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Contents

Volume: 1

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Issue: 1

1. **Co-Culture of Diatoms and Microalgae for improvement in aquaculture ecosystem with development of resources for green energy production- A sustainable model for self-reliable economics and environment** 3-8

Authors

Debasish Sahoo

Virendra Vaishnav

Tanushree Chatterjee

Navita Gupta

Md. Imran Ahmad

2. **Air borne transmission is the main causes of Covid-19 strain -2: A novel framework** 9-14

Author

Arunesh Dutt

Mahesh Dutt Tiwari

Pushpesh Dutt Tiwari

Shipra

Ashish Khare

Narendra Kumar Shukla

3. **Changing role of labour in service economy during Covid -19 pandemic: A case study of business process outsourcing industry in India** 15-22

Author

Avdhesh Kumar

4. **Microeconomic consequences of COVID-19: Swapping the bench for entrepreneur's business** 23-32

Author

Jannatul Mawa Meridha

5. **A conceptual review of microeconomic impact of Covid 19 pandemic in Nigeria** 33-50

Author

Ibeka Paschal Onyekachi



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Research Article

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Co-Culture of diatoms and microalgae for improvement in aquaculture ecosystem with development of resources for green energy production- A sustainable model for self-reliable economics and environment

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ABSTRACT

Background study: During the phases of Pandemic at times of COVID-19, many people have lost their livelihood. During this period, many people opt for aquaculture in their native places and became self-reliable as well as created employment opportunity for other native and unemployed youths. Scientific farming using various technologies can increase the productivity, engage with environmental friendly terms, lower dependency on chemical inputs and more important produce sources of green energy substrates. **Prospect:** Development and co-culture of diatoms grown along with the aquaculture help in efficient re-cycling of the nutrients thereby maintaining natural nutrient cycle for growing population of aquaculture fishes, increase DO level, decrease the level of toxic contaminants, act as a natural predator for different parasites and pests, promotes food chain cycle as they can be primary sources of feed for larva and many more. This will also help in reduction in dependency on chemical or synthetic entities leading to lesser generation of pollutant and increasing the healthiness of the aquaculture thereby maintaining natural ecosystem. This also helps restoration of the down town ecosystem stabilizing both commercial and natural ecosystem providing sustainable and suitable agriculture practice. Culture of algae biomass in artificial/natural ponds can efficiently act as CO₂ Bio absorber along with their potential to be converted into Biofuels, Food additives, Pharmaceutical and cosmetics products. Better understanding, training, utilization can help in increased economic potential of farmers and associates in these agriculture models.

Keywords: diatoms, microalgae, sustainable agriculture practice, environment

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INTRODUCTION

Chaetoceros sp. can be used as aquaculture feed, feed additives, natural colouring agents, antioxidants etc. (Pulz and Gross 2004). They are the natural food for the larval stages of many commercial aquaculture organisms such as fish, shrimps, crustaceans and molluscs (Arnaud 2000; Spolaore et al. 2005; Saavedra and Voltolina 2006). They can be used for the enrichment of zooplankton that are the natural feed for the aquaculture organisms (Coutteau 1996; Khatoon et al. 2009; Khatoon et al. 2013; Banerjee et al. 2011). High nutrition such as protein content, carbohydrates content, fatty acid content, vitamins & mineral content, and antioxidants are present in these diatoms (Natrah et al. 2007; Goh et al. 2010). Therefore, simple and large scale production of microalgae in aquaculture is an important aspect to support larviculture (Lai et al. 2012).

The major challenge is the continuous production of high quality microalgae that require specific environmental conditions such as high salt concentration and high pH. So for sustainable production of microalgae environmental factors play a pivotal role. (Veron et al. 1996; Cirik and Goksan 2008), Optimization of growth conditions such as medium composition and culture attributes and conditions are very important for the economic viability. (Lai et al. 2012).

Although there are many diatom species but species important for the commercial aquaculture are limited and the species of diatoms that are commonly used in aquaculture include Chaetoceros, Isochrysis, Chlorella, Skeletonema, Nitzschia, Thalassiosira, and Dunaliella (Pulz & Gross 2004). Amongst all the

diatoms, Chaetoceros are used widely as natural feed system to commercial aquaculture (Becker 2004) because of their high nutritional value, high rate of production (Vega et al. 2010), especially for the rearing and maintenance of shrimp larvae, bivalve mollusc larvae and postlarvae, prawn larvae and brine shrimps (Coutteau 1996) that are extensively used in commercial aquaculture. Chaetoceros plays a vital role in shrimp aquaculture lies on the fact that all nutritional requirements of penaeid larvae are met by the Chaetoceros (Rodriguez et al. 2000).

However, experimentation in regards to the optimization of growth conditions and nutrient profile with respect to optimizing of growth conditions and nutrient composition of growth medium (Martinus and Caetano 2010).

MATERIALS AND METHODOLOGY

Procurement of Diatoms: The marine diatom Chaetoceros sp. was procured from the Central Marine Fisheries Research Institute, Visakhapatnam, India.

Stock culture: The stock cultures was maintained in F/2 medium (pH 6.00) (Guillard 1975). This is one of the widely used growth media that is enriched with seawater for growth of marine algae, especially diatoms. In order to prepare, 950 mL of filtered natural seawater was taken and the following components (Table 1, Table 2, Table 3) were added. The final volume was made with 1 litre with filtered natural seawater and was sterilized by autoclave at 121°C, 15 psi for 15 minutes.



Table 1: f/2 Stock Solution Chemical Composition

Components	Stock Solution	Quantity	Molar Concentration in Final Medium
NaNO ₃	75 g/L dH ₂ O	1 mL	8.82 x10 ⁻⁴ M
NaH ₂ PO ₄ .H ₂ O	5 g/L dH ₂ O	1 mL	3.62 x 10 ⁻⁵ M
Na ₂ CO ₃	30 g/L dH ₂ O	1 mL	1.06 x 10 ⁻⁴ M
Trace Metal Solution	See Table 2	1 mL	---
Vitamin Solution	See Table 3	0.5 mL	---

Table 2: Trace Metal Composition

Components	Stock Solution	Quantity	Molar Concentration in Final Medium
FeCl ₂ .6(H ₂ O)	---	3.15 g	1.17 x10 ⁻⁵ M
Na ₂ (EDTA) ₂ (H ₂ O)	---	4.36 g	1.17 x10 ⁻⁵ M
CuSO ₄ .5(H ₂ O)	9.8 g/L dH ₂ O	1 mL	3.93x10 ⁻⁸ M
Na ₂ MoO ₄ .2(H ₂ O)	6.3 g/L dH ₂ O	1 mL	2.60 x10 ⁻⁸ M
ZnSO ₄ .7(H ₂ O)	22.0 g/L dH ₂ O	1 mL	7.65 x10 ⁻⁸ M
CoCl ₂ .6(H ₂ O)	10.0 g/L dH ₂ O	1 mL	4.20 x10 ⁻⁸ M
MnCl ₂ .4(H ₂ O)	180.0 g/L dH ₂ O	1 mL	9.10 x10 ⁻⁷ M

Table 3: Vitamin Composition

Components	Stock Solution	Quantity	Molar Concentration in Final Medium
Thiamine HCl (Vitamin B1)	---	200 mg	2.96 x10 ⁻⁷ M
Biotin (Vitamin H)	0.1 g/L dH ₂ O	10 mL	2.05 x10 ⁻⁹ M
Cyanocobalamin (Vitamin B12)	1 g/L dH ₂ O	1 mL	3.69 x10 ⁻¹⁰ M

Biomass estimation: The biomass was calculated as factor of dry weight from the standard calibration curve with Abs_{750nm} vs. dry biomass. For establishment of standard calibration curve, 10mL of algal culture was taken and the absorbance at 750nm (Abs_{750nm}) that ranges from 0.1 to 0.5. Then they were filtered through pre-combusted (100°C, 4 hours) and preweighed glass-microfibre filters (pore size-1.2µm) and rinsed with ammonium formate. The filters were then dried at 100°C for 4 hours and cooled

in a dessicator till a constant weight was obtained. The dried biomass so obtained was recorded by difference in weight of dried filter paper (after and before filtration) by filtered volume (Banerjee et al. 2011).

To determine test dry biomass, 2ml of 10 days old culture was taken and A_{750nm} was calculated by plotting the absorbance in the slope equation to get unknown dry biomass.



Nutritional assessment: The proximate composition for nutrition information were analysed in terms of total carbohydrate (%age dry weight), total protein (%age dry weight) and total lipid content (%age dry weight). Culture of 10-day old were taken for analysis. The total protein was determined by Lowry's method (Lowry et al. 1951), total carbohydrate by phenol sulphuric acid method (Dubois et al. 1956) and total lipid by Bligh and Dyer method (Bligh and Dyer 1959).

Optimization of medium composition and culture conditions: The experimental design was based on the optimization of different attributes.

$$\text{Dry mass (mg ml}^{-1}\text{)}(x) = \frac{\text{Abs 750nm (y)} + 0.0378}{0.0009}$$

(R² = 0.995; p<0.001)Equation 1

The biomass production of 10 days old culture of *C. muelleri* under the non-optimized conditions in F/2 medium found to be 0.42±0.01 mg mL⁻¹.

Nutritional assessment: The experimental values of nutritional attributes of *C. muelleri* for Total protein content (13.02 ± 1.13%), Total lipid content (19.58 ± 1.2%) and Total carbohydrate content (0.97 ± 0.03%) were predicted by standard methodology.

Optimization of process attributes: The different nutrient attributes were optimized for parametres such as nitrate (0.19 mg L⁻¹), phosphate (7.5 mg L⁻¹), silicate (30 mg L⁻¹) along with physico-chemical attributes such as temperature (31°C), pH (6.5), salinity index (35 mg L⁻¹) and agitation speed (150 r.p.m)._1,

CONCLUSION

Chaetoceros (grown along with the aquaculture help in efficient re cycling of the nutrients and thereby maintaining natural nutrient cycle for growing population of aquaculture fishes, increase DO level,

Process attributes- physicochemical parameters taken for study were Temperature (20°C-30°C), pH (6-9), salinity index (15gm L⁻¹- 40 gm L⁻¹) and agitation speed (100 rpm- 200 rpm). Nutritional attributes such as nitrate (7.5 gm L⁻¹-150 gm L⁻¹), phosphate (0.5 gm L⁻¹-10.0 gm L⁻¹) and silicates (3.0 gm L⁻¹- 60.0 gm L⁻¹).

RESULTS

Biomass estimation: From the standard curve Abs_{750nm} vs. dry biomass; the unknown dry mass can be calculated from the regression curve equation (Equation 1)

decrease the level of toxic contaminants, act as a natural predator for different parasites and pests, promotes food chain cycle as they can be primary sources of feed for larva and many more. This will also help in reduction in dependency on chemical or synthetic entities leading to lesser generation of pollutant and increasing the healthiness of the aquaculture thereby maintaining natural ecosystem This in turn also helps restoration of the down town ecosystem stabilizing both commercial and natural ecosystem. More important, these models can be also being helpful for farmers those who can produce and supply to these large aquaculture firms results in rural livelihood self-sustained model of employment and economy This indeed will also reduce dependency of those anthropological entities on environment.

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Research Article

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Air borne transmission is the main causes of Covid-19 strain -2: A novel framework

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ABSTRACT

In this paper here we summarize that the India started air borne transmission disease against the covid-19 pandemic. We address current information about the COVID-19 strain - 2 in this analysis. The goal of this work is to comparative analysis of covid-19 and COVID – 19 strain – 2, advise for vaccine. We also proposed framework for Covid-19 Strain – 2.

Keywords: COVID–19 diseases, vaccination and novel frame work for COVID-19 for strain -2

INTRODUCTION

Airborne disease can spread when people with certain infections cough, sneeze, or talk, spewing nasal and throat secretions into the air. Some viruses or bacteria take flight and hang in the air or land on other people or surfaces (WHO 2020a). When you breathe in airborne pathogenic organisms, they take up residence inside you. You can also pick up germs when you

touch a surface that harbours them, and then touch your own eyes, nose, or mouth. A rapidly spreading corona virus, SARS-Cov-2, and the disease it causes, COVID-19, has been responsible for millions of infections and hundreds of thousands of deaths globally in 2021. While the corona virus that causes COVID-19 is not generally considered to be airborne, there may be some situations in which the virus can act like an airborne disease. These include certain





clinical settings in which people are receiving intensive medical treatment. In usual situations, SARS-Cov-2 is spread through respiratory droplets after a person coughs or sneezes, but these droplets are larger than what is considered airborne (WHO 2014). Airborne diseases happen all around the world and affect virtually everyone (WHO 2020b). They spread easily in close quarters, such as schools and nursing homes. Large outbreaks tend to occur under crowded conditions and in places where hygiene and sanitation systems are poor. Incidence is lower in countries where vaccines are widely available and affordable. No studies have found viable virus in air samples (Faridi et al 2020; Cheng et al 2020).

How to prevent spreading an airborne transmission disease: Although it's impossible to completely avoid airborne transmission, but there are some things we can do to lower our chances of getting sick as:

- Avoid close contact with people who have active symptoms of disease (Somsen et al 2020).
- Stay home when you're sick. Don't let vulnerable people come in close contact with you.
- If you must be around others, wear a face mask to prevent spreading or breathing in germs.
- Cover your mouth when you cough or sneeze. Use a tissue or your elbow to cut down on the possibility of transmitting germs on your hands.

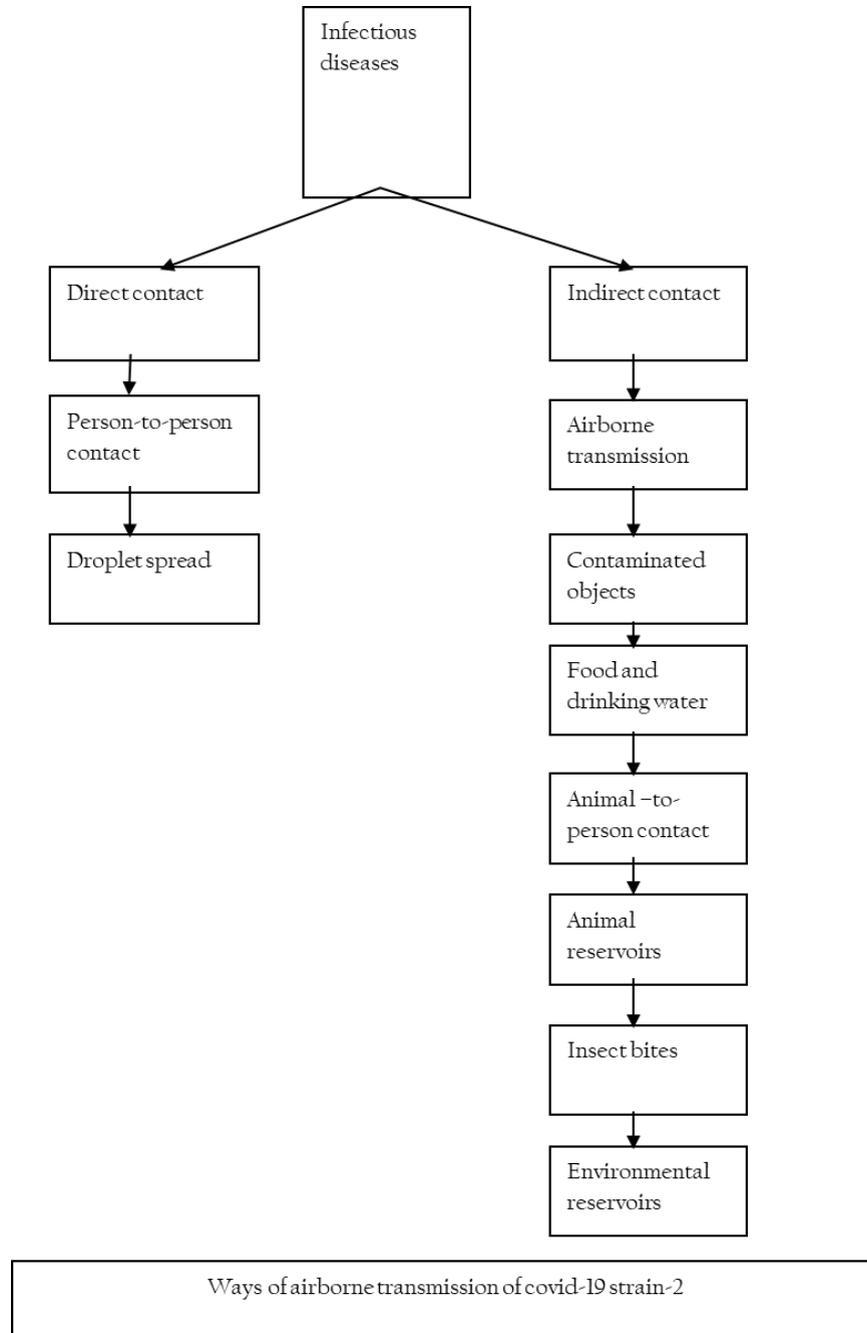
- Wash your hands thoroughly (at least 20 seconds) and often, especially after sneezing or coughing.
- Avoid touching your face or other people with unwashed hands.

LITERATURE REVIEW

One experimental study quantified the amount of droplets of various sizes that remain airborne during normal speech (Stadnytskyi et al 2020). Another recent experimental model found that healthy individuals can produce aerosols through coughing and talking (Somsen et al 2020). Some studies conducted in health care settings where symptomatic COVID-19 patients were cared for, but where aerosol generating procedures were not performed, reported the presence of SARS-CoV-2 RNA in air samples (Faridi et al 2020; Cheng et al 2020). The detection of RNA using reverse transcription polymerase chain reaction (RT-PCR) - based assays is not necessarily indicative of replication- and infection-competent (viable) virus that could be transmissible and capable of causing infection (Bullard et al 2020). Recent clinical reports of health workers exposed to COVID-19 index cases, not in the presence of aerosol-generating procedures, found no nosocomial transmission when contact and droplet precautions were appropriately used, including the wearing of medical masks as a component of the personal protective equipment (PPE) (Durante-Mangoni et al 2020; Wong et al 2020).



Block diagram and Mode of Air borne transmission of Covid-19 Strain-2:





How to prevent airborne transmission of covid-19 strain-2:

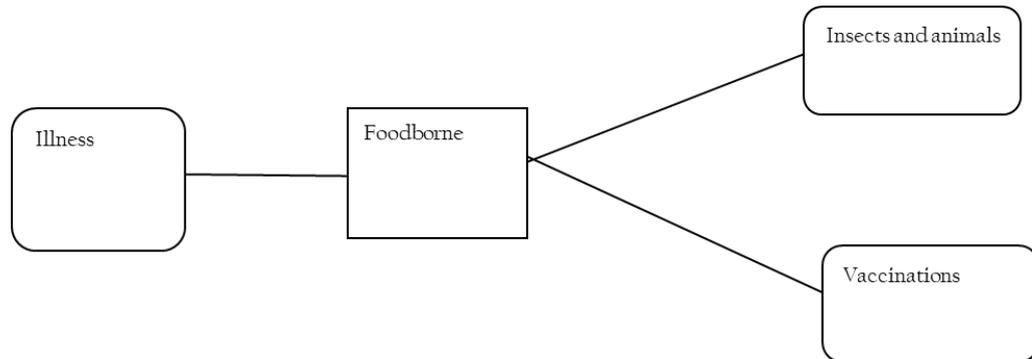


Figure 2: Prevention of airborne transmission of covid-19 strain-2

COMPARATIVE ANALYSIS

Parameters	Covid-19	Covid-19 Strain-2 (airborne disease)
Symptoms	Fever, cough, fatigue, shortness of breathe	Fever, fatigue, loss of appetite, congestion, coughing
Topology	Network topology	M protein topology
Size	It has round or elliptic and often pleomorphic form, and a diameter of approximately 60–140 nm	>5micro metre as droplets and <5 micro metre as aerosols or droplet nuclei
Incubation period	Average 5-6 days, but can be as long as 14 days	Same as COVID - 19
Nature	Spiky / Crowns	Spike / Crowns
Range	large	large
RT-PCR	Detect accurate result	Failed (not detect accurate result)
Origin	Bats	Host specific



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Article

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Changing role of labour in service economy during Covid-19 pandemic: A case study of business process outsourcing industry in India

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ABSTRACT

The outbreak of the Covid -19 pandemic led to revolutionary transitions in the different sectors of the service economy. Those service sectors which were technology-driven were operating efficiently. The Business Processing (BPOs) industry has shown tremendous growth in terms of investment and providing jobs to the youth in India. The potential of this industry has shown a promising path for economic growth, especially for developing nations. Though outsourcing is not a new practice that countries are doing pandemic has changed its meaning. The modern economy has shown that employing technology for efficient management through surveillance over labour as a normal phenomenon. Ironically, these changes have been projected positively as the symbol of progress in the service industry. Consequently, most of the jobs in different sectors are under the process of automation. The present economy is inclined towards work that is either technology-driven or technology-mediated. The pandemic has indicated that technology-driven works were less vulnerable in comparison with nontechnology driven works in terms of the security of jobs. Though being seen as favourable for stabilizing the service economy, it resulted unfavourably for the employees as they deal with the changes in the workload, workplace and work time. The pandemic has redefined the meaning of work, labour and workplace in a neo-liberal economy. Therefore, this paper will be analyzing the meaning of labour, technology and the workplace in the era of the Covid-19 pandemic. This study adopts an ethnographic method. The interviews have been conducted by telephone with the employees working in different parts of Delhi, India.

Keywords: labour, technology, Covid-19 pandemic, control, outsourcing, BPOs

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INTRODUCTION

Indeed, technology has changed the human life and their livelihood. Now the concern is whether it has impacted all sections of society equally? Among those changes who has gained and who has at the losing position? So, it is necessary to look at this with have and have not. Though, this debate is in the public and academic world for a long time. From the Marxist perspectives earlier, the oppressor can be seen and questioned whereas in contemporary situations the visuals are not that extant contrastingly clear. The initial stage undoubtedly provided a different form of jobs to the large sections of society. Later on, a gloomy state turns up for the labour class probably in all developed states. Carl Benedikt Frey (2019) argues that it was the twentieth century that has raised the demands of skilled workers and consequently it displaced unskilled workers gradually from the market. In other words, hand jobs were replaced with machines. Economists and historians Mckenna (2006) and Frey (2019) also think that "routinised" "taylorised" and the principle of scientific management has further paved the way "control form of the economy". The present paper would be further analysing claims which twentieth-century economists have made as mentioned in some of them mentioned above.

The covid-19 pandemic has been proven catastrophe for the entire world. Even, economically strong states were failed to provide adequate medical facilities to their citizens. Due to longer lockdown in the respective countries, economies have performed badly especially in developing nations. Somehow certain kinds of professions have survived due to their certain characteristics of jobs such as running by technology and the internet. The present paper is trying to understanding the relationship between technology, labour, and workspace. For that, the study has an interview with people who are working in call centres in different parts of the Delhi region. The interviews were conducted telephonically due to present

lockdown restrictions in January-August 2021. Most of them, coming from lower-middle-class families background and their parents are either engaged in either small businesses or manual labour. Most of the workers fall in the age group between 18-26 and most of them are holding Bachelor Degree in Humanities. Every worker is having on average nine months of experience with different companies within the same industry. The interview has been conducted in the period January-August 2021. But certain findings of this research cannot be ignored from the emerging labour point of view. Broadly, present research focusing on Work, Workload and Workplace (3W). The research findings will be elaborated in narrative forms in different sections of the research.

MYSTICAL LIVES OF BPO WORKERS IN INDIA

Understanding Impact of Pandemic on Work, Workplace and the Economy

Pandemic has impacted everyone differently. Most of the IT and IT-driven works are run by computers and the internet. For that, we can find sophisticated and complex systems in corporate offices. Corporate offices or workplaces are not just meant for work but it is also a place where people exchange ideas and thoughts. Those thoughts and ideas can either be negative or positive. The workplaces are also a place for identity and selfhood formation. Pandemic has created a condition where physical interaction and dialogue are proscribed to maintain physical distancing. Physical distancing is moving away from humans from social life which has become a 'new normal. However, social distancing is not a new phenomenon. It was used differently by different states back then in history (Mishra & Mazumdar, 2020; Connley, 2020). There is an inevitable and strong relationship between work and identity. In this formation, the workplace has an immense role play in it. Kimberly D. Elsbach (2003) has elaborated



the idea of the workplace identity of the workers. She argues it makes ones distinguish and unique due to a person's workplace identity (job profile). There is a power relation between the being and workplace identity. She argues it is the workplace identity that makes to recognise their work and existence of worker. Therefore, the recognition of someone's work is the recognition of the being also which stimulate good and hard work. As a result, it is good for the firm and workers also. The pandemic has ruined this form of social recognition. On the positive side of covid-19 is that the larger section of unemployed people has got the job in the BPO sector too. But there is the contrary side of it also which respondents have experienced differently. One of the respondents Trishy, a young girl in her early twenties says she was working in a company named Cars24. Which deals with buying and selling. She says "corona ke time bahut log berojgaar ho gaye the jiske karan vo log call centre me apply kar rahe the. Aur eska fayda company ne khoob uthaya. Company ne customers ke hisab se paise diye naki salary di. Ek customer par 100 rupay. Iske karan logon se apni salary ka aadha hissa bhi nahi kamaya corona ke samay me" (Because of corona virus so many people have lost their jobs. And those people were applying for jobs in the call centres. Company (Cars24) has taken advantage of it. They paid according to the dealings as per customer for 100 rupees in a day, not by salary based. Instead of giving salary, they pay according to the dealings with the customer and each customer 100 rupees. Following this, people were not even able to earn half of their actual salary during Covid-19).

The BPO industry has faced a bleak future at the beginning of Covid-19. Some revolutionary changes took place within the industry. According to Deloitte private multinational professional services company survey conducted in 2020 finds that 32 per cent of clients expressed a shortage of outsourcing even after the pandemic going to end. It would be a result of new normal and the steps which most of the companies have taken such as strict rules and regulations and security of data. Despite the grim status of the world

economy, website Ameyo.com has projected sluggish growth by \$76.90 billion in the year 2020-24. Some of the news agency and online websites has shown some sectors were able to not just survive but earned profit handsomely. According to Ps-bpo.com in the energy, communication and technology sectors have been profited. Pandemic has predicted that certain kinds of jobs can be survived due to their adaptability to quick change and its digital nature. Therefore, it can be said that the BPO sector has survived even in odd times. Similarly, most of the respondents have said they were able to get the job due to the industry having digital characteristics. For instance, Purak, a 23 old man got a job in the international company called Concentrix for the Tata Sky process. He said "mai apne aapko bahut lucky manta hu ki mujhe job mil gai corona ke samay me. Jabki mujhe nahi lag raha tha ki mai interview clear kar paunga. Mera sab kuch online hi hua tha selection letter, training, sab kuch" (I feel lucky myself that I have got the job despite corona time. I was thinking that I would not be able to clear the interview. Everything was done online such as selection letter, training and everything else).

However, whatever the prediction and concerns have been projected by the government or industrialists were limited to the welfare of capital and business growth. Concerns such as labour and their welfare were being sidelined. These matters of concern would be addressed in the further part of the paper.

Whether pandemic is the only reason which is making work and identity relations weak and vulnerable? The answer is true no. There are other factors as well. Among those factors, automation is considered to be the biggest cause that makes the futuristic picture more vulnerable for the labour class especially those jobs which are repetitive, monotonous, and nonjudgmental. Patrick Beer & Regina H. Mulder (2020) have interpreted what sociologists have to say about technology. The sociologists have argued that technology impacts every aspect of labour such as freedom, power, and



privacy which decides employee identity at work and the degree of alienation they experience at their work.

In the present, “the phenomenon of speed” got normalized in almost all aspects of human beings. As Beer & Mulder (2020) have argued that technology minimizes the possibility of mistakes and increases the degree of competitiveness among organizations. The feeling of competitiveness in the IT-driven world is further indoctrinated by these organizations amongst the workers. The work structure itself makes sure that people cannot exchange their views with each other. Everyone is limited to either their immediate senior or computer or app algorithms. Their issues are not the issues of the organization rather limited to his/her immediate senior. The mechanism itself created a process where a worker cannot realize its alienation from the work and organization discriminatory system. Rather, the firm/organization creates the feeling or gesture that (S)he does not get success due to their lack of efforts and organization does not involve in it anyhow. And, the neo-liberal economy has done this successfully. On this point, most of the respondents have said a quite similar point of view. Every respondent iterated the same thing: “if you work harder then you will be successful.” Does it raise other questions as to why they did not get success despite their hard work? Are they aware of the algorithm which works for their activities control? Most of them said computers or certain app control them but whether that mechanism can be manipulatable? On that point, most of them were not sure. But collectively mostly respondents were agreeing that their targets cannot be achieved always despite their best efforts. Respondent has said every second or third day of the week their team leader (TL) keep shouting by saying that “guys we are not achieving targets”. David Peetz (2019) has argued that the more complex algorithm means difficult to analyze the process of discrimination. Further, he argues organization or individual is using AI technology for making themselves stronger. Rather, rights or welfare of the employee.

The larger section of economists has argued that the nature of work of today's jobs is itself monotonous and boring. Since every day is the same day for them same work same people and same approach. Therefore, the larger sections leave their jobs after the completion of one job within a year or six months. The attrition rate always remains high. One of the respondents was an Ex-employee of Concentrix BPO in his mid-twenties have said by doing the same kind of job people usually gets bored. There is no personal growth. They provide meagre salaries to the workers. He was not able to maintain his expenses within that salary, hence left the job.” In the present economy, the phenomenon of the collectivity of the workers is gradually losing its essence. Since, most white-collar workers think that there is no need for labour Unions in the call centre industry (Sandhu, 2006; Ramesh, 2004). Most of the respondents have said they did not find any kind of labour union in the BPO premises. If someone is having any problem then the person can approach the team leader (TL) or manager.

David Peetz (2019) has pointed out four changes at workplaces; demographic changes; technological changes; globalization and climate change. In the demographic changes, he highlights gender gap, age discrimination and occupational changes in organizations. He argues that due to age people are being denied jobs, whereas women labour is utilized at minimal rates. In the technological development, he argues new jobs are not for all due to their ' skills and necessary location for it.' As a result of it, a different form of unemployment is taking place which he calls “structural unemployment.” On globalization, he talked about the global value chain within that the phenomenon of outsourcing has been discussed. Developed nations have exploited the labour of developing nations at cheap rates. Climate and its resources are the victims of capitalism argued Peetz. Apart from these findings, he has also talked about ‘technology of management.’ which is highly used in app-based works. Now, the physical management of the firms is getting replaced by these algorithm-based management technologies.



Workplace identity is not a static phenomenon, rather it is formed and shaped in a context. M.B Thatcher & Xiumei Zhu (2006) argue about workplace identities and how does it form. They argue that information technology has changed the social context of work and its relation to identity. The differences between traditional work and telecommunicating work arrangements have been elaborated by three dimensions; location of work; time spent in telecommuting; and the voluntary nature of the telecommunicating decisions. Location of work is a compilation of the social and physical environment of work activity. In the time spent telecommuting, Thatcher & Zhu (2006) argue that those who work at home constantly gets affected by ways such as job security, the strength of group identification and the outcome of telecommuting. In the third section, scholars argue that for identity-making and organization growth feedback and coordination is necessary. Therefore, scholars have argued that identity is a constant and continuous process.

Though, people are talking online. But online dialogue has certain limitations. Thatcher & Zhu (2006) argue that technology-mediated communication has some suspicion occurred. The worker activity always remains suspicious by the workplace management. Therefore, the relationship of the organization with its workers becomes vulnerable. Some of the recent news reports have said companies are worried about data security. Since people are working from their homes and management cannot see their entire work process. However, respondents have said they have enjoyed working without management control. Monu, a 24 old working in a Multi-industry Company said:

“It is nice to be working by own. However, system control is there. But at least we can get rid of the team leader's (TL) unnecessary gibberish. Despite working from home, they try to control us in different ways. For instance, they make a call and behaves like customers ask some technical questions and if a

worker fails to satisfy them then financial repercussion has to face. Further, he argues that the company thinks that workers are not serious about their job. But the harsh truth is home is not meant to be the workplace. Even my best effort cannot make the home a workplace since my locality falls in a semi-slum area. The company cares about its business only not us. Workers just face negative repercussions”.

Thatcher and Zhu (2006) argue that home does not have an office like vibes. Home-based work means a person has to prepare for his/her identity enactment. Since, his/her life physically, socially and psychologically got influenced. Verification of one's selfhood by others opinions is necessary. The opinion of others is very important in the process of identity-making. It gives satisfaction and recognition. If it is not taking place then the person gets depressed. In other words, identity formation is dependent upon someone else opinion and thoughts.

Though, people have got jobs during the pandemic. But in the name of the revival of the economy, companies have got the authority to manage the workforce according to their own will. According to a recent report of the Government of India (2021), the BPO industry has been promoted by further liberalization. The government has recognized 'work from home' is without consideration of labour concerns. Ironically, labour concern is in the hands of organizations. In their entire report, the government did not use even the word labour. Now the issue is who is going to address the labour concern of the BPO industry in India?

FUTURE OF LABOUR IN BPO INDUSTRY

Concerns and Possibilities

The impact of a pandemic would not cease even after the situation gets normalized. It is inevitable that in the name of new normal exceptional efforts would



become part of organizational routines. As we can see, during pandemic universities have taken online teaching as a short time activity? But, later on, universities have converted short time activity into full-time activity. As a result of that, most of the universities have introduced full-time courses through online mode. The state of exceptions is becoming norms now (Agamben, 2005). These states of exception driven rules & regulations would be harsh for the labour section in the BPO industry.

Pandemic has promoted skilled and digitalized forms of works in the economy. According to the cnbc.com website has predicted that post-pandemic, our work culture going to change. The website has predicted work culture and work going to change in thirteen ways. Among those ways, two changes deserve to discuss thoroughly; that is automation would be increased and the demands for minimization of the digital divide. Broadly, these two concerns not just explaining the future of labour industry but predicting the minimizing the possibility of labour union in the BPO industry as well.

Three things Digitalization, skill-based work and changing pattern of the workplace is an inevitable outcome of Covid-19. However, automation and skill-based labour have been part of the contemporary debate in the political economy. Now the question is whether digitalization and skill-based work is the solitary answer for the problems. Whether acquiring a specific form of knowledge and skills is enough for the long run? Whether specific technology and skill work everywhere in the same way? These are questions that make the process of digitalization and automation drastic for the future of labour in a different industry. Since most of the countries and certain families cannot be part of the process. Colin Crouch, David Finegold, and Mari Sako (2004) have argued that skills are often individualized firm demand. And even if the standard of education increased in specific places situation might not be changed altogether. The reason is given by the scholars is if the education standard is going to up

then inevitably increase the labour standard in the industry as well. On the other side, jobs would not be created at the same speed. Consequently, unemployment will be amongst the highly educated section in the society for example U.S, Italy, Spain and France during the 1970s. Further, they argued a particular form of work and industry gets popularity in that situation. Ironically, people get attracted by the sector and they learned the skill of that particular sector. After a certain point of time that particular profession and industry get overpopulated. As a result, wages in that industry get lower.

Fortunately, BPO sector employees responded that in the BPO sector basic knowledge of computers and good command of the language is enough. But some of the respondents have said now the companies are asking whether the candidate has good typing speed in the WhatsApp Messenger application? However, there is only one respondent Furkan talks about this specific skill while working for a Google LLC American multinational technology company at Gurugram, Haryana. It might be a new trend in International companies. Since nine out of ten respondents are working for domestic BPOs. It means certain mechanisms of BPOs are going through automation.

The biggest concern of this industry is the scope of labour unions is even further sidelined. It means labour concerns would be dwindling even further. Most of the respondents have said they have not found a labour union in their workplaces. All the respondents have said they can only approach their immediate seniors such as team leader (TL), and manager. However, three respondents who are working for an American firm called Concentrix have said there is a specific committee addressing worker concerns not fully but at least functioning.

Work in a BPO is considered to be isolated. People do not share their work and amenities with their colleagues said almost all the respondents during the interview. Workers have been told by the firm that it



is against the organization rule and regulations. However, some of the respondents have said for the motivation of the worker's team leader usually takes person's name those who become an employee of the month. On the contrary, some of them have said it creates stress and workload on the people. This is a trick which most companies use to get the maximum work out of their employees. Pandemic has decreased the work pressure to some extent. But on the negative side, covid-19 has gradually diminishing workplace identity.

CONCLUSION

Indeed, most of the sectors have been hit hard during covid-19. However, some of the sectors, especially service sectors survived despite workplace and other constraints. Among those service sectors, business process outsourcing (BPO) is one of them. Respondents have said that despite the pandemic, they were able to get a job in the BPO sector. It was become possible due to the quick adaptability of the work approach. As a result, the BPO sector has gone through some changes such as digitalization, mobility of the workplace and further liberalization of policies by the Indian government. Apart from the positive side, the negative side also needs to be discussed for the overall impact of covid-19 in the economy.

Pandemic has further dwindled the already under-represented identity question in the BPO industry. Identity formation is a constant process, and the work and the workplace play a critical role in it. A workplace is a place where social identities exchange thoughts and ideas about each other. By knowing someone else's opinion about him/her is the stimulation to work upon the 'oneself'. It is a process of recognition of self. That is how workplace identity or social identity comes into existence. The recognition of 'selfhood' is also associated with one's bargaining power. Pandemic has weakened this form of power. Since employees work from their homes and they do not exchange their words with each other. However, in the pre-covid time, dialogues between

colleagues were not that much strong, but people inevitable used to engage with each other due to their similar caste, class, language and gender.

In the name of business and economic growth, labour concerns have been put under the carpet. Labour unions were trying to get their place in the industry despite non-recognition by the industry. As Sandhu (2006), Ramesh (2004), Premilla D' Cruz & Ernesto Noronha (2013) have argued that due to the white-collar status of BPO jobs, work timing, and people thought that the presence of labour union will hamper the growth of industry and workers are the main hindrances which stop the stronghold of labour union in the BPOs industry. Now, the pandemic has further bleakened the future of labour unions as well as labour concerns in the BPO industry.

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Research Article

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Microeconomic consequences of COVID-19: Swapping the bench for entrepreneur's business

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ABSTRACT

Amidst COVID-19 pandemic microeconomic activities have compressed, which is resulting in loss of employment and income, and a rise in poverty and inequality. By the same token, uncertainties are looming large in terms of macroeconomic mismanagement due to Covid-19, which is gradually decaying given the inefficiency in both consumer and small business. This study examines the way how selling ability and purchasing behavior are being reduced overwhelmingly. The number of impoverished people has increased compared to the pre-Covid period. This study has taken into consideration the impact of the COVID-19 induced economic crisis on entrepreneur income in Bangladesh. This study also explores the possible economic outcomes and how COVID-19 might evolve from its adverse effect in the upcoming future especially on income and sustains own sector by using the method developed by Lee and McKibbin (2003) and outstretched by McKibbin and Sidorenko (2006). However, this research demonstrates the scenario of the impact of Covid-19 pandemic on entrepreneur's business activities and in particular their conceptions of the comparison in consumer behavior during extreme situations. It is likely that how the pulse of the targeted marketplace will put the spotlight on entrepreneur's businesses so that they can be successful long after they launch, will be revealed in future studies.

Keywords: microeconomic, COVID-19, entrepreneur's, business, purchasing behavior

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INTRODUCTION

This report presents the results detailed analysis of data from Small Business Sector survey to inform understanding of the ways in which affects activities and in particular their conceptions of the contrast in consumer behavior during acute situations.. The overall purpose of the research study is evidence base in relation to the attitude of the consumer and buyer. Entrepreneurs are facing problems with product availability that in turn; hinder their abilities to satisfy the customer needs as a consequence of COVID-19. In my country, GDP that used to enjoy an exponential enlargement of 8.16 percent will be slowing down significantly due to the advent of COVID-19. This sector contributes about 20.25 percent in our GDP contributes on every year and engaged about 35-40 percent of our employment various industry. The prolongation of the pandemic beyond 5 months will force a majority of the small businesses to close down. This sector employs over fifty million people. The pause in economic activity that since 4 months to April brought a challenging experience for the small businesses as most of them hardly managed any financial hold up from period. After restarting, these entrepreneurs' were facing challenge that is reduced demand in market and the burden of paying for fixed costs such as rent and utilities. Even after a month of reopening, approximately all the entrepreneurs' were still running at the break-even indicate largely because of the lower amount of sales. The number of small wholesale and retail businesses in the country stands at more than 53 lakh, which is 39 per cent of the entirety business establishments. The research shows the most entrepreneurs' businesses are conceive a negative impact on sales and jobs over the next 6 months. The report will be detailed the literature reviews, the research methodology and the key findings.

Research Problem

A rational of the study offers the reasons for proceeding to address a particular problem. Research is a scientific way by which we know about any problem deeply and take steps properly to remove these problems. There are various kinds of social problem in our country on which we can research. Now a days the struggles and vulnerable conditions of small entrepreneur's business in Bangladesh are increased day by day. So it is very important to create consciousness about this problem and to remove this horrible situation. In this situation we should try to solve these problems.

In this Research, research problems are economically vulnerable particularly small entrepreneur's what faces the whole nation during lock down after gradually improving pandemic. Their position is unfavorable how effects in the forthcoming business especially on income and survive own zone.

Objectives of Research

No work can be possible to be done except specific objective. Entire research is circled with the centralization of research objective.

The objectives of this research are:

- To measure and analyze the effects of Covid-19 on entrepreneur's businesses.
- To explore the impact of the corona virus pandemic consumer behavior.
- To evaluate the government policy measures to stimulate the entrepreneur's businesses during the pandemic;
- To recommend the way forward for the improvement of entrepreneur's businesses in Bangladesh in the current context.



Rationale of the Research

The number of problem creates for pandemic in which was broken planning daily base life. This situation is greatly effect on business sector and purchasing behavior. This research mainly small business how overcomes before they had, after they have gained from own business. In my country, most of the people had changed their profession during Covid-19. Because they could not get enough profit from it. Many of them suffered different type's personal loans, rent, and bank debt and so on. The corona virus pandemic started in late 2019 and broadens to the rest of the world in early 2020. In many countries, the authorities first announced the closure of shops and cafes, which then turned into an absolute lockdown such as in India, Japan and Pakistan, consequently causing many day laborers to drop their livelihoods and become unemployed. This situation in turn placed pressure on the economy in these countries. Alike to the rest of Bangladesh region, Bangladesh's entrepreneurs considered quitting their businesses since the pandemic was thought to negatively impact their businesses which was impact on customer behavior and employee competence. This predicament was heightened by the limited studies in the country regarding the true influence of the pandemic on the organizations of entrepreneurs.

LITERATURE REVIEW

Literature review is a crucial need for every research. Without literature review research report cannot be lively and practical. To modify in this research as a practical, acceptable and time utility, I reviewed appropriate literature for this. Many journal reports, papers, internet, books are associated.

Among them some are below:

A report by Craven et al. (2020) shows the influence of Covid-19 on business and purchasing consumer behavior as a result of well known band could not overcome from this situation and minimize their

profit. This research also presents the various retailers suffer around multiples dimensions from sales and promotion to range. The finely tuned consumption of digital instrument since the start of the pandemic has been blurring the lines up between individual life and occupation and between domains such as economics and mobility. There has been a extreme spike in downloads for business and video seminar apps, 60% of US consumers stated they were spending more cash online and 40% indicated they have been purchasing more through mobile gadget since the start of COVID-19.

Miri et al. (2020) observed panic buying the whole time the pandemic. However, in some countries, individuals purchased products such as canned foods, first aid box and hand sanitizer to arrange for the signs of corona viruses such as nausea, coughing, and vomiting.

Alexander W. Bartik, Marianne Bertrand (2020) in his study found that the business still keeps up selling market rate price than higher the amount of dealing their products. In this research, No need to think about impact on since the start of COVID-19. They also shows that a large number of respondents also anticipated problems with accessing the help, citing possible issues like as bureaucratic bothers and difficulties setting up eligibility.

RESEARCH METHODOLOGY

There were 200 traders and employees participating in this Rajshahi district, Bangladesh chosen for research respondents. My main objective is to find out what problems small businesses faced during this coronation period and what caused the most stress, such as problems with the sale of rent bank loans and raw materials. This study focused on the impact of corona virus on the basis of my objective. This research report analyzes that the COVID-19 has affected the situation of small traders in Bangladesh and forced them to change their professions. The economic condition of small traders in Bangladesh has

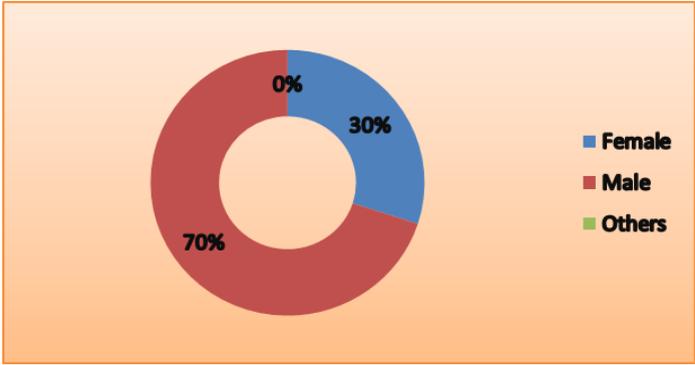


deteriorated. The consumer was purchasing attitude which have constraints caused by the decrease in demand and tighter financial resources. In my region, the most of the traders have started their small businesses relying on micro loans. Many employees have been deprived of jobs due to COVID-19 in Bangladesh. They did not get their due monthly salary. They did not obtain salary what they used to get in the past. Additionally, they did not enough jobs reasons that have been politicized by the Bangladesh government for businessmen as a matter of policy. In my study, the data has collected through simple random sampling. Simple random sampled methods are likely to be selected by all units; sampling cannot be a personal argument or bias. The method is also referred to as the following procedure: lottery system and data takes every 10th or 20th or 100th unit to sort the units by geographical alphabetical serial number. Moreover, the online platform for data collection has

been used in this study. Data collection has also been done online and considers that participants are able to feel safe. Moreover, online based business has developed during the Corona period, so some interviews have been done online the manner in which communicate with respondents such as in WhatsApp, email, and Facebook. The data of this research has been analyzed through SPSS MS Word. There is a limit to every breath. It took a long time to conduct this research interview and they were reluctant to give accurate information of the research. Finally, the recommendation is that the government should introduce specific schemes for these small traders. Encouraging them to improve, such as making them a variety of inspirational documentaries through newspaper media so that they are interested in getting back to the way they were.

DATA ANALYSIS

Doughnut: 1 Sex

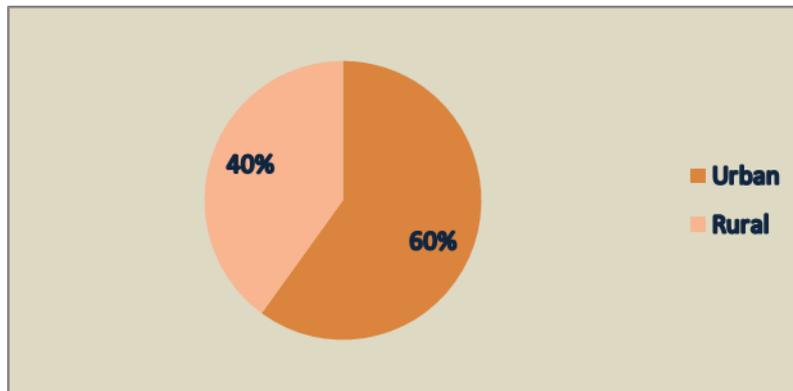


After analyzing received data from doughnut 1, the result shows the male respondent more than female. Female only 30% and male 70% are doing businesses.

Table explores the approval of the most of the respondents 70% engaged in small business.



Pie chart: 2: Company locations



The pie chart results show during COVID-19 in Bangladesh urban and rural both area entrepreneurs suffered various from of problem. In Bangladesh, we lose many of rising future. The Rural area workers are

lower only 40%. On the other hand, The Urban job holders and owners are continuing their work in COVID-19 a large majority 60% respondents.

Table: 1 Position in the company

Respondent position	Frequency	Percentage
Owner	120	60
Employee	80	40
Total	200	100%

Figure 1 shows the respondent position of company changes COVID-19 in Bangladesh. December 1, 2020. Overall, more than 60% owners survives own zone. Their ambiguity draws attention to the broader uncertainty that was current throughout the world at

the time. The number of employees is loss their position and income as well. In this area, 40% employees work tough to stay a job that is in exist company they lead simultaneously.



Table: 1 Need time for the company's selling improvement within period.

Improvement Period	Frequency	Percentage
Within 2 weeks	60	30
1 month	90	45
1 month to 3 months	10	5
More than 3 months	40	20
Total	200	100%

This table Altogether, the results illustrate that a huge number of enterprises is diminishing profit. They have to improve their conditions which are better for future business. It was difficult to gain so early. The company's selling improvement they needed within 2

weeks only 30%, 1 month to 3 months 5% as well as more than 3 months 20% of respondents. The large numbers of respondents express to overcome period from drastic situation only 45%

Table: 3 Company's present cash flow keeps up the company's procedure

Company's procedure overcome	Frequency	Percentage
Less than 1 month	78	39
1-3 months	85	42.5
4-5 months	20	10
6 months or further	17	8.5
Total	200	100%

After analyzing received data from table 5, the table describes company's present cash flow keeps up the company's less than 1 month 39%, 1-3 months 42.5%, and 4-5 months after ending covid-19 in this area. The

majority of companies given opinion 39% they have done rapidly in this crisis. In this sector, there were a few number respondents to need lower period only 8.5%.



Table: 4 Companies have the same hope as you before belonging in this area

Express situation	Frequency	Percentage
Yes	50	25
No	100	50
Maybe	50	25
Total	200	100%

Table 4 shows the respondents express concerns related to back to own position. The situation impacts to their level of trouble across company operations, sales movement, and deliver chains which cannot prevail over before existed in business 50% claim. The mean sales space across these categories aligns most closely with confusion to sales accomplishment so

that result is 25% concern of upgrading along with some numbers not sure around 25%. It is clear that sales break across these groups brings into line most intimately with difficulty to sales progress. Definitely, even small business that pointed out no supply interruption had a negative impact on sales environment.

Table: 5 Company's raw materials and entire operating price in 2020 compared to 2019

Current Raw Materials Price	Frequency	Percentage
Amplify by more than 10 percent	110	55
Enhance, but less than or equal to 10 percent	30	15
Be the equivalent as last year	30	15
Decline by less than 10 percent	15	7.5
Diminish by more than 10 percent	15	7.5
Total	200	100%

Table 5 shows the respondents give out data their raw material related price, delivery time including suddenly change market condition during the COVID-19 in Bangladesh. The huge numbers respondents said that they have paid extra 10% than normal circumstances of 55% contribute to this

research. A 7.5% respondent's claim that price was lower because sometime they getting offer from producer. The evident shrinking of descending nominal severity during the COVID-19 pandemic is moderately abnormal.



Table: 6 Business had at the closing stages of 2019

Workers Number	Frequency	Percentage
A lesser amount of 10 persons	40	20
11-50 persons	60	30
51-100 persons	40	20
101-500 persons	40	20
500 or more persons	20	10
Total	200	100%

Table 6 shows the respondents answer worker active role play since company started with them. However, the entrepreneur's business lost capability of workers in their place where they belongs during the COVID-19 in Bangladesh. A large numbers respondent that

had temporarily closed job seekers and starting point engaged 30% and lower 10% in company. Employee health concerns as the reasons for closure, along with disruptions in the supply chain being less of a cause.

Table: 7 The most significant economic problems face for business during the outbreak

Economic Problems	Frequency	Percentage
Rent	40	20
Refund of loans	90	45
Payments of bill	40	20
Other costs	15	7.5
Not precise	15	7.5
Total	200	100%

Table 7 shows the respondents did not manage financial problems during the outbreak. In Bangladesh a large proportions entrepreneur's business is based on bank loan or micro scheme from different NGOs and loans problem suffer around 45%, rent and payment of bill cause 20 %. On the other hand, cost and not exact idea about expenses 7.5% respondents. As a result, they cannot keep up run own

business during COVID-19 in Bangladesh. COVID-19 in Bangladesh would also be likely to effort to overtake on these unit charge enhances by increasing prices and, finally entrepreneur's business lead to anticipate higher inflation in the upcoming season. Table identifies the approval of the majority of 45% the respondents disturbed from refund loans.



Table: 8 Satisfied own position in pandemic situation

Expression Respondents	Frequency	Percentage
Yes	38	19
No	140	70
Maybe	22	11
Total	200	100%

Table 8 additional lights on the scenery of the COVID-19 upset. Results entrepreneur's felt that examination the massive impact on financial that the respondent's gain experience and learnt strategy during COVID-19 in Bangladesh. The expression of respondents were not positive attitude towards small business 70%, satisfied rate 19% positive together with 11% unaware about feelings.

CONCLUSION

On the basis of above conversation it can be said that. In this research, I have highlighted some necessary elements of the systems approach to the force to swapping the bench for entrepreneur's business. This piece of writing contributes significant new pragmatic analysis of the impacts of the pandemic on Small Enterprise in Bangladesh at a point where there is an great quantity of abstract papers and approach pieces on other aspects of the impact of COVID-19 but still limited proof on the impacts of the pandemic Small business mostly in developing countries like Bangladesh. One of the strategy implications of our study is necessitate addressing social safeguard steps which can help to cushion the effect on the pandemic on the Small business in Bangladesh.

The damage to the small sector in the Corona crisis is manifold. One of the losses incurred in this sector during the last one and a half years is due to disruption in the supply of raw materials, reduction in production, difficulties in transportation of goods, loss of market, layoffs etc. The people involved in the industry are also looking at all the reasons for the

news that has come out through various media including the media so far. It is possible to estimate the loss of this industry by taking into account the workers involved in the industry, the families of the workers, all the ancillary industries associated with the industrial cluster, raw material suppliers, drivers, shopkeepers, hoteliers, day laborers, peddlers. I spoke to the relevant data and stakeholders as part of a survey on how the targeted population is getting the incentive package taken by the government and its benefits to overcome the damage caused by COVID-19. Considering the importance of small, cottage and medium industries in the national economy, there is no alternative but to give special priority to the most backward regions and the most affected industries in the Corona epidemic. Therefore, the government should not end its responsibility by announcing the amount of incentive money and incentives. Institutions or individuals in charge of the government have to take special responsibility so that the money of the government and the people reaches the industrial entrepreneurs who have been harmed in a proper and orderly manner.

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Research Article

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A conceptual review of microeconomic impact of Covid 19 pandemic in Nigeria

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ABSTRACT

COVID-19 is not only a global pandemic and public health crisis but has severely affected the global economy and financial markets, reductions in income, a rise in unemployment, and disruptions in the transportation, public services, and manufacturing industries. It has become clear that most governments in the world underestimated the risks of rapid COVID-19 spread and were mostly reactive in their crisis response. The government responded to the crisis by providing financial assistance to businesses and a small number of households that were affected by the coronavirus (COVID-19) outbreak. This article undertakes a descriptive review of COVID-19 situation in Nigeria, its effect on the economy and the structural causes that worsen the coronavirus (COVID-19) crisis. The findings reveal that the economic downturn in Nigeria was triggered by a combination of declining oil price and spillovers from the COVID-19 outbreak, which not only led to a fall in the demand for oil products but also stopped economic activities from taking place when social distancing policies were enforced. The monetary authority adopted accommodative monetary policies and offered a targeted ₦3.5trillion loan support to some sectors. These efforts should have prevented the economic crisis from occurring but it didn't. Economic agents could not freely engage in economic activities because of the fear of contracting the COVID-19 disease that was spreading very fast at that time.

Keywords: COVID-19, outbreak, structural, economic, spillovers

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INTRODUCTION

COVID-19 is not only a global pandemic and public health crisis but has severely affected the global economy. Significant economic impact has already occurred across the globe due to reduced productivity, loss of life, business closures, trade disruption, and decimation of the tourism industry. COVID-19 may be that a “wakeup” call for global leaders to intensify cooperation on epidemic preparedness and provide the necessary financing for international collective action. There has been ample information on the expected economic and health costs of infectious disease outbreaks (WHO 2020).

Although the coronavirus outbreak which started in the Wuhan province of China had spillover problems in Nigeria, the reason why the outbreak was severe in Nigeria and caused suffering to poor citizens was because of weak institutions that were ineffective in responding to the pandemic and the lack of adequate social welfare programs that would have catered for majority of the poor citizens and vulnerable citizens who were affected by the crisis. The fear of financial and economic collapse led to panic buying, hoarding of foreign currency by individuals and businesses mostly for speculative reasons, flight to safety in investment and consumption, households stocking up on essential food and commodity items, businesses asking workers to work from home to reduce operating costs.

Economic crises are not new in Nigeria. During the 2016 economic crisis, the monetary authority in Nigeria defended the local currency from forced devaluation against the dollar and adopted a managed-float foreign exchange system, which worked well from 2016 to 2019. After the 2016 economic crisis or recession, it was widely believed that the unexpected and sustained decline in oil price was the most important cause of economic crises in

Nigeria. But in 2020, nobody thought that a public health crisis could trigger an economic crisis in the country. What made the 2020 economic crisis different from other economic crises or recessions in Nigeria was that most economic agents, who could have helped to revive the economy were unable to engage in economic activities due to fear of contracting the COVID19 disease. Also, economic agents did not engage in economic activities when the government imposed and enforced its social distancing rules and movement lockdown in Abuja, Lagos and Ogun states on the 30th March of 2020.

This study analyses the COVID-19 situation in Nigeria, the economic crisis and the structural causes. The COVID-19 pandemic has had far-reaching effects on the global economy (Ozili and Arun, 2020). It affected the global travel business, national health care systems, the food industry, events industry, education and global trade. Due to globalization, there are expectations of spillover effects to emerging and developing countries due to their dependence on developed countries for the importation of goods and services (Ozili & Arun, 2020). A recent literature has emerged that examine the effect of COVID-19 on economic activities (Fernandes 2020; Atkeson 2020; McKibbin & Fernando 2020; Altig et al 2020; Ozili & Arun, 2020). Yet, the recent literature has not examined the effect on COVID-19 on economic aggregates in developing countries such as Nigeria. The impact of COVID-19 on the Nigerian economy has not been explored in the recent literature. This study fills this gap in the literature.

Economic crises or recessions are often caused by market corrections (Hart & Tindall 2009; Jones 2016), market failure (Stiglitz 2008; Chauffour & Farole 2009; Petrakos 2014), external trade and price shocks (Ros 1987; Mendis 2002; Gomulka & Lane 1997; Francois & Woertz 2009), political instability (Aisen & Veiga 2013; Gasiorowski 1995; Lagravinese 2015), and civil unrest through protests (Bermeo & Bartels



2014; Giugni & Grasso 2016; Grasso & Giugni 2016; Bernburg 2016), amongst others.

The analysis in this paper contributes to the literature that examine the cause of economic crises in developing and transition countries. This literature shows that the level of development in a country plays an important role in prolonging economic crises or in facilitating economic recovery. This study also contributes to the recent literature that investigate the impact of coronavirus in society (Chinazzi et al 2020; Haleem et al 2020; Chen et al 2020; Fornaro & Wolf 2020).

This study contributes to this literature by exploring the factors that worsen the COVID-19 pandemic and the economic crisis in Nigeria.

The rest of the paper is divided into six parts. Section 2 discuss the literature on economic crisis. Section 3 presents an overview of the COVID-19 pandemic from a global context. Section 4 discuss the COVID-19 outbreak in Nigeria. Section 5 discuss the structural factors that worsen the economic crisis in Nigeria. Section 6 presents the research design including the sample and methodology. Section 7 discuss the results. Section 8 concludes.

THE CONCEPTUAL LITERATURE OF COVCOVID-19

Nigerian literature

Some Nigerian studies on COVID-19 have emerged in the recent literature. Olapegba et al (2020) assess the knowledge and perceptions of Nigerians about COVID-19. They find that some Nigerians have misconceptions about COVID-19, for instance, some respondents believe that COVID-19 is a biological weapon of the Chinese government. These misconceptions prevented them from taking maximum preventive measures. They suggest that evidence-based campaign should be intensified to remove misconceptions and promote precautionary

measures. Ozili (2020) show that Nigeria had the highest number of COVID-19 cases in West Africa and the third highest cases in Africa between March and April. Ohia et al (2020) predict that the effect on COVID-19 will be severe in Africa because African countries have fragile health systems. They argue that Nigeria's current national health systems cannot respond to the growing number of infected patients who require admission into intensive care units. They suggest that Nigeria should explore available collective measures and interventions to address the COVID-19 pandemic. Jacob et al (2020) show that the COVID-19 pandemic affected higher institutions in Nigeria through the lockdown of schools, reduction of international education, disruption of academic calendar of higher institutions, cancellation of local and international conferences, creating teaching and learning gap, loss of man power in the educational institutions, and cut in budget of higher education. Adegboye et al (2020) examine the early transmission of COVID-19 in Nigeria, and show that the COVID-19 cases in Nigeria were lower than expected. Adenomon and Majjamaa (2020) examine the impact of COVID-19 on the Nigerian stock exchange from the 2nd January 2020 to 16th April 2020. The results revealed a loss in stock returns and high volatility in stock returns during the COVID-19 period in Nigeria.

COVID-19 AND THE ECONOMY

Global context

The coronavirus began in Wuhan, Hubei Province, China. Residents who lived in Wuhan had some link to a large seafood and live animal market, which suggest that the mode of transmission of coronavirus was from animal to person. The virus has been named "SARS-CoV-2" and the disease it causes has been named "coronavirus disease 2019" (abbreviated "Covid-19"). The first known patient of Coronavirus started experiencing symptoms in Wuhan, China on 1 December 2019. Since then, there have been over 800,000 reported cases around the world.



Some global statistics are reported in table 1a. The table shows that the U.S. had the largest reported cases, followed by Spain and Russia on the reporting

date. In Africa, South Africa had the largest reported cases, followed by Egypt and Nigeria on the reporting date.

Table 1a: Covid-19 statistics (as at 15th May 2020)

Countries	Confirmed cases (Total)	Confirmed deaths (Total)	Recovery cases (Total)
Global	4,626,487	308,610	1,757,282
US	1,484,285	88,507	326,242
Spain	274,367	27,459	188,967
Russia	262,843	2,418	58,226
Egypt	11,228	592	2,799
South Africa	13,524	247	6,083
Nigeria	5450	171	1,320

Source: Worldometer. Note that there may be unconfirmed cases which were never reported to the public health authorities.

Data obtained from the World health organization (WHO) on the same reporting data shows that Nigeria had over 5,000 cases, 167 deaths and the mode

of transmission was through community transmission.

Table 1b: WHO Covid-19 statistics (as at 15th May 2020)

Countries	Confirmed cases (Total)	Confirmed deaths (Total)	Recovery cases (Total)
Global	4,626,487	308,610	1,757,282
US	1,484,285	88,507	326,242
Spain	274,367	27,459	188,967
Russia	262,843	2,418	58,226
Egypt	11,228	592	2,799
South Africa	13,524	247	6,083
Nigeria	5450	171	1,320

Source: WHO situation report No. 116. <https://www.who.int/emergencies/diseases/novel-coronavirus2019/situation-reports>

COVID-19: THE NIGERIAN EXPERIENCE

The spread of COVID-19

The coronavirus entered Nigeria through an infected Italian citizen who came in contact with a Nigerian citizen who was subsequently infected with the coronavirus. Table 2 shows that the coronavirus infected people in Lagos and then spread to other parts of the country from March to May.

Table 2: Confirmed Covid-19 cases in Nigeria

Timeline	Confirmed cases	Affected states
17/03/2020	3	Lagos
21/03/2020	22	Lagos, Abuja and Ogun
30/03/2020	131	Lagos, Abuja, Bauchi, Enugu
15/03/2020	5445	All states in Nigeria

Source: Nigeria Centre for Disease Control (NCDC)

Impact on the global economy

The COVID-19 pandemic affected the global economy in two ways. One, the spread of the virus encouraged social distancing which led to the shutdown of financial markets, corporate offices, businesses and events. Two, the rate at which the virus was spreading, and the heightened uncertainty about how bad the situation could get, led to flight to safety in consumption and investment among consumers and investors (Ozili & Arun 2020).¹ There was a general consensus among top economists that the coronavirus pandemic would plunge the world into a global recession. Top IMF economists such as Gita Gopinath and Kristalina Georgieva stated that the COVID-19 pandemic would trigger a global recession.

In financial markets, global stock markets erased about US\$6 trillion in wealth in one week from 24th to 28th of February. The S&P 500 index also lost over \$5 trillion in value in the same week in the US while the S&P 500's largest 10 companies experienced a combined loss of over \$1.4 trillion² due to fear and uncertainty among investors about how the pandemic

would affect firms' profit (Ozili & Arun 2020). The travel restriction imposed on the movement of people in many countries led to massive losses for businesses in the events industry, aviation industry, entertainment industry, hospitality industry and the sports industry. The combined loss globally was estimated to be over \$4 trillion. Several governments in developed countries, such as the U.S. and U.K., responded by offering fiscal stimulus packages including social welfare payments to citizens while the monetary authorities offered loan relief to help businesses during the pandemic. There were also spillovers to poor and developing countries. The effect was more severe on developing countries that have a weak public health infrastructure and non-existing social welfare programs.

COVID-19 spillover to the Nigerian economy

Direct effect

There are five main ways through which the COVID-19 pandemic spilled over into Nigeria. One, the



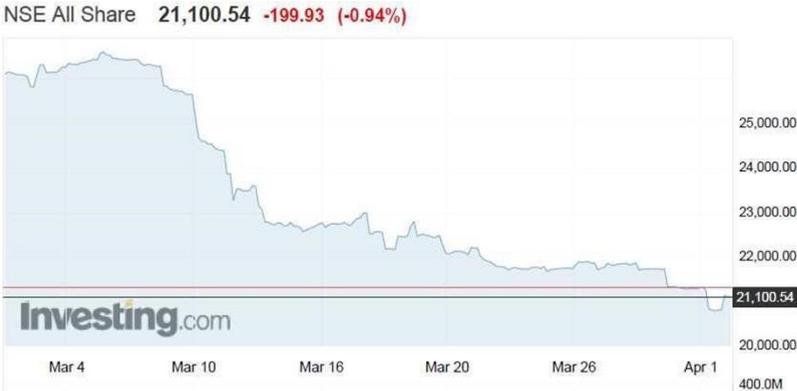
COVID-19 pandemic affected borrowers' capacity to service their loans, which gave rise to non-performing loans (NPLs) that depressed banks' earnings and eventually impaired banks' soundness and stability. Subsequently, banks were reluctant to give additional loans to borrowers as more and more borrowers struggled to repay the loans granted to them during the COVID-19 outbreak. Two, there were oil demand shocks which was reflected in the sharp decline in oil price. The most visible and immediate spillover was the drop in the price of crude oil, which dropped from nearly US\$60 per barrel to as low as US\$30 per barrel in March. During the pandemic, people were no longer travelling and this led to a sustained fall in the demand for aviation fuel and automobile fuel which affected Nigeria's net oil revenue, and eventually affected Nigeria's foreign reserve.

Three, there were supply shocks in the global supply chain as many importers shut down their factories and closed their borders particularly China. Nigeria was severely affected because Nigeria is an import-dependent country, and as a result, Nigeria witnessed shortage of crucial supplies like pharmaceutical supplies, spare parts, and finished goods from China.

Four, the national budget was also affected. The budget was initially planned with an oil price of US\$57 per barrel. The fall in oil price to US\$30 per barrel during the pandemic meant that the budget became obsolete and a new budget had to be formed which had to be repriced with at low oil price.

Finally, the COVID-19 pandemic affected the Nigerian stock market. Major market indices in the stock market plunged when investors pulled out their investments into so-called safe havens like US Treasury bonds. Stock market investors lost over NGN2.3 trillion (US\$5.9bn) barely three weeks after the first case of coronavirus was confirmed and announced in Nigeria on January 28, 2020. The market capitalisation of listed equities, which was valued at NGN13.657 trillion (US\$35.2bn) on Friday, February 28, 2020 depreciated by NGN2.349 trillion to NGN11.308 trillion (US\$29.1bn) on Monday 23 March 2020. The All-share index closed at 21,700.98 from 26,216.46 representing 4,515.48 points or 20.8 per cent drop. The stock market crash is illustrated in figure 1 below while table 3 shows the one-month movement in the all share index.

Figure 1: All-Share Index – Nigerian Stock Exchange



(source: investing.com)



Table 3: NSE All Share Historical Data (02/03/2020 - 02/04/2020)

Date	Price	Open	High	Low	Vol.	Change %
Apr 01, 2020	21,100.54	21,309.50	21,317.98	20,779.13	154.35M	-0.94%
Mar 31, 2020	21,300.47	21,330.79	21,340.64	21,270.26	422.00M	-0.14%
Mar 30, 2020	21,330.79	21,828.65	21,828.65	21,330.79	466.87M	-2.43%
Mar 27, 2020	21,861.78	21,842.18	21,885.05	21,803.89	251.41M	0.48%
Mar 26, 2020	21,757.47	21,729.48	21,903.00	21,696.88	172.16M	0.13%
Mar 25, 2020	21,729.48	21,743.47	21,814.74	21,663.32	233.07M	-0.05%
Mar 24, 2020	21,741.16	21,703.80	21,770.42	21,703.80	330.10M	0.19%
Mar 23, 2020	21,700.98	22,198.43	22,208.81	21,694.16	464.36M	-2.24%
Mar 20, 2020	22,198.43	22,072.56	22,211.67	22,035.11	379.48M	0.36%
Mar 19, 2020	22,118.90	22,785.19	22,785.19	22,118.90	525.85M	-2.94%
Mar 18, 2020	22,789.64	22,549.09	22,804.70	22,118.37	671.52M	1.09%
Mar 17, 2020	22,543.07	22,705.19	23,008.59	22,497.73	675.82M	-0.71%
Mar 16, 2020	22,705.19	22,745.39	22,797.39	22,618.36	551.48M	-0.13%
Mar 13, 2020	22,734.07	22,729.01	22,813.47	22,550.08	732.62M	0.17%
Mar 12, 2020	22,695.88	23,500.46	23,500.46	22,694.32	1.06B	-3.72%
Mar 11, 2020	23,572.75	24,278.53	24,321.51	23,260.07	1.39B	-3.35%
Mar 10, 2020	24,388.66	25,412.57	25,412.57	24,381.88	594.47M	-4.91%
Mar 09, 2020	25,647.54	26,141.24	26,141.24	25,648.45	185.49M	-2.41%
Mar 06, 2020	26,279.61	26,426.20	26,455.26	26,273.58	361.08M	-0.55%
Mar 05, 2020	26,426.20	26,418.82	26,626.07	26,408.25	431.90M	0.04%
Mar 04, 2020	26,415.54	26,283.35	26,438.78	26,256.24	307.66M	0.61%
Mar 03, 2020	26,255.11	25,816.57	26,344.55	25,816.57	387.42M	1.70%
Mar 02, 2020	25,816.57	26,143.02	26,170.58	25,816.57	325.26M	-1.53%
Highest:	Lowest:	Difference:	Average:		Change %:	
26,626.07	20,779.13	5,846.94	23,265.64		-	19.51

Source: investing.com The figures in green colour represent ASI gains while the figures in red colour represent ASI losses

Mitigating the spread of the pandemic Movement restriction

Both the State and Federal governments imposed movement restrictions in some areas across the country to control the spread of the novel coronavirus, as shown in table 4.



Table 4: Movement restriction in Nigeria during Covid-19 pandemic

Affected sector	Impact
1 Aviation sector	Massive flight cancellations, NCAA suspends all international airports
2 Education sector	Students were sent back home. Private and public schools and universities were closed
3 Banking sector	Senior staff work from home. Few branch staff available to attend to depositors
4 Civil service sector	Suspension from work for 14 days for remote quarantine
5 Markets	Major food markets were partially closed
6 Religious sectors	All religious services were banned during the pandemic. A Christian pastor was arrested for holding church service during the ban
7 Sports	All sporting events were cancelled
8 All sectors	A 14-days nationwide stay-at-home lockdown was officially enforced beginning from 30 th March, 2020.
9 Eleven (11) businesses excluded from the ban	(i) private security companies, (ii) medical establishments, (iii) broadcasters, (iv) food processing and distribution companies, (v) petroleum distribution and retail entities, (vi) power generation, transmission and distribution companies, (vii) hospitals, (viii) telecommunications workers, (ix) health care manufacturing and distribution companies, (x) print media staff, (xi) electronic media personnel.

Using monetary and fiscal policy measures

In response to the COVID-19 outbreak, the monetary authority, the Central bank, said it would provide support to affected households, businesses, regulated financial institutions and other stakeholders to reduce the adverse economic impact of the COVID-19 outbreak. The central bank provided support in six ways. One, it granted extension of loan moratorium on principal repayments from March 1, 2020. This meant that any intervention loan currently under moratorium would be extended by one year. Two, it offered interest rate reduction on all intervention loan facilities from 9% to 5% beginning from March 1, 2020. Three, it offered a NGN50bn (US\$131.6m) targeted credit facility to hotels, airline service providers, health care merchants, among others. Four, it provided credit support to the healthcare industry to meet the increasing demand for healthcare services during the outbreak. The loan was available only to pharmaceutical companies and hospitals. Five, it

provided regulatory forbearance to banks which allowed banks to temporarily restructure the tenor of existing loan within a specific time period particularly loans to the oil and gas, agricultural and manufacturing sectors. Six, it strengthened the loan to deposit ratio (LDR) policy which allowed banks to extend more credit to the economy. On the other hand, the fiscal authorities had to review and revise the 2020 national budget of N10.59 trillion (US\$28 billion). The government announced that the budget was reduced by NGN1.5 trillion (\$4.90 billion) as part of the measures to respond to the impact of coronavirus on the economy and in response to the oil price crash. The new budget was benchmarked at US\$30 per barrel from US\$57 per barrel in the previous budget.



STRUCTURAL FACTORS THAT WORSEN THE ECONOMIC CRISIS

Poor public health infrastructure

According to a 2015 BMI report, Nigeria had an estimated 3,534 hospitals in 2014, of which 950 were in the public sector. There were around 9,000 private health facilities, and an estimated 134,000 hospital beds in 2014, equal to 0.8 per thousand populations which is below the rate for the African region. The public health sector in Nigeria has poor infrastructure such as poor emergency services, few ambulance services, ineffective national health insurance systems, insufficient primary health care facilities, and these problems in the public health sector have often been linked to the high maternal and infant mortality rates in the country (Muhammad et al 2017).

Currently, Nigeria operates a two-tiered healthcare system with a large public healthcare sector and a smaller private healthcare sector. Compared to developed countries, the private healthcare sector in Nigeria is very small and fragmented because of the limited funding for private health insurance. Also, the majority of Nigeria's healthcare spending is still dominated by out-of-pocket expenditure which account for 70% of total health expenditure⁶, which suggest that most Nigerians either do not rely or trust the health insurance system in the country or they are unaware of the availability of health insurance. Despite the introduction of the National Health Insurance Scheme (NHIS) in 2004, the population covered by health insurance in 2019 was only 5 percent of the total population.

The Nigerian pharmaceutical industry also has its own problems. The Nigerian pharmaceutical industry is one of the largest in West Africa, and accounts for about 60% of the market share in West Africa. But most of the active pharmaceutical ingredients (API) used in Nigeria are imported from China, and only

10% of the drugs used in Nigeria are manufactured locally in the country. The industry is facing many problems such as poor infrastructural and unreliable utilities, scarcity of skilled workers, poor access to finance, lack of appropriate government incentives, policy incoherence by the government, poor demand due to robust competition from Asian companies particularly China, high cost of doing business as a result of imported and expensive production inputs, regulatory problems, among others.

Nigeria has a drug market that is almost unregulated because the health agencies have difficulty in preventing the importation of illegal drugs and difficulty in tracking informal drug sellers that operate without a registered license (Fatokun, 2016). It is estimated that informal drug sellers in the country account for more than 70% of the pharmaceutical market, and these informal agents import substandard and falsified drugs through informal channels. Research shows that 78% of low-quality medications came from private facilities compared to public facilities, and most of these private facilities are unregulated. The unregulated drug market in Nigeria is the major factor responsible for the circulation of low quality medicines in the country (Klantschnig & Huang 2019).

The failings in Nigeria's public health sector made it difficult for Nigeria to cope with the fast spreading COVID-19 disease during the outbreak. Local drug manufacturers could not manufacture drugs that could temporarily suppress coronavirus in infected patients because the APIs used to manufacture suppressant drugs could no longer be imported because China had shut down its factories and closed its borders to control the coronavirus pandemic that was ravaging China at the time.

Also, there were insufficient isolation centers in many states including in Abuja and Lagos. The number of infected patients in Lagos grew worse to the extent that a stadium had to be converted to an isolation center. In the end, the COVID-19 outbreak



overwhelmed the poor public health infrastructure in Nigeria.

A weak and underdeveloped digital economy

Before the COVID-19 outbreak began, Nigeria already had a weak and underdeveloped digital economy. Currently, Nigeria has eight (8) operational telecom service providers, namely, MTN Nigeria, Globacom, Airtel, 9Mobile, M-Tel, Telkom, Econet Wireless and Vodacom. According to the Nigerian Communications Commission (NCC), the number of mobile phone subscribers in Nigeria decreased by 49,060 in April to 173.38 million from 173.43 million in March. Also, MTN, the largest telecom provider, had 64.73 million users in April which is a drop of 302,448 from 65.03 million in March. Also, Statistia reports that there are 96 million internet users in Nigeria.

Yet, during the COVID-19 pandemic, there were hardly any university or school that offered a full educational curriculum online from start to finish. Many businesses operated using the traditional 'come-to-the office-to-work' model as opposed to the 'working-from-home' model. The outbreak of the novel coronavirus brought challenges to the business environment in Nigeria. It impacted industries and markets in the short term. The operations of these markets and industries would have been minimally affected if they had a large digital infrastructure. The only services that were offered through the existing digital infrastructure during the COVID-19 outbreak were telecommunication services, digital bank transfers and internet services.

The digital economy would have played a major role in driving recovery from the economic crisis if Nigeria's digital economy was robust and well-developed. For instance, in Nigerian schools, universities and educators can put coursework online so that students quarantined at home don't have to miss out on key aspects of their education while school is closed or when students can't get to school.

E-commerce apps that enable online buying and selling can allow buyers and sellers to make purchases and sales while staying in their homes. Also, tele-health apps for health and wellness checks can allow individuals in all affected areas to take extra precautions to monitor their vital signs and learn how to reduce their risk of infection. Also, family members can visually check on their parents, grandparents and siblings without physically visiting them which provides a level of comfort that would be impossible over the phone. Online delivery businesses can use virtual assistants to help ensure that goods purchased from online grocery stores are delivered when customers need them. Businesses that don't want their workers to travel or whose employees are uncomfortable taking trips can stay connected with team members, clients and prospective clients around the world using online video conferencing technologies. All these are possible when there is a robust and wellfunctioning digital economy.

Outside Nigeria, digital technology helped many businesses in developed countries survive the effect of the COVID-19 outbreak, and it created an opportunity to enhance the country's digital economy. In the future, a well-developed digital economy in Nigeria, achieved through intense digital technology penetration, will play a greater role in reducing the effect of recessions in the country, and will also help in supporting economic activities, social activities and the development of good health care systems.

Lack of social welfare program

Before the COVID-19 outbreak, there were major social welfare problems in Nigeria which include child abandonment, armed robbery, homelessness, mental health problems, divorce, and problems of single parenting. These social welfare problems can only be addressed with serious social welfare policy and programs. But, currently, social welfare activities in Nigeria is under developed, poorly funded and is unavailable to majority of those who need them



(Ahmed et al, 2017). For instance, the Nigerian government created the ‘N-Power’ social welfare program to address poverty among unemployed youth in Nigeria. The purpose of the NPower program was to provide job training and skills to young (and educated) Nigerians, as well as a monthly stipend of 30,000 Nigerian naira (USD \$83.33). The problem with the N-Power was that it isolated uneducated people, needy children, and older adults that need to be empowered as well. This is just one example of how Nigeria’s social programs did not provide a social welfare safety net for all citizens in need of social welfare. In fact, Nigeria does not have a national social welfare program that offers assistance to all individuals and families in need of health care assistance, food stamps, unemployment compensation, disaster relief and educational assistance.

The consequence of not having a national social welfare program became evident during the coronavirus outbreak of 2020. During the outbreak, people had little to rely on, many poor citizens did not

have welfare relief that could help them cope with the economic hardship at the time. There were no housing subsidies, no energy and utilities subsidies to individuals that were most affected by the coronavirus outbreak. In the literature, there are debates on the benefit of using social welfare programs to alleviate poverty and to help citizens cope with disasters (Luenberger 1996; Dolgoff et al 1980; Abramovitz 2001), and social welfare theories provide different perspectives on how social welfare can be designed to meet the basic needs of the people (Fleurbaey & Manique 2011; Arrow et al 2010; Andersen 2012). So far, the provision of social welfare services to vulnerable citizens in the population is the most proven way to protect them from economic hardship in bad times (Ewalt & Jennings 2014). In Nigeria, the lack of such welfare services for vulnerable people, households and poor individuals during the coronavirus outbreak caused severe pain and economic hardship to households and poor individuals. The implication of this is that social welfare has not been a policy priority by policy makers in Nigeria.

Table 5: Data summary

S/N	Data Name	Data type	Duration	Source
1	Purchasing Managers Index ¹	Economic	Monthly	CBN database https://www.cbn.gov.ng/
2	Inflation	Economic	Monthly	CBN database https://www.cbn.gov.ng/
3	Crude oil (bonny light)	Economic	Monthly	CBN database https://www.cbn.gov.ng/
4	Health care infrastructure	Structural	Year	World Bank database
5	Digital economy	Structural	Year	World Bank database
6	Social welfare infrastructure	Structural	Year	World Bank database

¹ https://www.theglobaleconomy.com/Nigeria/pmi_manufacturing/



RESEARCH DESIGN

Data

Economic and structural data were collected from multiple sources, namely: the Central bank of Nigeria, World Bank, Oxford, etc. Data on purchasing managers index (PMI) and inflation was collected from the Central bank of Nigeria. The sample period was from January 2020 to June 2020. For some data, comparison was made between the current year and the previous year, while for other data, comparison was made on a month-on-month basis. Due to the very small number of observations and the narrow lockdown days during the COVID-19 pandemic, it was almost impossible to perform any robust econometric modelling; therefore, descriptive analysis was used to analyse the economic crisis and its structural causes.

Methodology

Descriptive analysis was used to analyse the effect of COVID-19 pandemic on the economic crisis and its structural causes. Descriptive analysis is a basic

statistical tool which is widely used to analyse and interpret primary and/or secondary data.

RESULTS

Analysis of the economic factors

Purchasing Managers Index

The Purchasing Managers Index (PMI) is a measure of the prevailing economic trends in manufacturing in a country. The PMI is derived from a monthly survey of supply chain managers across 19 industries engaged in upstream and downstream activities.

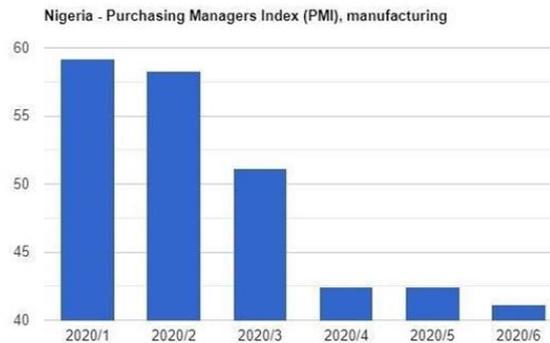
The analysis of Nigeria's PMI data in the early months of 2020 is shown in Table 6. It shows that the month-on-month PMI fell from January to June in 2020 as shown in figure 2. This was because the lockdown restriction prevented workers from working, lenders were unwillingly to issue new loans, and consumers were not buying products at the time which affected the real sector, especially the manufacturing sector. Also, the percentage change in the PMI fell from March to June, which indicates falling productivity in the manufacturing sector.

Month/Year	2019	2020	Percentage change	Remark
January	58.5	59.2	1.2	Marginal increase
February	57.1	58.3	2.1	Marginal increase
March	57.4	51.1	-10.9	Decrease
April	57.7	42.4	-26.5	Decrease
May	57.8	42.4	-26.6	Decrease
June	57.4	41.1	-28.4	Decrease

Source: Central Bank of Nigeria



Figure 2



Source: TheGlobalEconomy.com, Central Bank of Nigeria

Inflation

The analysis of Nigeria's inflation data in the early months of 2020 is shown in Table 7 below. It shows that the month-on-month inflation rate increased from January to June in 2020. This was because the lockdown restriction led to increase in the price of

consumer goods as trade borders were closed and inter-state travels were banned which disrupted the distribution of consumer goods across the country. Also, the percentage change in inflation rate increased from January to March, and from April to June, which indicates a worsening economic situation.

Table 7: Analysis of inflation (Year on Change) from January to June of 2019 and 2020

	(1)	(2)	(3)	(4)
Month/Year	2019	2020	Difference [(2)-(1)]	% change
January	11.37	12.13	0.76	6.7
February	11.31	12.2	0.89	7.9
March	11.25	12.26	1.01	8.9
April	11.37	12.34	0.97	8.5
May	11.4	12.4	1.0	8.8
June	11.22	12.56	1.34	11.94



Crude oil (bonny light)

The price of crude oil is the single most powerful indicator of the size of Nigeria's revenue because a large portion of Nigeria's revenue derives from crude oil export. As shown in Table 8 below, in columns 4 & 5, the price of crude oil fell significantly at the peak of the COVID-19 pandemic in Nigeria in March, April

and May, which led to an economic crisis. Subsequently, the price of crude oil export began to increase slightly in June as the Nigerian government began to ease the lockdown restrictions. The decline in the price of crude oil export from March to April worsened the country's budget deficit and forced Nigerian government to seek foreign loans to avert the existing economic crisis.

Table 8: Analysis of the Price of Crude Oil Export from January to June of 2019 and 2020

		(1)	(2)	(3)	(4)	(5)
Month/Year			2019	2020	Difference (3)-(2)	% change
January	30-January		62.69	61.07	-1.62	-2.6
February	28-February		66.23	53.76	-12.47	-18.8
March	31-March		69.02	15.07	-53.95	-78.2
April	30-April		73.72	13.88	-59.84	-81.2
May	29-May		75.76	33.91	-41.85	-55.2
June	30-June		-	42.94	-	-

Analysis of the structural causes

Health care infrastructure

An analysis of Nigeria's healthcare infrastructure prior to the COVID-19 pandemic is reported in Table 9. It shows that the number of hospital beds per 1,000 people increased from 1960 to 1988, and decreased from 1990 to 2004. This implies that the healthcare facilities such as hospital beds, are insufficient relative to the growing population in Nigeria.

Digital economy

An analysis of Nigeria's digital economy data prior to the COVID-19 pandemic is reported in

Table 10. It shows that the proportion of individuals using the internet, using mobile phones to pay bills and to send money in Nigeria is increasing while the fixed broadband subscriptions per 100 people has decreased. This result suggests that, although a lot people are willing and able to use digital services in the country, the number of people who have access a fixed broadband subscription is declining possibly due to high cost of broadband subscription.



Table 9: Number of hospital beds per 1,000 people in Nigeria

Country	Indicator Name	1960	1970	1975	1980	1988	1990	2000	2004
Nigeria	Hospital beds (per 1,000 people)	0.42	0.56	0.56	0.87	6.37	1.67	1.2	0.5

The implication is that, although Nigeria has some digital economy infrastructure, the declining fixed broadband subscriptions per 100 people became a

challenge for Nigeria which worsened the ability of citizens to fully move their businesses to a digital platform during the 2020 COVID-19 pandemic.

Some digital economy indicators	(1)	(2)	(3)	(4)	(5)
Mobile phone used to pay bills (% age 15+)	2010	2014	2017	% change	% change
Mobile phone used to send money (% age 15+)	-	1.824	5.18	-	184.6
Mobile phone used to pay bills (% age 15+)		0.467	1.29	-	100.7
Fixed broadband subscriptions (per 100 people)	0.063	0.089	0.06	-41.3	-34.7
Individuals using the Internet (% of population)	11.5	21	42	82.6	100

Social welfare infrastructure

An analysis of Nigeria's social welfare infrastructure prior to the COVID-19 pandemic is reported in Table II. It shows that the adequacy of social insurance programs, as a percentage of total welfare of beneficiary households in Nigeria, increased from 2012 to 2015. Similarly, the adequacy of social protection and labor programs, as a percentage of

total welfare of beneficiary households in Nigeria, increased in 2012 and 2015 respectively, while the adequacy of social protection and labor programs, as a percentage of total welfare of beneficiary households in Nigeria, decreased in 2012. The implication is that Nigeria had a social safety net prior to the COVID-19 pandemic, but in reality, these safety nets were either nonexistent, dysfunctional or existing but not implemented during the 2020 COVID-19 pandemic.

Table II: Social welfare infrastructure in Nigeria

Country	Social Welfare Indicator	2010	2012	2015
Nigeria	Adequacy of social insurance programs (% of total welfare of beneficiary households)	-	9.79	29.28
Nigeria	Adequacy of social protection and labor programs (% of total welfare of beneficiary households)	2.65	7.57	18.34
Nigeria	Adequacy of social safety net programs (% of total welfare of beneficiary households)	2.65	0.63	2.18



CONCLUSION

As the spread of the virus is likely to continue disrupting economic activity and negatively impact manufacturing and service industries in Nigeria, we expect that financial markets will continue to be volatile. There is still a question as to whether this unfolding crisis will have a lasting structural impact on the global economy or largely short-term financial and economic consequences. In either case, it is evident that communicable diseases such as COVID-19 have the potential to inflict severe economic and financial costs on regional and global economies.

This paper undertakes a descriptive review on the recent economic crisis in Nigeria. It showed that the spillover of COVID-19 pandemic in Nigeria coupled with declining oil price, which were external shocks, caused economic crisis in Nigeria in 2020. The structural problems in Nigeria at that time prolonged the economic crisis.

The implication of the study is that policy makers should pay attention to three areas of the economy for economic and structural reform. Firstly, policy makers should introduce economic reforms to diversify the economy and reduce Nigeria's dependence on revenue from crude oil export. Secondly, policymakers in Nigeria should invest in health care infrastructure to improve the ability of the national health system to withstand the outbreak of contagious diseases. Thirdly, there is also a need to build appropriate digital infrastructure to facilitate the transition from 'face-to face' business activities to a 'digital or online' business activities, which can help to grow the digital economy.

Finally, policy makers should use legislation to create a robust social welfare safety net for all citizens particularly for unemployed citizens and poor households. Finally, the government need to focus on rebuilding institutions, and pay more attention to

institutions like National Agency for Food and Drug Administration and Control (NAFDAC), and the Nigeria Centre for Disease Control (NCDC).

The scope and severity of the economic crisis in Nigeria, caused by the fall in oil price and the COVID-19 pandemic, is a clear signal that growth and development reforms are needed in Nigeria.

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