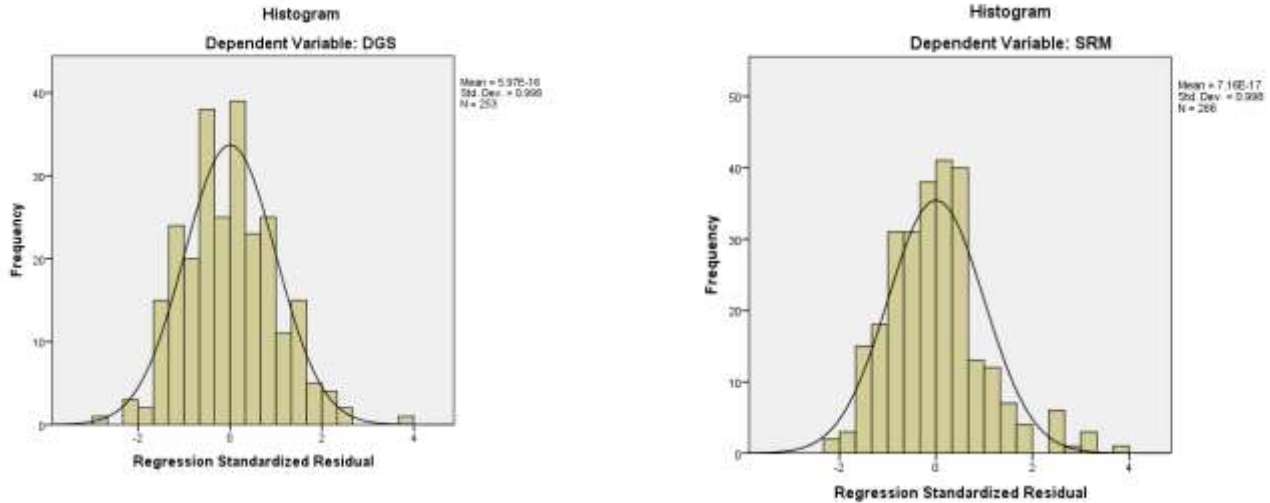


Figure 1: (a, b, c, d, e, and f): Normality test using SPSS 23

Normality test was conducted to ensure that the data used for analysis are suitable for parametric analysis. When the data is non-normal, a non-parametric analysis will be required. Normality test was conducted using the histogram. The study conducted, a normality test for all the dependent variables. Figure 1 shows the histogram for a test of normality. The histogram provides a useful graphical representation of the data. From the diagrams, the histograms show that the data follows a normal distribution given that the bell-shaped curve is symmetric.

Table 1: Regression estimates (SPSS output 26.0)

	<i>Model</i> 1		<i>Model</i> 2		<i>Model</i> 3		<i>Model</i> 4		<i>Model</i> 5		<i>Model</i> 6	
	Coeff	P-value	Coeff	P-value	Coeff	P-value	Coeff	P-value	Coeff	P-value	Coeff	P-value
Constant	1.441	0.000**	1.373	0.000**	1.628	0.000**	1.642	0.000**	1.863	0.000**	1.474	0.000**
COV	0.396	0.000**	0.459	0.000**	0.253	0.001**	0.205	0.003**	0.179	0.032**	0.239	0.001**
r²	0.105		0.095		0.043		0.032		0.018		0.045	
N	268		263		262		265		252		259	
F*	31.31	0.000**	27.48	0.000**	11.63	0.001**	8.690	0.003**	4.624	0.032**	12.23	0.001**
Durbin-Watson	1.5		1.765		1.813		1.885		1.669		1.675	

Dependent Variables TGS, WGS, RGS, PCM, SRM, DGS

** significant at 5%

Hypothesis One

H₀: Covid 19 pandemic disruptions has no significant effect on transportation of goods/service

From the result of the P-value of Covid-19 is 0.000. The decision rule which states that when the p-value is less than the level of significant 0.05, the null hypothesis should be rejected while the alternate hypothesis is accepted. Therefore, Covid 19 pandemic disruptions has a significant effect on transportation of goods/service.

Hypothesis Two

H₀: Covid 19 pandemic disruptions has no significant effect on warehousing of goods/services.

The result of the P-value for Covid-19 is 0.000. Hence, Covid 19 pandemic disruptions has a significant effect on warehousing of goods/services.

Hypothesis Three

H₀: Covid 19 pandemic disruptions has no significant effect on retailing of goods/services

The P-value for Covid-19 is 0.001. Thus, Covid 19 pandemic disruptions has a significant effect on retailing of goods/services.

Hypothesis Four

H₀: Covid 19 pandemic disruptions has no significant effect on people in Jos

From the result in Table 1, for model number 4 indicated that the P-value for Covid-19 is 0.003 Therefore, we failed to accept the null hypothesis and accept the alternate hypothesis which stated Covid 19 pandemic disruptions has significant effect on people in Jos.

Hypothesis Five

H₀: Covid 19 pandemic disruptions has no significant effect on suppliers of raw materials in Jos

The P-value for Covid-19 from table 1, model 5 is 0.032. As a result, Covid 19 pandemic disruptions has no significant effect on suppliers of raw materials in Jos.

Hypothesis Six

H₀: Covid 19 pandemic disruptions has no significant effect on distribution of goods/services in Jos

From the result in Table 1, for model number 6 indicated that the P-value for Covid-19 is 0.001 Therefore, we failed to accept the null hypothesis and accept the alternate hypothesis which stated Covid 19 pandemic disruptions has significant effect on people in Jos.

Discussion of Findings

The main objective of this study was to evaluate the effect of Covid 19 Pandemic disruptions on Supply Chain Management in Jos, Plateau State. It specifically sought to examine effect of Covid 19 Pandemic disruptions on transportation, warehousing, retailing, movement, suppliers and distributions of goods/services. The result from this study indicated that there is a significant effect of Covid 19 Pandemic disruptions on transportation, warehousing, retailing, movement, suppliers and distributions of goods/services. The result was found to be consistent with the works of Butu, Bruma, Tanasa, Rodino, Vasiliu, Dobos, and Butu (2020), who found that Covid -19 pandemic induced significant changes in consumer purchasing behavior of fresh vegetables. Also with Otache (2020) and Sue (2020) who affirmed that Covid 19 pandemic in Nigeria include jobs losses, a sharp drop in income of the informal workers and the poor, food insecurity, business and school closures, a steep decline in oil revenues, economic uncertainties and death toll.

According to Aday and Aday (2020) the pandemic created economic chaos and threatened economic access and physical availability of food. Disruptions and possible problems in marketing, logistics, and trade systems may restrict access to food in some places and times; therefore, hunger and malnutrition problems may appear. The implication to this, is that businesses, households and the economy are affected adversely. It will slowdown of retail and trade activities, as most finished goods flow through the sector to final consumers, has also affected the manufacturing sector, especially for non-essential goods. Again, Manufacturers and distributors will find it difficult to replace or replenish their inventory and equipment or machinery, due to supply-chain disruptions globally. Importers and exporters have also found it challenging to deliver or bring in goods across most international borders, as the seaports, which is the main route for international exchange of goods, have been impacted by restrictions and the slowdown of industrial activities of major trading partners. The result agreed to the Protection Motivation Theory, which suggested that a robust self-efficacy is more likely to (1) lead to the takings of protective action in an appropriate timeframe, (ii) influence the degree of receptivity to information and (iii) promote the likelihood of taking effective remedial action.

CONCLUDING REMARKS

Conclusion

The main objective of this study was to evaluate the effect of Covid 19 Pandemic disruptions on Supply Chain Management in Jos, Plateau State. The study specifically sought to examine effect of Covid 19 Pandemic disruptions on transportation, warehousing,

retailing, movement, suppliers and distributions of goods/services. The result from this study indicated that there is a significant effect of Covid 19 Pandemic disruptions on transportation, warehousing, retailing, movement, suppliers and distributions of goods/services.

Recommendations

1. Containment strategy should be adopted by relevant stakeholders so as not to derail the transport system but rather boost transportation of goods/services during the Covid 19 period and beyond. Managers and management should be proactive and boost road, rail and air transport system overtime.
2. Emphasis on building and stretching the warehouse system should be encouraged by organisations. Again, management should encourage geographical expansion of the warehousing system as this is necessary as a result of the pandemic.
3. The retail networks should be strengthened and empowered by management for ease of operations to make access to goods and services available.
4. Movement of people can only be made possible with lifting of restrictions. Government can only be bold to lift such restrictions with enhanced medical advancement especially vaccine availability. So this study recommends that Government should explore the possibility of making Covid-19 vaccines available to all citizens as this will contain the pandemic and enhance movements of all and sundry.
5. Organisations should further explore and enhance raw materials supply routes in order to keep suppliers energized during this pandemic and thereafter. Management can do so by motivating financially suppliers of raw materials to enable them remain focused and dedicated.
6. Individual entrepreneurs through Government supports should intensify its efforts with respect to warehousing, transportations and retailing amongst others so as to enhance its distribution efforts. It is only when the aforementioned chains are well oiled and activated that any organisation can attain optimum distribution.

Scope for Further studies

This study recommended that a further study should be carried out on effect of covid-19 and supply chain management in the agricultural sector so as to understand its effect on food security in Nigeria.

REFERENCES

- Adams R, (2022). Big Business Games the Supply Chain. <https://prospect.org/economy/big-business-games-the-supply-chain/>
- Adnan, M., Khan, S., Kazmi, A., Bashir, N., & Siddique, R. (2020). COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *Journal of Advanced Research*, 24, 91–98. Available at: <https://doi.org/10.1016/j.jare.2020.03.005>
- Butu, A., Bruma, I. S., Tanasa, L., Rodino, S., Vasiliu, C. D., Dobos, S., & Butu, M. (2020) Impact of COVID-19 crisis upon the consumer buying behavior of fresh vegetables
- Chandra, C. and Grabis, J. (2007). Supply chain configuration. New York: Springer.
- Chopra, S., & Meindl, P. (2001). *Supply Chain Management*, Prentice Hall
- Chopra, S., & Meindl, P. (2003), *Supply Chain, Second Edition*, Upper Saddle River, NJ: Prentice-Hall, Inc.
- Christopher, M., & Towill, D.R. (2000). Supply chain migration from lean and functional to agile and customized. *Supply Chain Management*, 4(5), 206-213.
- Darley A, (2021). The Global Supply Chain Crisis. <https://blog.manningtoncommercial.com/the-global-supply-chain-crisis>
- Department of Management Sciences and Information Systems, 303 Beam Business Building, Penn State University, University Park, Pennsylvania.
- Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A metaanalysis of research on protection motivation theory. *Journal of Applied Social Psychology*, 30, 407-429.
- Francise E, (2020). Essential Strategies for Improving Supply Chain Efficiency. https://www.scmr.com/article/essential_strategies_for_improving_supply_chain_efficiency
- Ganeshan, R., & Harrison, T.P. (1995). An Introduction to Supply Chain Management,”
- Guandelina, G., Serena B., Marriarosaria S., Lorenzo P., Greta C., Andrea B. & Edoardo L. (2020). Measuring Italian citizens' engagement in the first wave of the Covid -19 pandemic containment measures: A cross-sectional study. *PLoS One*. 11, 15(9): 238613.
- Headey, D., Heidkamp, R., Osendarp, S., & Reuel, M. (2020). Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality. *Lancet*. 396(10250), 519–521. doi: 10.1016/S0140-6736(20)31647-0
- IBM, (2018). Supply Chain Management. <http://www.ibm.com/topics/supply-chain-management>
- Lambert, D.M., James, R. S., & Ellram, L. M. (1998). *Fundamentals of Logistics Management*, Boston, MA: Irwin/McGraw-Hill.
- Lee K, (2021). Importance of supply chain management paint and coating market <https://www.pcmag.com/articles/109227-lessons-learned-from-Covid-19-about-the-importance-of-supply-chain-management>
- Markosyan V, (2021). 10 Best Practices to Optimize Supply Chain Management. <https://www.google.com/search?channel=nrow5&client=firefox-bd&q=10+best+practices+to+optimize+supply+chain+management>
- Mentzer, J.T., William, D., James, S. K., Soonhong, M., Nix, N.W., Smith, C.D., & Zach, G. Z., (2001). Defining supply chain management, *Journal of Business Logistics*, 22(2), 1-12
- Michael. H. H. (2011), Essential of supply chain Management third edition.
- Mohamed, A. (2021). The Impact of COVID-19 Pandemic Somaliland Economy. *Open Journal of Social Sciences*, 9, 54-64.
- O'Byrne R, (2021). Pursuing a Career in Logistics and Supply Chain. <https://www.supplychainsecrets.com/pursing-a-career-in-logistics-and-supply-chain/>
- Ohia, C., Bakarey, A. S., & Ahmad, T. (2020). COVID-19 and Nigeria: Putting the realities in context. *International Journal of Infectious Diseases*, 95, 279–281. Available at: <https://doi.org/10.1016/j.ijid.2020.04.062>.
- Otache, I. (2020). The effect of Covid-19 pandemic in the nigeria's economy and possible *Public Health. Int.j.envIRON.res.public health* 2020, 17,5485; doi: 10.3390/ijeroh
- Plotnikoff, R. C., & Trinh, L. (2010). Protection Motivation Theory: Is this a worthwhile theory for physical activity promotion. *Exercise and Sport Sciences Reviews*, 38(2), 91-98.

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of psychology*, 91(1), 93-114.

Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: a revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *social psychophysiology*. New York: Guilford Press.

Simchi-Levi, D., P. Kaminski, and E. Simchi-Levi (2000) *Designing and managing the supply chain –concepts, strategies and case studies*, McGraw-Hill

The importance of supply chain management and its key benefits (2021). <https://www.seraitrade.com/blog/the-importance-of-supply-chain-management-and-its-key-benefits>

Unhale, S. S., Ansar, Q. B., Sanap, S., Thakhre, S., & Wadatkar, S. (2020). A review on corona virus COVID-19. *World Journal of Pharmaceutical and Life Sciences*, 6(4), 109–115. Available at: <https://doi.org/10.14744/ejmo.2020.51418>.

Van der Velde, F. W., & Van der Pligt, J. (1991). AIDS-related health behavior: Coping, protection motivation, and previous behavior. *Journal of Behavioral Medicine*, 14, 429-451.