

ISBN : 978-81-948376-5-7

POST COVID

OPPORTUNITIES AND CHALLENGES

Edition I



Post Covid Opportunities and Challenges
Edition I

Dr. Asha & Dr. Ashok



Dr. Asha Rathi
Dr. Ashok Kumar

POST COVID OPPORTUNITIES AND CHALLENGES

Edited by:

Dr. Asha Rathi

Assistant Professor

Department of Business Administration

Jai Narain Vyas University, Jodhpur, Rajasthan, India

Dr. Ashok Kumar

Assistant Professor

Department of Business Administration

Jai Narain Vyas University, Jodhpur, Rajasthan, India

I N S P I R ATM
Reg. No. SH-481 R- 9-V P-76/2014

JAIPUR - DELHI (INDIA)

Published by
INSPIRA
Prof. (Dr.) S S Modi
Proprietor
25, Modi Sadan
Sudama Nagar
Tonk Road
Jaipur-302018
Rajasthan, India

© Publisher

ISBN: 978-81-948376-5-7

First Edition: June 2021

All rights reserved. No part of this book may be reproduced in any form without the prior permission in writing from the Publisher. Breach of this condition is liable for legal action. All disputes are subject to Jaipur Jurisdiction only.

Price: Rs. 690/-

Laser Type Setting by
INSPIRA
Tonk Road, Jaipur
Ph.: 0141-2710264

Printed at
Akrati Advertisers, Jaipur

CONTENTS

Chapter	Topic	Page No.
1	Post Covid-19 Pandemic Society: Changes and Challenges <i>Dr. Kapil Kumar</i>	01-06
2	COVID-19: Rebooted the Challenges and Opportunities: Time to Reorganize the Growth Plans <i>Rama Narasimham</i>	07-11
3	Impact of COVID-19 on Industries in India <i>Mr. Kaushikkumar Ratilal Dalvi</i>	12-22
4	Study of Current Scenario of COVID-19 Patients in Context of India with USA using Machine Learning Algorithms <i>Anurag Bhatnagar, Usha Badhera & Vaibhav Bhatnagar</i>	23-47
5	Analysis of Health Sector for COVID-19 Pandemic <i>Vaibhav Bhatnagar, Shilpa Sharma & Linesh Raja</i>	48-60
6	Transformation of Multi-Channel Retailing into Omni-Channel Retailing in the Post-COVID World <i>Ravikanth Reddy Vadamala</i>	61-72
7	Work from Home: A Prospective Model of Working Post COVID 19 Outbreak in India <i>Ms Vidushi Bajpai & Dr. Bhawna Chahar</i>	73-82

8	Covid-19 Prediction using Supervised Models for Machine Learning <i>Shilpa Sharma, Harshal Patil & Devershi Pallavi Bhatt</i>	83-89
9	Post Covid-19 Opportunities and Challenges in India <i>Prof. Fatima Begum Saderkhan</i>	90-101
10	Rebooting Indians Economy Post Covid-19 Pandemic <i>Bhader Singh & Vinod Shant</i>	102-112
11	Impact of Covid-19 on Banking Business: A Review <i>Dr. Neelam Sethi</i>	113-118
12	Collective Actions of Women Self-Help Groups and their Functioning in Rural Areas during Covid-19 in India <i>Dr. Vikas Batra</i>	119-126



Post Covid-19 Pandemic Society: Changes and Challenges

Dr. Kapil Kumar*

Introduction

The outbreak of the COVID-19 is a clear warning that pandemics have existed in the past and exist in the future like many other unusual catastrophes. We should plan to dim their influence on civilization, even though we cannot avoid the advent of harmful viruses. The current epidemic has serious economic implications across the globe and does not seem to impact any region. In addition to the immediate and challenging work, the issue of reopening our communities after the pandemic of the latest coronavirus raises particular questions for social researchers. The dilemma for academics is not just whether civilization will evolve after the Covid 19 pandemic. However, how are the social circumstances revealed, amplified and generated by the current coronavirus forcing us to rethink significantly our ideas about culture and hence some of the existing social science beliefs, approaches and theories?

The Covid 19 crisis has undermined standard economic and governance practices as well as science knowledge. The global economic recession has been unexpected in recent weeks; given the intensity and scale of this slowdown has no historical context, their effect cannot easily be influenced by the traditional methods of social science. We see transformations in the field of political economics without historical precedents, such that even when modern and unforeseen informal markets develop, they are difficult to accurately model them. Besides adding new complexities, the pandemic reinforced what scientists know about socioeconomic injustice, and introduced unequal odds of survival to the cross-setting forces of race, class, and gender. A significant, more severe social pandemic of racial injustice is, for instance, the disproportionate life-threatening effect of the latest coronavirus on the Black populations in the United States. Social scientists have for many years been conscious of health and well-being as regards socioeconomic prospects, jobs, prison and detention conditions, housing insecurity and access to education.

* Assistant Professor, Department of Management Studies, BPS Mahila Vishwavidyalaya, Khanpur Kalan, Sonapat, Haryana, India.

Common Socio-Economic Impacts of COVID-19

- Self-isolation and distancing
- Restrictions on travel and transport
- Reduced workers in all business industries
- Loss of jobs
- Closing school
- Disorder to children's usual lives
- Demand for goods and products produced decreased
- Increased medical supply requirement
- Increased food sector demand
- Panic purchase and transportation.
- Health, medical and dietary domino effect
- "Infodemic": panic and anxiety propagate across social networks
- Xenophobia against particular racial and geographical communities
- Education research 'COVIDIZATION': to discredit other research and academic fields.
- The poor, transient, immigrants, migrants are impacted by health overwhelmingly.

In order to introduce and sustain health care programs as well as socio-economic reintegration of the group members, it is important to recognize the psycho-social barriers for Covid-infected people and their health care practitioners. A Covid-affected patient has as important a social recovery and psychiatric assistance as its prompt diagnosis and treatment. When the health system matures, it is not only necessary but important to meet these real needs of patients. The patient's story highlighted emotions of fear, fear, disappointment, depression, loneliness and optimism as well. The medical narrative offers a general summary of the health and safety factors for patients with COVID-19, the health care problems, details on Covid's natural history, variations in biological and social understanding among COVID-19 and AIDS leprosy and the complexities of patient-health care.

Healthcare Expenditure and Financial Stress

The effect on personal/family income and social deprivation of out-of-pocket health spending is a real concern in the past. In India, the average hospitalization OOPE (out of pocket) for 2014 was INR 19,210, the cost was higher for cancer and then heart disease (INR 57,232). (INR 40,947). Average cost of managing a respiratory disease previously reported in India was in 2014 INR 15,046.[13] The patient's life support system (mechanical ventilation, dialysis, intensive care) or long

hospitalization costs would probably be high when vaccines are in first stage of implementation for COVID-19 (for example, Covaxin, Remdesviretc). To that end, states released advisories to private hospitals on recommended pricing lists for COVID-19 health care facilities. In its purported attempts to monitor the genetics of the pandemic, the national lockdown has just intensified the financial hardships of the citizens.

- Shift in lifestyle
- Broad purchasing delaying
- Reduced holiday and recreation expenses
- The use of schemes for voluntary subsidies/funds/co-payment to offset treatment expenses.
- Temporary work loss due to illness/medical care
- Want to market inventories and savings
- Use of insurance plans, income with disabilities or pension funds
- Need to reimburse medical costs for mortgage/refinancing home
- Long-term work loss after medical attention.
- Debt actually exceeding household incomes .
- Failure to pay for food and services necessities .
- Have to buy medical bills at home
- Medical treatment declaration of bankruptcy
- Need for financial burden to avoid treatment
- Extreme emotional shock

The effect of Covid-19 on education from the economy was cruel and can be seen in the future. WB warns of the lifelong effect of school closures on the productivity of this generation of pupils, according to the World Bank's study entitled "Drowned or Broken: Informality and Covid." Any information and their academic abilities could be ignored by children who have missed school for eight months.

Conclusion

The effect of Covid-19 is diverse and countless, as India is known as a country of diversity. However, if we see the other side of fact, COVID-19 has influenced our culture and that is certain, but only negative? This is what we would thoroughly examine and cannot leave without a quick debate. We should ask the true question at this stage: what sort of society we are going to see after the Covid-19? Fragmented? Fragmented? Anyone? We don't know, so we must help each other again. We do not know. In order to make India an earth's better place for its people and the universe we must follow the principles set out in our preamble to the Constitutions, e.g. 'Freedom, Solidarity, Intelligibility' .

References

- Anser M.K., Yousaf Z., Khan M.A., Nassani A.A., Alotaibi S.M., QaziAbro M.M. Does communicable diseases (including COVID-19) may increase global poverty risk? A cloud on the horizon. *Environ Res.* 2020 May 15;187:109668.
- Bureau Covid-19 lockdown estimated to cost India \$4.5 billion a day: acuité Ratings. *The Hindu businessline.* 2020 <https://www.thehindubusinessline.com/economy/covid-19-lockdown-estimated-to-cost-india-45-billion-a-day-acuité-ratings/article31235264.ece> [Internet] [cited, Apr 23]. Available from. [Google Scholar]
- Dejongh F. Protecting the most vulnerable children from the impact of coronavirus: an agenda for action. <https://www.unicef.org/coronavirus/agenda-for-action> [Internet]. [cited 2020 Apr 23].
- Edwin T. Why migrant workers are protesting: No money to buy essentials, limited access to cooked food. <https://www.thehindubusinessline.com/news/why-migrant-workers-are-protesting-no-money-to-buy-essentials-limited-access-to-cooked-food/article31352912.ece> [Internet]. @businessline. [cited 2020 Apr 23].
- Ghosal S., Sinha B., Majumder M., Misra A. Estimation of effects of nationwide lockdown for containing coronavirus infection on worsening of glycosylated haemoglobin and increase in diabetes-related complications: a simulation model using multivariate regression analysis. *Diabetes MetabSyndr.* 2020 Apr 10;14(4):319–323.
- Ghosh A., Arora B., Gupta R., Shajit A., Misra A. Effects of nationwide lockdown during COVID-19 epidemic on lifestyle and other medical issues of patients with type 2 diabetes in north India. *DiabetolMetab Syndrome.* 2020 [Press]
- Guermond V., Datta K. How coronavirus could hit the billions migrant workers send home. *World Economic Forum.* 2020 <https://www.weforum.org/agenda/2020/04/how-coronavirus-could-hit-the-billions-migrant-workers-send-home/> [Internet] [cited, Apr 23].
- Gupta R., Hussain A., Misra A. Diabetes and COVID-19: evidence, current status and unanswered research questions. *Eur J ClinNutr.* 2020 May 13 <https://www.nature.com/articles/s41430-020-0652-1> [Internet] [cited 2020 May 25];1–7.
- Hogan A., Jewell B., Sherrard-Smith E., Vesga J., Watson O., Whittaker C. Report 19: the potential impact of the COVID-19 epidemic on HIV, TB and malaria in low- and middle-income countries. 2020 May.

- <http://spiral.imperial.ac.uk/handle/10044/1/78670> [Internet]. Imperial College London, [cited 2020 May 18].
- Jacobson D. Indian society and ways of living. Asia Soc. 2020 <https://asiasociety.org/education/indian-society-and-ways-living> [Internet] [cited, May 22].
 - Kaul P. India's Stark inequalities make social distancing much easier for some than others. <http://theconversation.com/indias-stark-inequalities-make-social-distancing-much-easier-for-some-than-others-134864> [Internet], The Conversation.
 - MahendraDev S. Addressing COVID-19 impacts on agriculture, food security, and livelihoods in India | IFPRI : international food policy research institute. <https://www.ifpri.org/blog/addressing-covid-19-impacts-agriculture-food-security-and-livelihoods-india> [Internet]. IFPRI. [cited 2020 May 22].
 - Mail Today Bureau April 27 2020UPDATED:;lst 2020 04:45. Domestic violence spikes in lockdown, govt told to step in. <https://www.indiatoday.in/mail-today/story/domestic-violence-spikes-in-lockdown-govt-told-to-step-in-1671460-2020-04-27>.
 - Mishra A.R. India's slow growth is a drag on the world: IMF. Livemint. 2020 <https://www.livemint.com/news/india/india-s-slow-growth-is-a-drag-on-the-world-imf-11579541807331.html> [Internet] [cited 2020 May 5]. Available from. [Google Scholar]
 - Mishra H.H. Coronavirus lockdown: how to keep 130 million migrant workers afloat during COVID-19 crisis. <https://www.businesstoday.in/opinion/columns/coronavirus-lockdown-130-million-migrant-workers-afloat-covid-19-crisis-unorganised-sector/story/400806.html> [Internet]. [cited 2020 Apr 23].
 - MoHFW. National health policy 2015. 2014. https://www.nhp.gov.in/sites/default/files/pdf/draft_national_health_policy_2015.pdf
 - Moses N.V. Covid-19: India is staring at a mental health crisis. Hind Today. 2020 <https://www.hindustantimes.com/analysis/covid-19-india-is-staring-at-a-mental-health-crisis/story-hmBOzUYsbo3SmtIWilmBzL.html> [Internet] [cited 2020 May 22].
 - Press Trust of India W. Remittances to India likely to decline by 23% in 2020 due to covid-19: world bank. <https://www.indiatoday.in/business/story/remittances-to-india-likely-to-decline-by-23-in-2020-due-to-covid-19-world-bank-1670052-2020-04-23> [Internet]. India Today. [cited 2020 May 18].
 - RBI. Reserve Bank of India <https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=19334> [Internet], Reserve Bank of India - Publications. [cited 2020 May 5]. Available from.

- Robertson T., Carter E.D., Chou V.B., Stegmuller A.R., Jackson B.D., Tam Y. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. *Lancet Glob Health*. 2020 May 12 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7217645/> [Internet] [cited 2020 May 19];
- Rothan H.A., Byrareddy S.N. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun*. 2020 May <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7127067/> [Internet] [cited 2020 Apr 24];109:102433. Available from. [PMC free article] [PubMed] [Google Scholar]
- Saini S. COVID-19 may double poverty in India. *Financ Express*. 2020 <https://www.financialexpress.com/opinion/covid-19-may-double-poverty-in-india/1943736/> [Internet] [cited 2020 May 22].
- Sharma N.C. Private hospitals stare at losses amid covid outbreak. *Livemint*. 2020 <https://www.livemint.com/news/india/private-hospitals-stare-at-losses-amid-covid-outbreak-11586889225780.html> [Internet] [cited 2020 May 5]. Available from. [Google Scholar]
- Singh A.K., Gupta R., Misra A. Comorbidities in COVID-19: outcomes in hypertensive cohort and controversies with renin angiotensin system blockers. *Diabetes MetabSyndr*. 2020 Apr 9;14(4):283–287.
- Singh A.K., Misra A. Editorial: herd mentality, herds of migrants/people, and COVID-19 in India. *Diabetes MetabSyndr*. 2020 May 5 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7198411/> [Internet] [cited 2020 May 6];
- Thakur R.K. Food Corporation of India allocates 120 LMT foodgrains for distribution in states amid lockdown- the New Indian Express. <https://www.newindianexpress.com/nation/2020/may/14/food-corporation-of-india-allocates-120-lmt-foodgrains-for-distribution-in-states-amid-lockdown-2143394.html> [Internet]. The New Indian Express. [cited 2020 May 25].
- WebDesk Young old, male or female: 86% of 111 who died of COVID-19 had one factor in common. <https://www.theweek.in/news/india/2020/04/07/young-old-male-female-86-per-cent-of-111-covid-19-deaths-had-one-factor-in-common.html> [Internet], The Week. [cited 2020 May 6].

COVID-19: Rebooted the Challenges and Opportunities: Time to Reorganize the Growth Plans

Rama Narasimham*

Introduction

This paper attempts to provide an overview on how the pandemic situation prevailed during Q2 of 2020 and that was continued. Also elaborated on the new set of challenges those were faced by the global economies and public. Overall, how the Covid-19 rebooted the challenges & opportunities of the entire globe. The paper finally explains how can the Indian economies to transform by utilizing this challenge as a catalyst to make the growth plans.

Conditions prevailing during Q2 of 2020

The corona virus (Covid-19) spread across the world and disrupted the world economies. All major sectors were forced to shut down completely. The Covid-19 was declared by WHO (World Health Organization) as a pandemic, caused complete lock down of the entire industry and all major sectors. During the century, the world has witnessed two world wars and badly affected by them. The Covid-19 is being treated as a third world war with which the entire globe is fighting with. Still there is no probable visibility on when this war will be going to an end.

The outbreak of the Covid raised many questions on China's transparency. Because of suppression of important facts and wrong information shared about the virus by China, the virus spread was drastically high. By the time the WHO noticed that the virus spread between human to human very quickly and by the time declared it as a pandemic condition and health emergency across the globe, the major countries witnessed its hard impact. Each country faced the situation by lock down its economy to prevent the damage of lives. Governments across the globe started declaring complete lock down of all economic activities to avoid people movements

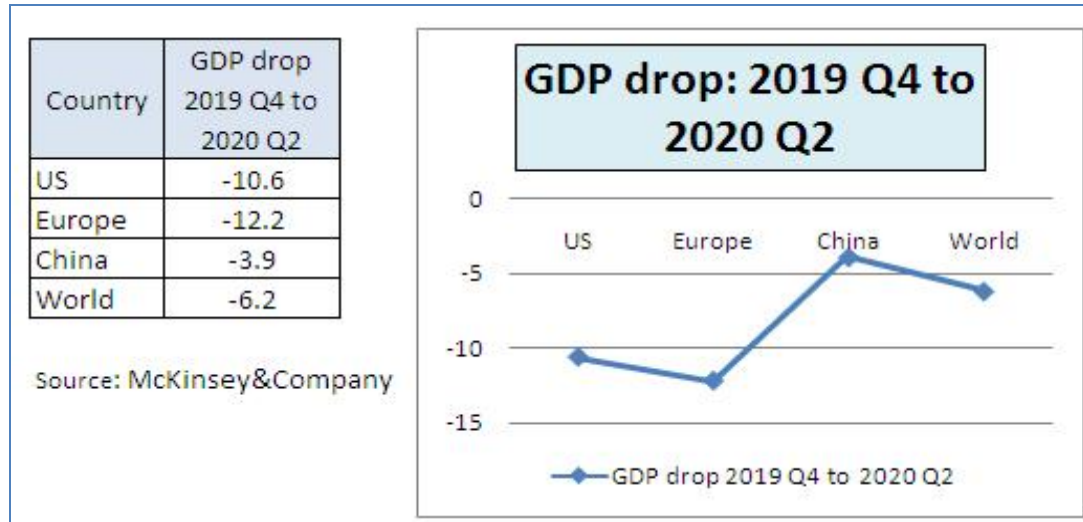
* Business Writer, Hyderabad, India.

and thereby to prevent spreading of the virus. The global economy was declined to the lowest ever since 1933. Within weeks time, the virus spread across the boundaries drastically and taken away the lives of many people particularly in European countries.

The below are some of the major happenings that probably the entire global population has witnessed for the first time during their lifetime:

- The Governments imposed strict restrictions on people movements, almost restricted to their homes
- People those infected with Covid were went into quarentine, which means restrict themsleves to their rooms. That means complete social distancing with everyone including the family members in the same house
- Governments across the Globe imposed severe penalties and punishments on people coming onto roads without proper mask, outside spitting and any action that may cause the virus spread
- Food habits and life styles have been changed completely
- All industrial activities were shuttered down to prevent the virus spread. All service sectors are closed
- The entire transport system – air,road and sea travels are banned between the countries
- The WHO and Health Ministries of all major countries started releasing health bullitens and statistics on the count of Covid impacted patients and death rates on a daily basis
- Tourism and hospitality industry were the badly affected sectors. Both had seen complete shutdown. The flights and occupancy of hotel rooms was dropped beyond 80%
- Due to complete shutdown of economic activities and people movements, many daily wage earners lost their livelihood. Millions of people lost their Jobs
- Many orgnaisations started providing Work from home facility to their employees where operations can be continued through WFH. Eventually the Schools and Educational institutions started providing on-line classes
- Countries across the globe provided financial packages starting from 5 – 10 percent of their annual GDP to sustain the economic survival. Also provided direct Cash transfers and necessary food supplies to the individuals who affected badly due to the pandemic
- The unemployment rates were drastically increased all over the world. In India, as per CMIE (Center for Monitoring Indian Economy) the unemployment rate in Jan. 2020 was 7.22 % whereas it was jumped to 23.52% in Apr. 2020

- Huge drop in GDP growth rates across World economies to the lowest ever as shown in below table:



- Stock markets of all countries have been crashed to a great extent
- Digital transactions and WFH facilities were hiked up to a great extent, which caused an increase in cyber crimes

Challenges thrown up by Covid -19 to the world

The pandemic situation because of Covid-19 has presented completely different kind of challenges to the world. There is no one in the world expected this kind of pandemic, completely shutting down the economies which eventually presented to the world a different set of challenges which were faced never before.

- The biggest challenge is saving of human lives. As per WHO latest report in Jan.21, the total number of confirmed cases across the globe is 101 million and the death rate is over 2 million. Most affected regions are US with above 45 million confirmed cases, Europe at 34+million and South East Asia with 12+ million confirmed cases. However, the good part in recent times is rising in recovery rates across the globe
- The second challenge is to find out the answer to the question how to end this pandemic situation. Major countries started working on to develop vaccines including India. Recently few vaccines were developed and tested successfully, which were accepted by governments of major economies. Some countries started giving vaccination to the public in Jan.21. The real challenge is how to produce and distribute the vaccine to the major public across the globe
- Customer and Consumer confidence was very low, thereby reduction in global consumption and demand

- Supply chain was very badly affected. This is the main bone of the international trade and Organizational success
- Many MSMEs in India and world broadly depends on China companies for raw material. This caused a major setback for MSME sector. Nearly 45 per cent of Indian exports are contributed by the MSME sector. Now that is affected very badly. Financial package and digital transformation is the need of the hour in this sector

Opportunities: Covid-19 has rebooted the opportunities

The growth prospects of each economy majorly depends on its decisions and proactive behavior about how they turn these challenges as a catalyst to accelerate the growth

- World believes that China attempted to hide key information on the virus and could avoid consequent repercussions. Now many companies are thinking to shift their operations from China and trying to find a better place. Japan has released a package of around \$2 billion dollars to support in shifting their operations from China back to Japan. At the same time China is facing a biggest trade war with US. Also many European countries are looking to shift their operations to a better place than China. This will be a game changer for Indian economy to attract the investors by restructure the business plans to accelerate the growth
- Digital transactions are increased to a great extend. This created potential opportunities for cyber professionals. India has a bright scope on this front to look for. Digital transformation as a service can be a new sector for growth, India can lead on this front globally
- Banking and capital markets are able to operate very effectively in India throughout the covid crisis. MNCs and outsourcing firms affectively managed the pandemic with WFH and with an increased productivity. This was proved that India is a right destination for the world to establish their operations
- Make in India and self sufficient Bharat initiatives have created a good platform for growth. India Easy of doing business rank has been jumped from 142 in 2014 to 63 in 2019, it's a dramatic change
- India is much better scored compared with China in Intellectual property rights protection and transparent government norms
- WHO praised India in handling Covid much better and asked to lead the world on that front. Huge opportunities to grab the world market on paramedical and cleaning staff. Major role to play on health care industry by providing training and skill developments, quality research and development facilities. India already known for as a major hub for Medical tourism.

References

1. Commonwealth of Massachusetts (2020), , <https://www.mass.gov/news/baker-polito-administration-announces-covid-19-community-tracing-collaborative-to-further> (accessed on 17 November 2020).
2. Global Innovation Exchange (2020), Joint donor COVID-19 Innovation Hub, <https://covid19innovationhub.org/> (accessed on 17 November 2020).
3. Maker's Asylum (2020), , <https://www.makersasylum.com/m19-shields/> (accessed on 17 November 2020).
4. USAID (n.d.), Local works, <https://www.usaid.gov/localworks> (accessed on 17 November 2020).



Impact of COVID-19 on Industries in India

Mr. Kaushikkumar Ratilal Dalvi*

Introduction

The outbreak of 2019 novel corona virus disease (COVID-19) is a public health emergency of international concern (WHO, 2020) that had spread to more than 100 countries by March 8, with more than 100,000 infections and 3,830 deaths (NHC, 2020; WHO, 2020), seriously affecting economic and social development. On February 28, UN Secretary-General Guterres called on governments to take action to do everything possible to control COVID-19 pneumonia (New.cn, 2020). At the present globally, as of 6:31pm CET, 28 January 2021, there have been 100,455,529 confirmed cases of COVID-19, including 2,166,440 deaths, reported to WHO.

The outbreak of COVID-19 has impacted nations in an enormous way, especially the nationwide lockdowns which have brought social and economic life to a standstill. A world which forever buzzed with activities has fallen silent and all the resources have been diverted to meeting the never-experienced-before crisis. There is a multi-sectoral impact of the virus as the economic activities of nations have slowed down. What is astonishing and worth noting is an alarm bell which was rung in 2019 by the World Health Organization (WHO) about the world's inability to fight a global pandemic. A 2019 joint report from the WHO and the World Bank estimated the impact of such a pandemic at 2.2 per cent to 4.8 per cent of global GDP. That prediction seems to have come true, as we see the world getting engulfed by this crisis.

* Assistant Professor, Department of Commerce and Management, Kachchh University, Bhuj, Gujarat, India.

Impact of COVID-19 on Industries in India

Agriculture



The ongoing health crisis around COVID19 has affected all walks of life. Protecting lives of people suffering from the disease as well as frontline health responders have been the priority of nations. Governments have swung into actions since the Corona virus attack created an unprecedented situation. India declared a three-week nation-wide lockdown till mid-April in the initial phase, which was subsequently extended for achieving satisfactory containment of the virus spread.

During these challenging times, how does Indian Agriculture respond to the crisis and how do government measures affect 140 million farm households across the country and thereafter impact the economy of a very important country in the developing world? We assess the immediate challenges that COVID19 has posed to the farm sector and suggest mitigation measures to ensure a sustainable food system in the post-crisis period.

The Indian Council of Agricultural Research (ICAR) has issued state-wise guidelines for farmers to be followed during the lockdown period. The advisory mentions specific practices during harvest and threshing of various rabi (winter sown) crops as well as post-harvest, storage and marketing of the farm produce.

Automobile



The global pandemic caused by the novel corona virus comes at time when both the Indian economy and the automotive industry were hoping for recovery. While the GDP growth forecasts were north of 5.5%, COVID-19 may result in a negative impact of 1-2% on the expected growth rates.

The onset of Covid-19 in India will have a negative impact on the automotive industry. It is estimated that there will be an overall revenue impact of at least \$1.5 - 2.0 bn per month across the industry. Even after we open up, further decline in passenger vehicles demand is expected with discretionary spend taking a backseat. This will be coupled with transition to BS-VI norms that will increase cost of ownership.

Farm sector and two wheelers demand could see a dip but expected to bounce back in the U fashion. Commercial vehicles are expected to show some resilience, although this is contingent on government continuing to invest in large infrastructure projects and the liquidity available with the transportation sector.

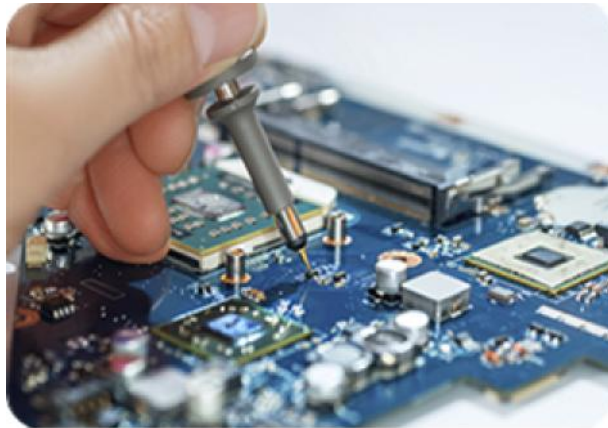
The supply chain is expected to adapt quickly as China is coming back faster than normal, however extended supply chain visibility at Tier 2/3 level is the biggest risk mitigation factor that vehicle companies will need to work on.

The impact of COVID on the economy & automotive industry could vary depending on intensity, duration and spread of the outbreak. As a result, the economy may witness a recovery that is V shape – Quick recovery, U shape – Impacting whole of 2020 or L shape – 18 months of downturn.

Education Sector



The pandemic has disrupted the education sector as people are forced to stay at home. The schools and colleges remain closed ever since the nationwide lockdown was imposed. Many children are struggling to keep up with the challenges of online classes. Students and teachers in cities, towns and villages scramble to cope with the demands of the times. From September 21, students of class 9-12 were allowed to attend schools physically on a voluntary basis as per the government's Unlock 4 guidelines.

Electronics

One of the biggest challenges for the Indian electronics manufacturing sector is its excessive dependence on imports. China is the largest manufacturer of electronics in the world and also the largest exporter. India imports almost US\$ 60 billion worth of electronic equipment, assemblies, components and raw materials every year, and a majority of this is sourced from China. Wuhan is a major manufacturing centre for the electronics industry and companies based there are important suppliers for Indian manufacturers. MSMEs are bearing the brunt of the disruption in supplies caused due to the coronavirus, which has resulted in the lockdown of several cities and towns. MSMEs have limited resources and generally do not have many suppliers or alternative sources. The only saving grace has been that the COVID-19 outbreak happened just before the Chinese New Year holidays when Indian companies usually arrange for extra stocks on account of the holidays.

The leading consumer electronics and smartphone companies in India have announced a decrease in production and there is a high chance that the launch of new products will be delayed. China produces 75 per cent of the total value of the components used in TVs and almost 85 per cent, in the case of smartphones, claims the ET. In fact, the pivotal components such as mobile displays, open cell TV panels, printed circuit boards, capacitors, memory and LED chips, are all imported from China. The market lockdown has forced Chinese vendors to increase the cost of components by 2-3 per cent due to the shortage of supplies. This will ultimately increase the prices of Indian electronic products.

The giant manufacturers such as Panasonic, Haier, Samsung, Voltas and LG have decided to raise prices of their products by 3-5 per cent, depending on the models, which implies a hike of Rs 3000- Rs 4000 on premium and flagship models. The Budget had increased the import duty on refrigerator and air-conditioner compressors from 10 per cent to 12.5 per cent. On motors used in washing machines and some other products, the import tax has gone up from 7.5 per cent to 10 per cent.

Food & Beverage Industry



Considering the current market conditions, the virus is rapidly impacting the consumption and supply chain for the companies in the market. There is a wide increase in the alcohol-based cleaning sanitizers and important daily consuming food products, which makes consumers panicking in the market and this results in grocery shelves to face scarcity. This disturbs the supply chain and suddenly created the demand for a high amount of raw materials and ingredients to the F&B companies, this hampered the production and forcing them to shut operations due to limited manpower availability. It is expected that the F&B companies suffered a revenue loss of around 22% worldwide, as followed by the French trade group ANIA study.

Healthcare Industry



Healthcare is the epicentre during this unprecedented global pandemic. Lack of medical investment and healthcare infrastructure are the biggest challenge for an effective response in India in a battle against the novel pandemic. Amid the rising cases lack of healthcare facilities like shortage of beds, lack of protection equipment. According to a survey conducted by Local Circles, which included responses from over 17,000 individuals located in over 211 districts of the country, only 4% patients who needed an ICU bed were able to find one by going through the routine process while 78% are forced to use connections, clout to secure an ICU bed.

Hospitality Industry

The CII-Hotelivate report says that the shutdown which was initially expected to affect revenue streams till October have now indicated otherwise and only 30% of occupancy in hotels till the start of 2021. Currently hotels are seeing 80% to 85% erosion in revenue streams. The hospitality industry, including branded and unbranded hotels, will incur a revenue loss of \$19.31 billion, as per the CII-Hotelivate research.

Iron & Steel and Mineral Processing

Iron and steel are the basic raw material for many industries. All the industries are shut down due to their less usage. Mining and mineral processing were totally shut across the world. So, there's almost less supply of minerals. Due to this petroleum and its products supply has come down. The import of petroleum has declined in such a great range i.e., from few million litres in normal days to mere thousands of tons today.

IT Industry

The information technology industry has been the hallmark of the Indian growth story since the 1980s. The Indian IT sector has relied heavily on non-home markets for demand and resources and built deep global ties using co-location with clients, enabled by international travel and temporary on-site migration, acting as a key mechanism in developing “cognitive proximity.” However, the COVID-19 pandemic is expected to make international travel and migration more restrictive and costlier, maybe for a long time. The paradigm shift creates significant barriers for IT firms to be able to maintain cognitive proximity with its clients and could adversely impact their global competitiveness.

Personal Care & Cosmetics Industry



The industry primarily comprises products related to skin care, fragrances & perfumes, haircare, and others. These all products witness a wide downfall in the demand and consumption owing to halt in operation across the online and offline distribution channels in the global market. Considering many countries' operations in the pandemic situation, there is still a lockdown and pause in the supply of any kind of non-essential products. This decrease in demand from the end-users and limited manpower engagement in the production areas are resulted in the shutting production operation of the companies and stops trade of personal care & cosmetics products in the market. The industry mainly affected owing to the halting distribution of non-essential products of e-commerce companies such as Amazon, Alibaba, and Flipkart. Moreover, hypermarket and supermarket companies also halted the distribution of non-essential products in some countries.

Pharma Industry



COVID-19 created a disrupted effect in the pharma industry and further leads an incredible pressure on the companies to maintain a positive supply of medical products, creating a problem of shortage. The countries are dependent on the partnered countries for the raw materials in the pharma industry are heavily impacted by this spread of the virus, as it created a halt in the supply of all products between two countries. For instance, the US are greatly depending on the Asian companies for the raw materials related to pharmaceutical and medical devices and now they are facing high risks in supply shortages.

Currently, China is the leading producer and supplier of the active pharmaceutical ingredients (API) in the global market. Around 80% of Indian APIs are arrival from the Chinese companies, while the US's 13% of the medical supplies are producing by the Chinese.

Thus, these statistics stated that the pharma manufacturing companies in these countries have suffered heavily after the outbreak of the pandemic. In the industry, the virus enforced many pharma manufacturing to extends its production capabilities to produce masks, ventilators, sanitizers, and other pharma cleaning products to minimize the impact of the pandemic to some extent.

Telecommunication Industry



During this crisis period of COVID-19 and the lockdown, the telecom sector has ensured that people remain socially connected, information is processed and disseminated. Telecom networks have also enabled various sectors to remain connected and functioning, the move to work-from-home can be enabled, and other digital work like online classes, online payments, continue to be available to citizens. Despite the fact that the sector is reeling under a financial debt of over Rs 7.7 lakh crore, the industry continues to ensure the uptime of their networks remain at 99.99 per cent, while maintaining key quality of service parameters. At the initial phase of the lockdown, the telecom sector aggressively pursued with all the stake-holder's initiatives that would provide safety, accessibility, and bandwidth to mobile phone users during these challenging times. Telecom companies have placed their personnel in kirana stores, medical stores, grocery stores, mother dairies and

locations approved to be kept open by the government, so as to enable customers top up their service packs. Online access through company websites have been streamlined and made easy to navigate and for payments to be made. The industry has also gone the extra mile to ensure those at the “bottom of the pyramid” receive some free voice services and SMS services during the period of the lockdown.

Textile Industry



Textile industry was on good hike previously but now, situations have changed otherwise and we're running in great losses. Textile Industry is one of the largest contributors to the country's exports with around 11.4% share in India's total export earnings for the fiscal period ended 2018-19 valuing to nearly USD 37.5 billion (INR 2,596 billion) and growing at a CAGR of 7% since 2004-05. The industry is currently pegged at an estimate of USD 150 billion (INR 10,834 billion) with 75% of the total consumption being witnessed in domestic market, while exports accounted for the remaining 25% of the total market size. India ranked 2nd in textile export with 6% of global share and stood 5th in apparel export with 4% of global share. In terms of employment, Indian textile industry is the second largest employer after agriculture, providing direct and indirect employment to nearly 100 million people in India. The sector is broadly classified into three categories, with cotton accounting for 50% share, followed by man-made fibres and jute textiles.

Travel & Tourism Industry



Indian travel and tourism industry is one of the worst-impacted sectors by the coronavirus pandemic. More than one lakh of people in India depend on tourism for livelihood whereas in today, from Chandni - chowk market in Delhi till rushy Streets of charminar have come to a stand-still positions. Also, whole tourism department has been locking down due to pandemic fear. According to estimates, complete lock down of tourism has thrown government in to economic loss of about 20000 to 30000 crores. According to the Confederation of Indian Industry (CII) and hospitality consulting firm Hotelivate. Tour operators, including both online and offline as well as inbound and outbound will lose \$4.77 billion. The entire value chain linked to Travel & Tourism is likely to lose around 5 lakh crore or US \$65.57 billion, with the organized sector alone likely to lose US \$25 billion.

Real Estate



Real Estate businesses have paused-up since last few weeks. All the construction work has come to stand-still due to various reasons although, main reason being lock down. The year of 2020 brought the world to a screeching halt as the COVID 19 pandemic unsettled various verticals of the world. The businesses are struck hard, the markets have seen a record low and COVID-19 has also disrupted the real estate sector, which was on a growth trajectory since the last few years. The major industry contributing to national economy stalled as almost 1.3 billion people went under quarantine since 21st march 2020.

As per ANANROCK H1 2020 PAN India Residential Market report - Q2 2020 was the most impacted quarter with launches being the lowest since 2013. During this quarter, the new launch supply declined by 97% over Q1 2020 and 98% over the same period last year. Both the residential and commercial real estate sectors are hit in terms of launch, sale and purchase. The lacks of materials and labours have made the whole process slow and unpredictable. Although the investors and builders have braced themselves for the delays, the recovery of the real estate sector has been pushed farther away! The bounce-back of Real estate sector majorly depends upon the labours. And the situation of labours is not looking very promising! The effects of this pandemic can be dividing into three parts – the situations of labour, the current status of the market and the road of recovery ahead.

As soon as the lockdown was announced, the labours and lower segment families started facing a financial crisis. The people with daily wages also came face to face with their worst nightmare and had a hard time sustaining the living here. Most of the workforce migrated to their home towns, and the ones stuck here did not have any source of income.

Conclusion

Considering the impact of COVID-19 to the industries are expected to result in reduced demand and disrupted supply chain flow. In addition, the virus is also creating opportunities for the companies to re-innovate and change with time to remain relevant. The operation can be redesign and restarted with key development in the operation sites:

- Re-measures worker safety with the mandatory use of hygiene & sanitization products at worksites
- Reintroduce sourcing supplies
- Rationalize their product ranges
- Re-evaluate the supply chain issues and make it agile and strong
- Reintroduce the emergency response plans
- Bring optimization in the distribution channel, i.e. online and offline channels
- Change in pricing and promotion strategies through reviewing customer behavior

Two divisions of society are being affected to the superlative stage during this pandemic. They are poor and middle-class. These sections are now workless and some middle class of the elderly may be nil at their bank balance leading them to starvation. In such pathetic situations some people are helping the people by donating groceries etc. On behalf, we salute to those hands that are lending forward to feed the empty stomachs of needy and poor in such difficult situations, for their humanistic deeds.

References

- www.timesofindia.indiatimes.com
- www.Corona.mygov.in
- www.Webmd.com
- www.weforum.org
- www.researchgate.net
- www.accenture.com
- www.industrialautomationindia.in
- www.moneycontrol.com
- www.electronicb2b.com
- www.businessworld.in

Study of Current Scenario of COVID-19 Patients in Context of India with USA using Machine Learning Algorithms

Anurag Bhatnagar*
Usha Badhera**
Vaibhav Bhatnagar***

Introduction

Source and distribution of COVID-19 across the world and in India and the United States.

The COVID-19 coronavirus pandemic is presenting a threat in ongoing memory to global stability and it is the most exceptionally horrific risk we have encountered since the Second World War. After its rise in Asia towards the end of a year ago, the virus has spread almost to every landmass.

In any event, the pandemic goes impressively beyond a health epidemic and is indeed an unparalleled worldwide fiasco. This would also have financial and political consequences that would leave vital and long-standing scars by focusing on all the countries it contacts.

This study, focuses on the timeline of the outbreak of COVID-19 majorly on two most affected countries in the world United States and India as shown in figure1. These countries have reported a high number of confirmed and fatal cases. The period of investigation is when it was first reported i.e. from December 31, 2019, till October 29, 2020. The data is majorly collected from Johns Hopkins live dashboard, Wikipedia, and worldometers.info/coronavirus.

* Department of Information Technology, Manipal University Jaipur, Rajasthan, India.

** Jaipuria Institute of Management Jaipur, Rajasthan, India.

*** Corresponding Author, Vaibhav.bhatnagar15@gmail.com, Department of Computer Applications, Manipal University Jaipur, Rajasthan, India.

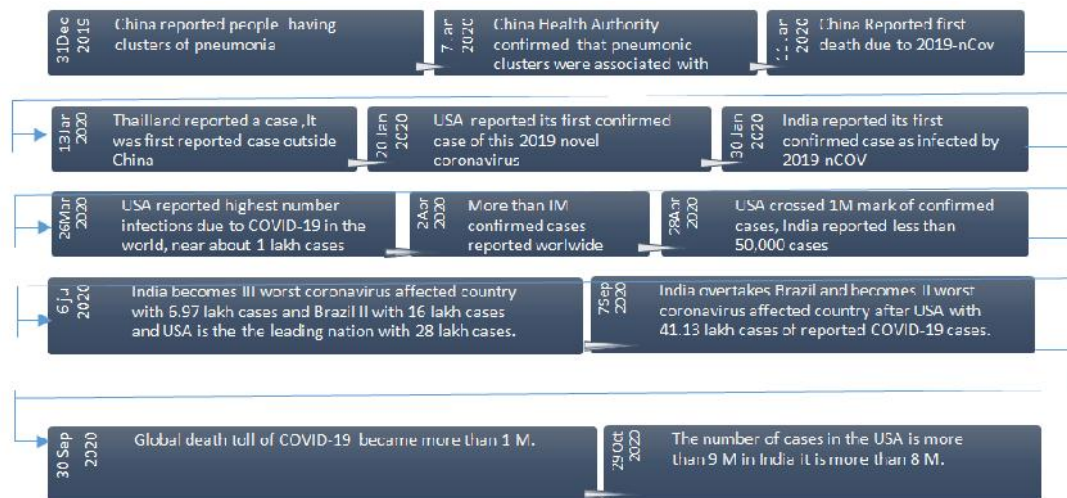


Figure 1: Timeline of origin and outbreak of COVID-19 in India and the USA.

On December 31, 2019, China confirmed incidents involving a cluster of pneumonia in persons associated to the Wuhan seafood center [1]. It was announced by the Chinese health authorities on January, 07, 2020 that these pneumonic clusters were infected with the novel coronavirus, 2019-nCoV [2], since its birth, the planet has struggled restlessly by its cause. The Center for Disease Control and Prevention of China (CDC) and local CDCs, following a screening criteria, attributed the epidemiology of this disease to a novel virus related to the coronavirus family [3], which included common cold SARS and spreads through airborne droplets. As of 29 October 2020, centered on universal live data from the Johns Hopkins dashboard, 45,362,862 global confirmed cases, and 1,187,995 global lost their lives globally [4].

China recorded first death due to 2019-nCoV on January 11, 2020 [5], and Thailand reported the case on January 13, 2020, and it was the first one which was reported outside of China [6]. The US reported its first confirmed case of this 2019 novel coronavirus in an American citizen on January 20, 2020 [1]. He was coming from Wuhan city, to his residence in Washington state. A total of 9976 cases were registered through at least 21 countries on January 30, 2020, [3]. CDC also confirmed the first US case of human to human transmission [7]. It was on this day only the outbreak of coronavirus has been announced a Public Health Emergency of International Concern (PHEIC) by WHO [8]. India also detected this disease in Kerala, a student who returned from Wuhan, on this day [9] was confirmed as infected by 2019-nCoV.

On February 11, 2020, the WHO officially named this latest coronavirus-related disease COVID-19 [10], and the new coronavirus SARS-CoV-2[10], COVID-19 belongs to the SARS-CoV and MERS-CoV families, starting with the initial symptoms of common cold [11].

On March 11, 2020, the WHO announced this to be a pandemic [12] as the number of cases of COVID-19 increased with enormous rate apart from China, with more than 118,000 cases in 114 countries and more than 4,000 fatalities [13]. February 29, 2020- [14] CDC, Washington State reported first death in US due to COVID-19.

March 26, 2020, the U.S. was reported as the leading nation in the world with highest numbers of infectious due to COVID-19, it surges past China and Italy, during this time India was among the least affected nations in the world by the advance of the coronavirus pandemic [15]. The U.S. surpasses the cumulative number of 1 lakh cases on March 27, 2020, and India crossed it on May 19, 2020[15].

April 2, 2020, More than 1M cases were confirmed worldwide, whereas, on April 11, 2020, The United States passed Italy to become the country with the most corona viral deaths, as shown in a count maintained by Johns Hopkins University during that period. April 14, 2020, All 50 states of the U.S. reported deaths and on April 28, 2020, the US crossed the 1M mark of confirmed cases [15]. May 27, 2020, More than 100,000 deaths in the US were reported after contracting the coronavirus, US confirmed 2M confirmed cases on June 11, 2020[15].

July 6, 2020, India has been the third worst coronavirus affected country with 6.97 lakh cases, and the United States with 28 lakh cases and Brazil with 16 lakh cases [16]. August 30, 2020, COVID-19 cases cross 25 million marks globally [17].

September 7, 2020, India overtakes Brazil and becomes the second country after the U.S., registering 41.13 lakhs of reported cases of COVID-19[18]. September 30, 2020, the global death toll of COVID-19 became more than one million, taking just 90 days to double that of half a million [17]. On October 16, 2020, the United States crossed 8 million COVID-19 cases [19].

Coronavirus India Timeline: Almost eight months after the first case of COVID-19 was identified in Kerala [20] on 30 January,2020.

India's Covid-19 tally surpassed the mark of 20-lakh on August 7, 30 lakhs on August 23 it crossed 30 lakhs mark, and on 40 lakhs on September 5, the mark crossed 40 lakhs in total, on September 16 it surpassed 50 lakhs, and 60 lakhs on September 27. The current death toll (October 29, 2020) is 120,527, with a total of 8,040,203 cases in India. India is the second most affected coronavirus-hit country, while it is the third in coronavirus deaths worldwide after the U.S. and Brazil.

As of October 29, 2020, more than 215 Countries and Territories have reported a total of 42,237,160 global confirmed cases of COVID-19 coronavirus originating from Wuhan, China, and a death toll of 1,144,682. The number of cases in the US is 9,244,435, where as in India it is 8,088,046. U.S deaths are 234,619 followed by Brazil with death number equal to 159,033 and total fatality in India is 1,21,131.

Table 1 gives comparison of populations and land areas of India and the USA (based on Wikipedia), it can be observed that people in the USA have about 12 times the area-per-person as Indians. Therefore, real-time evaluation of epidemiological data is therefore required to prepare society for improved action plans against spread of diseases.

Table 1: Comparison of populations and land areas of India and the USA (based on Wikipedia)

Region	Population(Millions)	Area(Million Sq. Kms)
India	1380	3.29
USA	331	9.83

Biological Structure and Family of Corona Virus

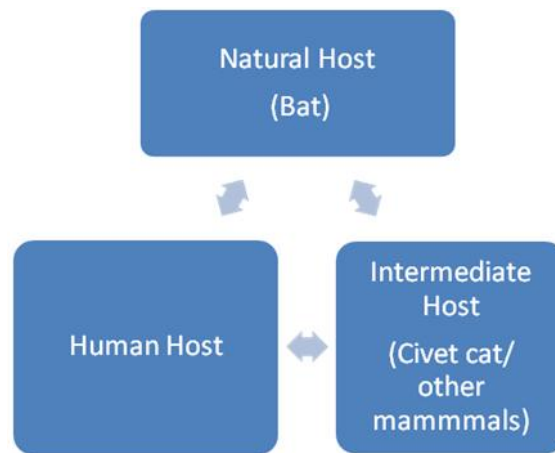


Figure 2: Key transmission routes of CoVs.

Coronaviruses are positive-sense, single-stranded enclosed RNA viruses. There are four CoVs generations, coronavirus, virus, Coronavirus, Coronavirus, and Coronaviruses respectively [21]. Past research reveals that these have zoonotic origin. The origins of most CoVs and CoVs are bats and mice, while the gene sources of most CoVs and CoVs are birds. Incidences has been reported in the past that CoVs have overcome barriers of species and got transmitted to different species and some have emerged as significant pathogenic organisms for humans and has resulted in acute diseases[Figure2].

There are two major outbursts of Coronaviruses which occurred in past two decades, one in 2002-2003, it was reported in China. It was called high scale epidemic because it led to 8422 infections and 916 deaths [22]. It was called Severe Acute Respiratory CoV Syndrome (SARS-CoV). In 2012 a decade later, another coronavirus of bat origin and with dromedary camels as the intermediate host emerged in Saudi Arabia it was called Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and it affected 2494 people and 858 people lost their lives [23].

Structure of Coronavirus

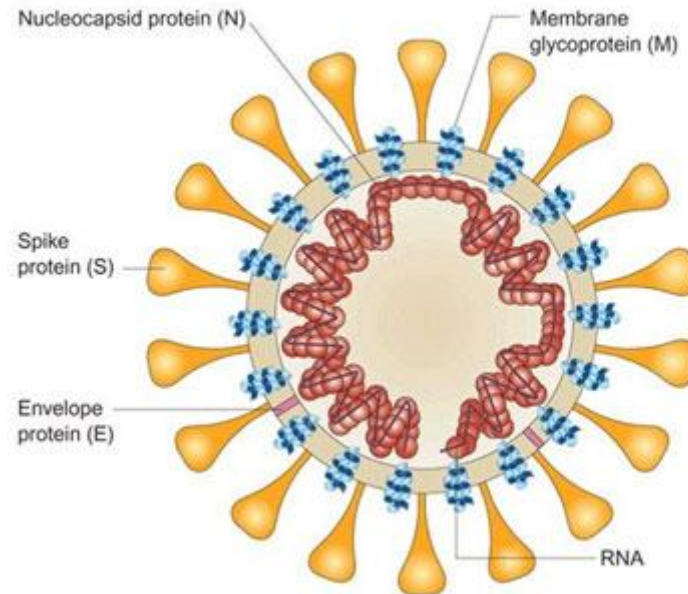


Figure 3: Schematic figure of Coronavirus.

Coronavirus has spherical envelope with radius ranging from 30 nm to 70 nm (Figure 3). There are sharpen glycoprotein extensions on its outer covering containing single-stranded (positive-sense) RNA associated with a nucleoprotein. These are named coronavirus as the projection looks like a crown under the microscope [24].

This was first found in three people from Wuhan. There were marked similarities of this virus in terms of clinical indications and biological characteristics to the virus which was the causative agent of severe acute respiratory syndrome (SARS), so this virus which originated in Wuhan was named SARS-CoV-2 by the International Committee on Taxonomy of Viruses [25]. SARS-CoV-2 is related to a big family of RNA viruses . Its structure has a single strand RNA, of genome origin.

COVID-19 transmission stages [26]

WHO classified the COVID-19 transmission into four stages [27]. Man to human transmission of the virus either through direct or indirect contact or through droplets [28].

- **Stage 1:** Travel Transmission-It includes the cases reported among people who had a travel history in already affected regions.
- **Stage 2:** Contact transmission-When the infected person who had travel history, affects the people who came in contact with him. The transmission is local. In this stage the cause of transmission to the affected people is traceable.

- **Stage 3:** Community transmission-The source of transmission of virus is not traceable. The individual who are affected neither travelled from country having positive Covid-19 cases neither they were infected by coming in contact with infected person. The transmission is in community.
- **Stage 4:** Epidemic-In this last there is an out break of the virus, the rate of transmission is very high, the cases multiply rapidly resulting in high number of deaths. The disease becomes endemic in this stage., which is prevalent in many regions as of now.[29]

Applications of Machine Learning in Healthcare

Looking at the present scenario when the entire world is waiting for a vaccine of COVID-19, the technical innovation for healthcare practices has become more evident. Technology is emerging as a significant player in improving the health of the world's population. The automated models, based on a machine learning approach that is capable of suggesting recommendations for the prevention of the spread of disease, identification of symptoms and treatment plans of patients from the present outbreak of Covid-19, that has shown exponential growth in the past, is the need of today [30].

The rapid and recent advancements in the collection of electronic health data (EHD) presents numerous prospects to discover knowledge that provide insights to improve healthcare practices [31]. The health data is large, complex, and heterogeneous in nature. It keeps changing frequently and has high dimensions and numerous attributes [32]. ML routines expose hidden trends, phenomena, and anomalies for creating templates that are quicker and more precise for physiological and health discovery [33]. ML proposes model with respect to dataset as shown in figure. 4. The performance of machine learning technique is deeply reliant on the selection of characteristics of data which they are enforced on [34]. For that reason, much of the actual effort in deploying machine learning algorithms (MLA). MLA is often used to direct clinical decision-making and to produce scientific knowledge from EHR (Electronic Health Records). Accessibility of EHRs provides major opportunities for the use of clinical data and other insights that are not possible with the traditional way of recording in papers [35].

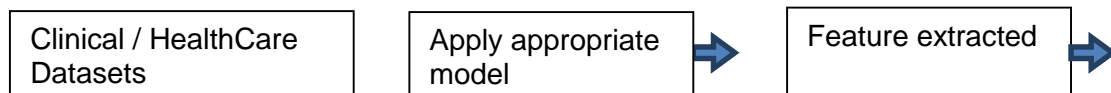


Figure 4: Machine learning for extracting features from health care datasets.

Electronic Health Record[EHR] datasets

These EHR data generally exist in but are not limited to the form of symptoms, social history, temporal patterns, demographics, medical notes, labs, imaging, electronic recordings from medical devices, vitals, medication diagnosis, and images [36]. The feature of these EHR datasets is given in table 1.

The health data is classified as structured and unstructured text data. The structured data includes demographics, vitals, etc. The unstructured text data contains the patient's description of his/her sickness, the doctor's prescriptions, etc. [37]

The growing availability of electronic health data provides a significant health discovery and diagnostic opportunity to enhance health care. In addition, the EHR systems have enabled health service providers anywhere and 24*7 availability of patient health database between hospitals, minimizing hospitalization cost. This cost savings is due to the removal of repetitive health check-ups and reductions in operating costs [38]. Clinical care data that are accessible from EHRs are extensively used in prediction and personalized decision making. EHR data and its characteristics are given in table 2.

Table 2: Electronic Health Records and its characteristics [33]

Data Source	Characteristics	Dimensions
Demographics	Age, gender, race	Temporal discrete
Diagnosis	ICD-9 codes	Temporal discrete
Prescription	Generic, drug class and subclasses	Temporal discrete
Lab	Glucose, cholesterol etc.	Temporal continuous
Vital Signs	Systolic and diastolic blood pressure, temperature, physiological variables, BMI, Respiratory rate	Temporal continuous
Social history	Addiction, housing condition, Socio economic status	Temporal discrete
Temporal patterns	Consultation rate, frequently co-occurring	Temporal discrete

However, for the best usage of these data by healthcare epidemiologists, automated procedures are required to generate information from Big data of EHR [32]. Machine Learning (ML) which is the study of tools and techniques for identifying patterns from Big data, can help. Machine learning (ML) disciplines are used easily and efficiently to adjust the patient's medical course to an ideal outcome. ML techniques provide highly effective avenues for the immediate extraction of information from health datasets and for the transformation of the whole results into clinical care decision ML techniques provide highly effective avenues for the immediate extraction of information from health datasets and for the transformation of the whole results into clinical /care decision. In the next section, an introduction to ML and its application areas are defined that have transformed the epidemiology of health care.

Machine learning paradigms and its application in health care

Machine learning extract features like targeted prevention, identification of disease, treatment plan, medications, and other relevant outcomes of interest from EHD. ML is dependent on fields like computer science, statistics, and optimization [7] to draw inference.

Most of the applications fall into unsupervised, supervised and semi-supervised categories of ML.

- **Unsupervised:** Unsupervised approaches finds hidden patterns or trends in data. These approaches segments dataset into clusters to find key features. These are commonly used in the frameworks for signal analysis[38]. Other common non-supervised approaches include spectral clustering, Gaussian mixture models[39], K-means[40], fuzzy clustering[41].The limitation of these techniques is that they are subject to predetermined thresholds.
- **Supervised:** Supervised learning approaches predictive modelling to assess the particular set of rules that can be used to differentiate between samples of different groups. Support vector machines (SVM)[42], k-nearest neighbor (k-NN)[43], Bayesian models[44], decision trees, linear and logistic regressions are some of the most commonly used supervised methods in healthcare.
- **Semi-supervised Learning:** Semi-supervised learning is a hybrid of unsupervised learning and supervised learning. It is applied in situations where the outcome is missing for certain subjects.

After reviewing different research papers, it was found that machine learning is extensively being applied in the field of health care management. Mentioned below are some popular application areas of the same:

- Glucose level of Diabetic Patient
- Telemedicine's Systems
- Monitoring ICU patients
- Computer aided diagnosis of cancer
- Rehabilitation of patients
- Decision making for traumatic surgeries
- Disease Risk prediction
- Signal Analysis
- Predicting Reservoirs of Zoonotic Diseases [44]

Zoonotic diseases (also known as zoonoses) are triggered by microorganisms that are transmitted between animals and people. Large number of human infections and deathsevery year across the world are happening because of Zoonotic diseases [45]. Researchers have applied ML algorithms on Zoonotic datasets to retrieve information about rodent species that are carriers of zoonotic pathogens [44]. ML approach is significant in finding patterns for predicting the clusters of a population which are susceptible, infected, recovered, and is more prone to fatality.

ML is capable of predicting a high rate of accuracy if an appropriate model is selected. According to McKinsey [46], The reliability of data varies for individual countries. According to the classification of World Bank based on GNI per capita:

India falls in the lower-middle-income group, whereas the United States is a high-income country. In general, epidemiological data are of lower-income countries, are less trustworthy because of limited quality assurance and control in data collection, storage methods, and monitoring. It is a primary consideration that to get better insights for prevention and diagnosis high quality and reliable health data is required and an appropriate model has to be applied. As per the report of McKinsey[46], the global disease burden can be reduced by 40% by using known interventions.

Innovations in technology can provide significant decisions for preventive health measures for a communicable disease like COVID-19.

Descriptive analysis of the data of COVID-19 patients of India

In this section, descriptive analysis of the data is performed. This data has attributes defined in the Table 3. In this section, data related with India is considered. This dataset contains 5 attributes and 136 cases.

Table 3: Data of COVID-19 patients of India

S. No.	Name of the Attribute	Description	Data Types	Possible Values
1	Age	Age of the COVID-19 Patient	Numeric	0-100
2	Gender	Gender of the COVID-19 Patient	Categorical	Male, Female
3	Detected_State	Province where COVID-19 detected of the person	Categorical	Derived Attribute (East, North, West, South)
4	Reason	Why person found positive	Categorical	Transmitted, Travelled outside
5	Current_Status (Target Attribute)	Whether person recovered or died due to COVID-19	Categorical	Recovered/Deceased

- **Age Attribute**

Age is a significant attribute for any disease. Many diseases such as Parkinson, osteoporosis, cardiovascular are affected by age. These diseases are generally not found in youngsters, but they affect older. In this case, till now in the study, it is not found that COVID-19 has an impact on Age.

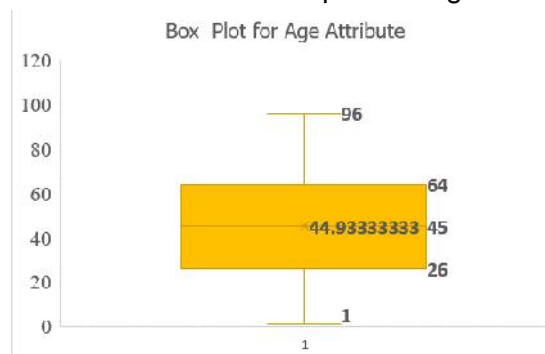


Figure 5: Box Plot of Age Attribute

The Box Plot of Age attribute is shown in the Figure 5. In this box plot it can be seen that mean and median age of COVID-19 patient found is 45, which indicates that it is affecting almost all age of persons. However, COVID-19 affects the patient of age 1 and age of 96 as shown as outlier in the figure 5.

- **Gender and Age Attributes**

After gender issues, almost every disease does not affect by any gender. In this sample population, means of age of male and female is compared. Independent sample T-test is used to compare the means. The hypothesis is shown in below in Figure 6.

- **Null Hypothesis:** There is no significance difference between age of Males and Females of COVID-19 Patients
- **Alternate Hypothesis:** There is a significance difference between Males and Females of COVID-19 Patients

The result of Independent T-test is shown below in Figure 6.

Independent Samples T-Test				
Independent Samples T-Test				
		statistic	df	p
age	Student's t	1.55	133	0.124

Figure 6: Independent Sample T-test between age of males and females

Since the p value is more than 0.05, we are failed to reject the Null hypothesis. It can be stated that there is no so significance difference between age of Males and Females of COVID-19 Patients. As an inference, gender also does not play a vital role in COVID-19 patients.

- **Gender and Current_status**

Unfortunately, there are many peoples are died due to COVID-19. The attribute Current_status hold two value weather a person is recovered or died due to COVID-19. Since both are categorical data, Chi-square test is applied.

- **Null Hypothesis:** There is an association between age and current_status of COVID-19 patients
- **Alternate Hypothesis:** There is no association between age and current_status of COVID-19 patients

The results are shown in the Figure 7.

χ^2 Tests			
	Value	df	p
χ^2	0.816	1	0.366
N	135		

Figure 7: Chi-Square Test between Current_Status and Gender

Since the p value is greater 0.05, we are failed to reject the null hypothesis. It can be stated that there is no association between gender and current_status. It can now be inferred that there is no biasness in recovery and deceased of male or female of COVID-patients.

Machine Learning Algorithms

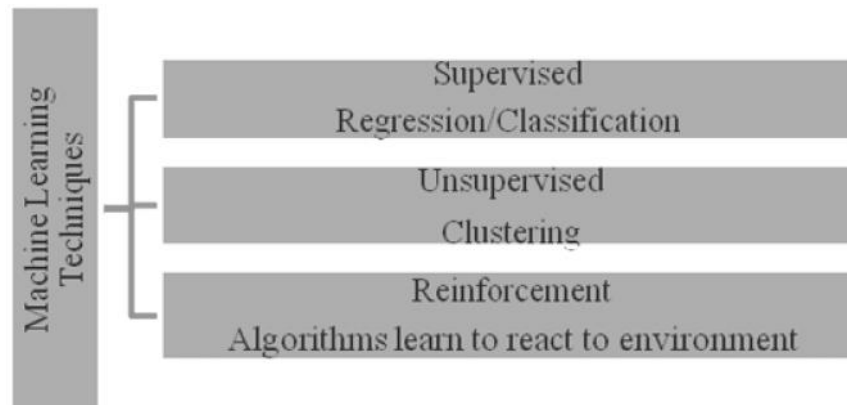


Figure 8: Machine learning techniques

It allows system to make its own decisions, and generate the result. The computing machine learns from data, example and previous experiences. As shown in figure 8 machine learning technique are divided into three categories Unsupervised, Reinforcement, and Supervised.

- **Unsupervised**

In this technique, machine is given certain sample inputs, but no output is present. This technique classifies correctly between data sets based on categorization. [47]

- **Reinforcement Learning**

In this technique training data is generated by external environment. The algorithm discovers what actions to take based on maximum reward by trying each action.

- **Supervised Learning**

This algorithm examines the input data and acquires a function that map the relationship between the input and output variables [48]. This technique is considered when the training data has output variables corresponding to the input variables.

In this study five supervised machine learning algorithms Decision tree regression, Logistic regression, kNN, Naïve Bayes and Adaboost are considered for prediction. Researchers have compared them on criteria like accuracy, speed of learning, missing values, tolerance to irrelevant, redundant, highly interdependent attributes, dealing with discrete/binary/continuous attributes, tolerance to noise, dealing with danger of over fitting.

- **Decision Tree:** It is a recursive technique of splitting dataset as per conditions. This incremental division creates a decision tree [49]. This splitting reduces the noise of a set. The algorithm terminates after gaining maximum homogeneity or purity. The groups that cannot be divided any more are known as terminal nodes. The tree has decision and leaf nodes. Target attribute is generally a discrete variable with dichotomous values e.g. Boolean values, Present/Absent, Recovered/Dead, Contact/ Transmitted etc.
- **Logistic Regression:** A logistic regression model forecasts a dependent data variable by investigating the connection between one or more existing independent variable. This function takes real vales as input but map these values to outcome having two values 0 and 1. Like decision tree it can also predict categorical binary values. It has an assumption that it works with no or moderate collinearity among all the independent attributes. However, it has some disadvantages such as it is affected by outliers, give the result with over fitting, and not designed for non-linear analysis [50]. This moves towards the extremes (0 and 1) more rapidly when data set is larger. Logistic regression is used to predict the probability of an outcome having only two values. The core of logistic regression is the logistic function - a S-shaped curve taking any real-valued number and mapping that number in a value between 0 and 1, though never precisely at 0 and 1.
- **k-Nearest Neighbor (k-NN):** It is used for estimating continuous variable. It categorizes data based on homogeneity of distance function. The data is classified on the criteria of nearest neighbor. It works on idea that similar data supposed to be nearer to each other. It classifies the data based on integer value of k. It starts from k=1 then keep on increment it by one unless it finds the best value for k. [51]However, It has a simple calculation and interpretation is also direct, but it is not suitable for ample amount of data with high dimensions.

- Naïve Bayes: This machine learning model, based on Bayes theorem [52]. It differentiates objects centered around certain features. It has an assumption that all variables are independent to each other.

It is given by the equation

$$P(A_1 \dots A_n | B) = \prod_{i=1}^n P(A_i | B)$$

A are attributes and B is response variable, $P(A|B)$ is the product of probability distribution of each attribute A given by B. [53]

- AdaBoost: AdaBoost is an abbreviation of Adaptive Boosting. Boosting [54] is a process for generating strong classifier from classifiers which are weak. AdaBoosting algorithm initially sets the distribution on the training data, set and then repeats till the exit condition is attained by using adaptive weights. In other words, the weights are set on classifiers, and training of dataset in every iteration is done in such a manner that it ensures the accurate predictions of unusual observations.[55] Performance of Adaboost is affected by outlier and noisy data.

Modeling of Covid-19 patients in India

In this section the collected data is transformed. It is modeled by using Orange tool.

- **Data Transformation:** The 32 states of India are classified in to four zones north, east, south, west. The attribute reason of contamination was made categorical by identifying if the person travelled from infected country or came in contact with infected person like relative.
- **Implementation of Supervised machine learning algorithms thorough Orange:**

Orange is an open source data mining tool with GUI [56]. It performs exploratory analysis of data and represents it visually. There are various widget controls in Orange. The data is loaded into it and connected to get desired insights [57].

The data is considered for performance evaluation of five supervised ML techniques Decision Tree, Logistic Regression, Naïve Bayes, AdaBoost, k Nearest Neighbor as in figure9. The data is divided into two portions, one part is for training and the rest for testing. Out of 135 records 10% are for testing and other for training.

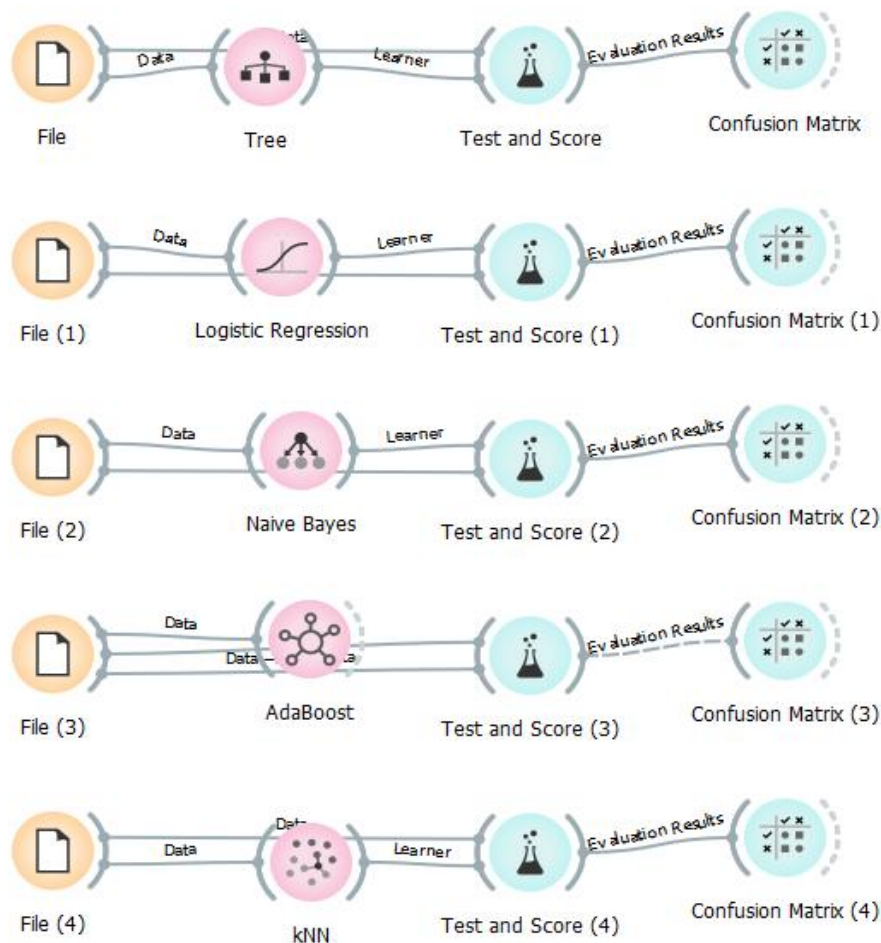


Figure 9: Implementation of five supervised machine learning algorithms on dataset.

To find which prediction method works best, the model was trained using Orange data mining s/w suite.

The widget in the Figure is depicting the following steps of workflow

- The data in excel file gives the data to test & score.
- Supervised ML techniques Decision Tree, Logistic Regression, Naïve Bayes, AdaBoost, k Nearest Neighbor algorithms are applied.
- Then data is trained and tested for predictions by all algorithms specified above on target attribute which is the number of patients deceased and recovered.
- Evaluation result, in Table – is the test result of all algorithms, is fed into confusion matrix.

- Confusion matrix gives the proportion between predicted and actual classes, in number/proportion of instances. It also represents how many instances were, misclassified. It is given in figure 10
- ROC Analysis is performed to evaluate testing classification algorithms. Figure 11. At test and score cross validation happens to check performance of the score, Number of folds 10, the train/test is repeated 10 times and the size of training set is 90%. Confusion matrix was created to evaluate the performance of five supervised ML algorithms.

Figure shows the confusion matrix, which is a table. The rows have actual class instances, whereas column represents instances of predicted classes. The confusion matrix is generated for class cases deceased and recovered.

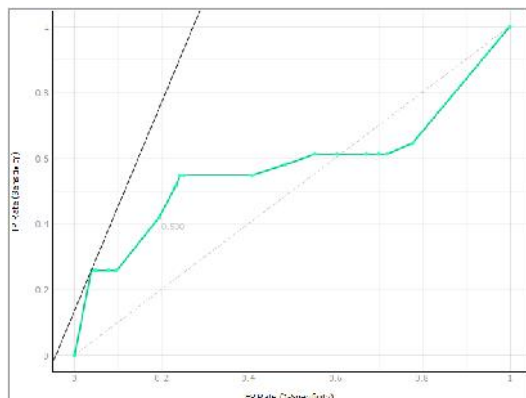
	Predicted		
Actual		Deceased	Recovered
	Deceased	☑	☒
	Recovered	☒	☑

Figure 10: Confusion matrix of actual and predicted cases

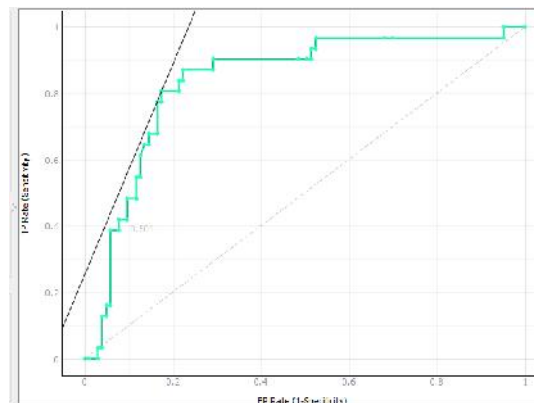
Table 6: Actual & misclassification of evaluation result of classifiers

Actual	Predicted									
	Decision Tree		Logistic Regression		Naïve Bayes		AdaBoost		Knn	
	Deceased	Recovered	Deceased	Recovered	Deceased	Recovered	Deceased	Recovered	Deceased	Recovered
Deceased	41.2%	17.8%	58.3%	16.2%	57.7%	15.6%			39.3%	19.6%
Recovered	58.8%	82.2%	41.7%	83.8%	42.3%	84.4%			60.7%	80.4%

Table 6 shows the actual and misclassification of evaluation result of classifiers. It can be seen that in Naïve Bayes, the correctly classified instances after training is for recovered which is 84.4% and for deceased is 57.7% So we can say that the training is good for it.



Decision Tree



Logistic Regression

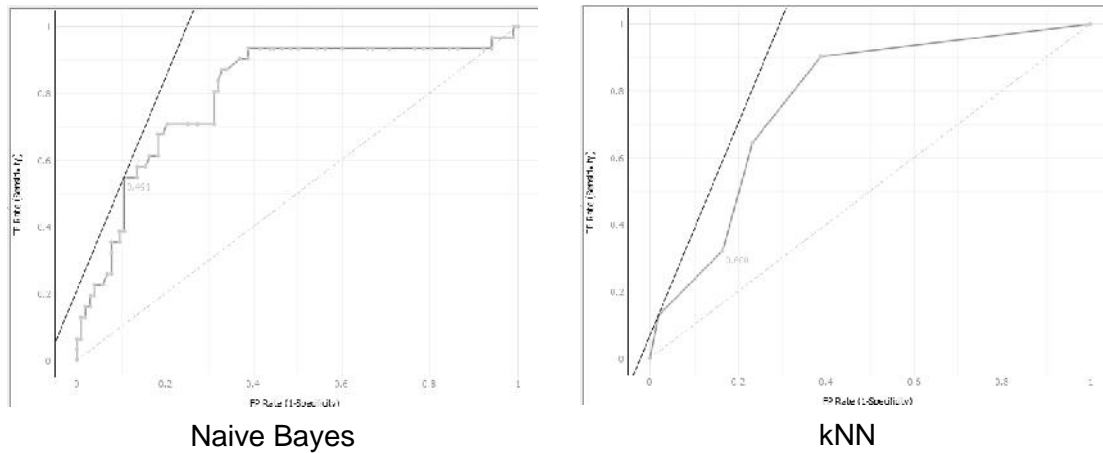


Figure11: Classification of number/proportion of instances among predicted and actual classes of Supervised ML techniques Decision Tree, Logistic Regression, Naïve Bayes, AdaBoost, k-Nearest Neighbor.

ROC curve is generated to identify the most suitable machine learning technique, on the basis of best classification accuracy for predicting deceased and recovery rate of COVID-19 patients. It plots false positive rate on x-axis and true positive rate on Y-axis. Curve performance analysis of receiver operating characteristics (ROC) is the most suitable and commonly used approach for a typical machine learning application environment in which it is essential to choose a classifier with the best classification accuracy for a selected problem domain [58]. Figure 11 shows five graphs and Naïve Bayes and Logistic Regression algorithms gives better predictions as compared to other techniques graph the curve of these two techniques is closer to left and top border of the ROC space as compared to Decision tree, Adaboost and, k-NN.

Comparative study of India with USA for Number of Patients

In this study time series forecasting model is employed for forecasting the trend of recovery rate among the people infected by COVID-19 cases future data based on previously observed data. In this study, time series forecasting model is employed on observed data of COVID-19 cases in India and the USA over the period of January 3, 2020 to October 29, 2020. This model is employed to predict future trend of spread of this virus from October 30, 2020 till March, 28, 2020 in India and USA. The trends are plotted of actual confirmed cases and the case which are predicted with respect to time. Time series plot is prepared with everyday figure of positive COVID-19 cases of India and the USA. In this study, quantitative forecasting technique is applied, on past 300 days confirmed COVID-19 cases belonging to these two countries. Short term forecasting of coming 150 days regarding the future of trend of spread of COVID-19 infections among residents of India and the USA is projected.

To generate the forecasting trend, the steps followed are as in figure 12.

- **Data Collection and Extraction**

The data of confirmed cases of COVID-19 infections of India and USA was collected from the URL <https://covid19.who.int/table>. The collected data set is from January 3,2020, to October 29, 2020.



Figure 12: Process of forecasting the trend

- **Data Analysis**

Linear Trend Model (LTM)

Trend analysis of the COVID-19 infected cases is done using LTM. Time series plot of the confirmed cases of COVID-19 for India and the USA is constructed of past 300 days from January 3,2020, to October 29, 2020. Trend analysis plot of confirmed COVID-19 patients from India is shown in figure 13. The fitted trend Equation for it is $Y_t = -1892069 + 23224 \times t$.

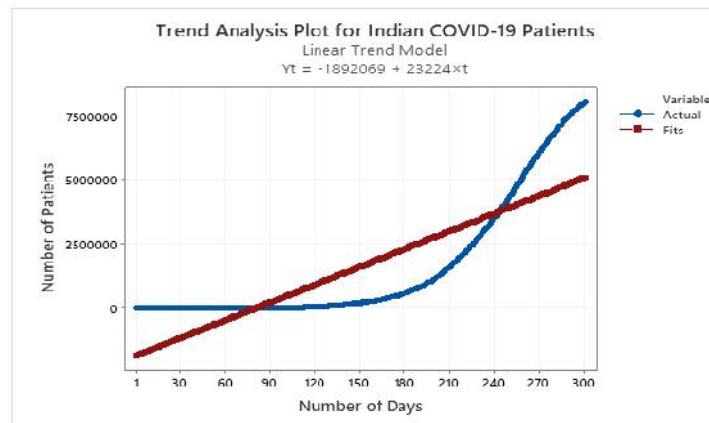


Figure 13: Trend analysis plot for India COVID-19 patients

As per the time series analysis graph of India the rate of growth of COVID-19 cases is slower in initial days and suddenly after 250 days' rate of growth is increased. In India the number rate of infection from COVID-19 cases were slower initially. There was a strict implementation of lock down in India, and as days passed and unlocking started rate of confirmed cases increased exponentially.

The trend analysis graph of confirmed COVID-19 cases from USA is given in figure 14. The fitted trend Equation is $Y_t = -1857791 + 3028 \times t$. The obtained graph of the USA is following a linear trend it is as per the linear regression model, as the days passed the number of confirmed positive COVID-19 cases have also increased linearly. It is depicting good co-relation between x and y.

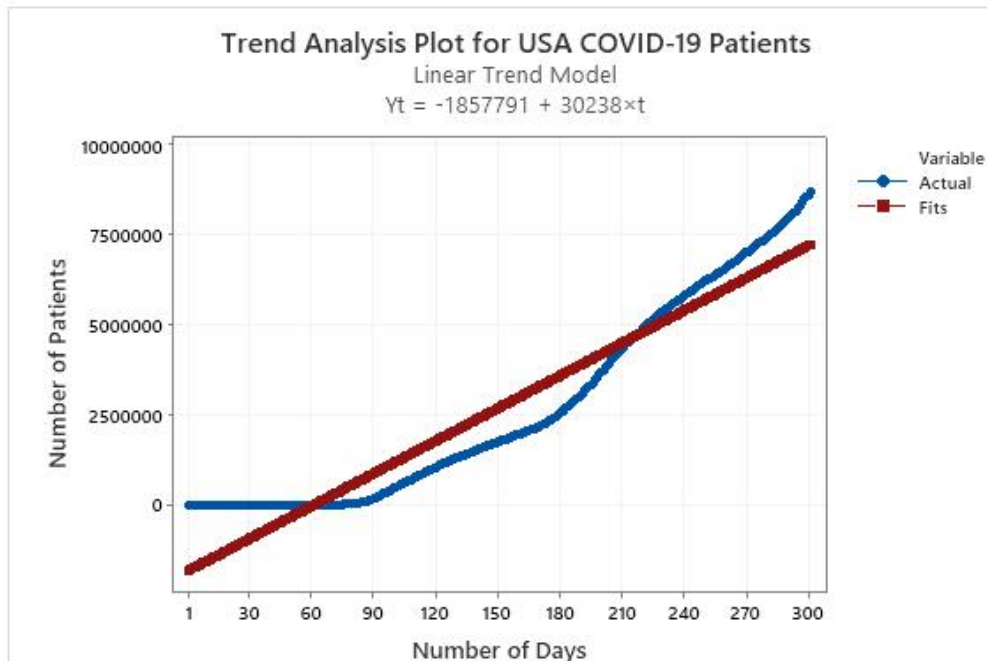


Figure 14: Trend analysis plot for USA COVID-19 patients

It can be observed from both the figures 13&14 that the time series is not static. These plots depict trend which is increasing trend. The rising trend of the time series suggests a growing COVID-19 cases in both the countries.

- **Stationary Data and Model**

Various machine learning models are there for prediction, Auto Regressive Integrated Moving Average (ARIMA) is one of them. To forecast the time series, we have applied an ARIMA model to confirmed COVID-19 cases of India and the USA. The following steps are followed for doing the predictions:

- **Stationarity:** To forecast accurately, stationarity of the data set is required [59]. The **stationarity** of a time series is related to its statistical properties in time. The statistical methods where time series data is used, the data is observed stationary only with the transformation through differencing. The series, which is stationary becomes predictable, assumes that the historical trend will repeat in the future.
- First order difference was taken to make the data stationary (stabilize the mean of COVID-19 prevalence)
- Forecasting was done for next 150 days.
- Prediction was done using ARIMA model with parameter (1,1,1)

- **Forecasting**

Figure 15, depicts forecasting of confirmed patients of India and Figure 16,

shows the prediction for USA. Figure 15 and figure 16 is a time series plot of positive COVID-19 cases in India and the USA respectively, from January 3, 2020, to October 29, 2020 (Three Red line represents forecast of cases whereas the blue lines represent actual cases). It can be seen in both the plots that cases of COVID-19 are on increasing trend even in near future. As per the predictions COVID-19 cases are going to increase in coming days in India as well as in USA.

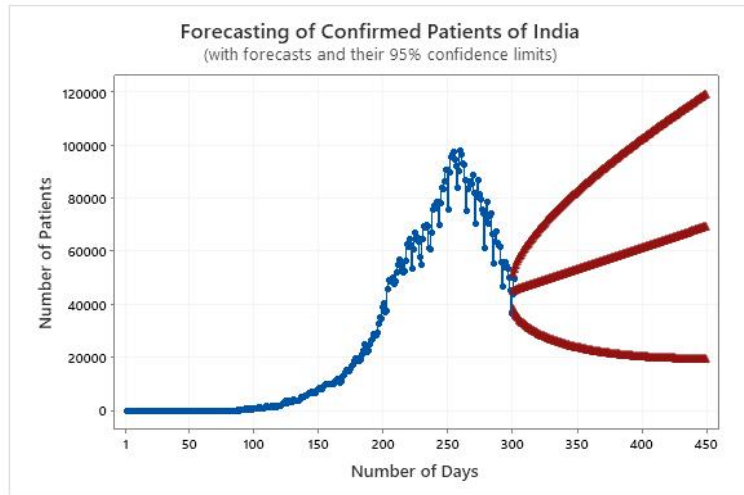


Figure 15: Forecasting of COVID-19 infections in India

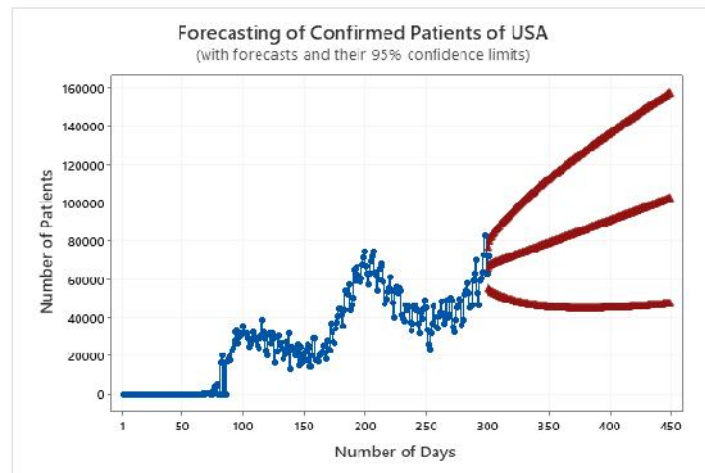


Figure 16: Forecasting of COVID-19 infections in USA

We have conducted this comparative study for the prediction of confirmed COVID-19 infected cases in India and the USA. As per the model forecast, the confirmed cases are expected to significantly grow in the near-term. The given time series model predicts exponential enhancement in the infected cases in India and increasing trend in the USA.

Conclusion

This study, highlights the origin and outbreak of COVID-19 worldwide and specifically the two most affected countries of the world United States and India. These countries have reported a high number of confirmed and fatal cases. The period of investigation taken is from the day when the first case of COVID-19 was first reported i.e. from December 31, 2019, till October 29, 2020. Timeline exhibits when first case was reported and when was first death was reported because of COVID-19, how and when it spread outside China. It further explores when was the first case was reported in USA and in India. USA reported highest number of infections in March and in September India became second worst coronavirus affected country after USA. This chapter further explores the biological structure and family of coronavirus alpha, beta gamma and delta Coronaviruses. It also reports key transmission routes of Coronaviruses that how they overcame barriers of species and got transmitted to humans.

The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. There are four reported stage of COVID-19 transmission. First stage of transmission is when it was found in people who travelled from infected countries, in second stage of transmission it was reported among those who came in contact with infected person. Third stage was called as community spread where it is difficult to find the source of infection followed epidemic stage in which the rate of transmission is very high, the cases multiply rapidly resulting in high number of deaths.

As technology has played a significant role in suggesting ways for the prevention of the spread of the disease, identification of symptoms and treatment plans of patients from the present outbreak of Covid-19, that has shown exponential growth. In this study applications of machine in this domain is identified. There are large repositories of health data classified as structured and unstructured. The structured data includes demographics, vitals, etc. and unstructured text data includes patient's description of symptoms and doctor's prescriptions. So machine learning algorithms provides a significant health discovery and diagnostic prospect to boost health care. ML approach is significant in finding patterns for predicting the clusters of a population which are susceptible, infected, recovered, and is more prone to fatality. In this study descriptive analysis of the data of COVID-19 patients of India is performed. The dataset contains 136 cases and 5 attributes which are age, detected state, reason, current status of patients (target attribute). Descriptive analysis result states there is no so significance difference between age of males and females of COVID-19 Patients. As an inference, gender does not play a vital role in COVID-19 patients. Another observation is that there is no association between gender and current status. This infers that there is no biasness in recovery and deceased of male or female of COVID-patients.

The collected data of Covid-19 patients of India is collected, transformed and is modeled by using Orange tool. The data is considered for performance evaluation of five supervised ML techniques Decision Tree, Logistic Regression, Naïve Bayes, AdaBoost, k Nearest Neighbor. The data is divided into two portions, one part is for training and the rest for testing. Out of 136 records 10% are for testing and other for training. Confusion matrix was created to evaluate the performance of five supervised ML algorithms. ROC graphs is generated it shows that Naïve Bayes and Logistic Regression algorithms gives better predictions as compared to Decision tree, Adaboost and, k-NN.

So it can be concluded that to perform comparative study of India with USA for number of COVID-19 patients, time series plot is prepared with everyday figure of positive COVID-19 cases for both the countries. quantitative forecasting technique is applied, on past 300 days confirmed COVID-19 cases belonging to these two countries. Short term forecasting of coming 150 days regarding the future of trend of spread of COVID-19 infections among residents of India and the USA is projected. ARIMA model is applied for processing the of forecasting the trend. Trend analysis plot of confirmed COVID-19 patients is obtained, the equation for them is $Y_t = -1892069 + 23224x_t$ and $Y_t = -1857791 + 3028x_t$ for India and USA respectively. The obtained graph of the USA is following a linear trend. The forecasting plots shows an increasing trend. As per the predictions COVID19 cases are going to increase in coming days in India as well as in USA. We have conducted this comparative study for the prediction of confirmed COVID-19 infected cases in India and the USA. As per the model forecast, the confirmed cases are expected to significantly grow in the near-term. The given time series model predicts exponential enhancement in the infected cases in India and increasing trend in the USA.

References

- AHolshue, M. L., DeBolt, C., Lindquist, S., Lofy, K. H., Wiesman, J., Bruce, H., Spitters, C., Ericson, K., Wilkerson, S., Tural, A., Diaz, G., Cohn, A., Fox, L. A., Patel, A., Gerber, S. I., Kim, L., Tong, S., Lu, X., Lindstrom, S., ... Pillai, S. K. (2020). First case of 2019 novel coronavirus in the United States. *New England Journal of Medicine*, 382(10), 929–936. <https://doi.org/10.1056/NEJMoa2001191>.
- Cascella, M., Rajnik, M., Cuomo, A., Dulebohn, S. C., & Di Napoli, R. (2020). Features, evaluation and treatment coronavirus (COVID-19). In Statpearls [internet]. StatPearls Publishing.
- World Health Organization. Novel coronavirus — China. 2020 (<https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/>).
- <https://coronavirus.jhu.edu/map.html>
- <https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/>

- <https://www.statnews.com/2020/01/13/woman-with-novel-pneumonia-virus-hospitalized-in-thailand-the-first-case-outside-china/>
- Kuo, Lily (January 21, 2020). "China confirms human-to-human transmission of coronavirus". The Guardian. Retrieved April 19, 2020.
- <https://www.npr.org/sections/goatsandsoda/2020/01/30/798894428/who-declares-coronavirus-outbreak-a-global-health-emergency>
- Ghosh, P., Ghosh, R., & Chakraborty, B. (2020). COVID-19 in India: Statewise Analysis and Prediction. JMIR Public Health and Surveillance, 6(3), e20341. <https://doi.org/10.2196/20341>
- <https://www.who.int/dg/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february-2020>
- <https://www.niaid.nih.gov/diseases-conditions/coronaviruses>
- Science, N., Phenomena, C., Swapnarekha, H., Sekhar, H., Nayak, J., & Naik, B. (2020). Chaos , Solitons and Fractals Role of intelligent computing in COVID-19 prognosis : A state-of-the-art review. Chaos, Solitons and Fractals: The Interdisciplinary Journal of Nonlinear Science, and Nonequilibrium and Complex Phenomena, 138, 109947. <https://doi.org/10.1016/j.chaos.2020.109947>.
- Singh, N., & Sanjay, P. (2020). COVID-19 Epidemic Analysis using Machine Learning and Deep Learning Algorithms. 1–10.
- <https://www.cdc.gov/media/releases/2020/s0229-COVID-19-first-death.html>
- <https://www.usatoday.com/in-depth/news/nation/2020/04/21/coronavirus-updates-how-covid-19-unfolded-u-s-timeline/2990956001/>
- <https://www.deccanchronicle.com/nation/current-affairs/060720/india-third-worst-hit-nation-in-coronavirus-cases-after-us-brazil.html>
- <https://www.worldometers.info/coronavirus/>
- <https://www.tribuneindia.com/news/nation/india-overtakes-brazil-as-country-is-second-worst-hit-by-covid-19-with-4-2-million-cases-137653>
- Mann, Ted; Hall, David (October 16, 2020). "Confirmed Coronavirus Cases in U.S. Surpass 8 Million". The Wall Street Journal. Retrieved October 16, 2020.
- https://en.wikipedia.org/wiki/Timeline_of_the_2020_coronavirus_pandemic_in_India
- Chan JF, To KK, Tse H, et al. Interspecies transmission and emergence of novel viruses: lessons from bats and birds. Trends Microbiol. 2013 Oct;21(10):544–555.
- Chan-Yeung M, Xu RH. SARS: epidemiology. Respirology. 2003;8: S9–14.
- Middle East Respiratory Syndrome Coronavirus. Available at:

- <https://www.who.int/emergencies/mers-cov/en/>. Accessed 16 Feb 2020.
- Richman DD, Whitley RJ, Hayden FG. *Clinical Virology*, 4th ed. Washington: ASM Press; 2016.
 - Abduljalil, J. M., & Abduljalil, B. M. (2020). Epidemiology, genome, and clinical features of the pandemic SARS-CoV-2: a recent view. *New Microbes and New Infections*, 35, 100672. <https://doi.org/10.1016/j.nmni.2020.100672>
 - http://timesofindia.indiatimes.com/articleshow/76837244.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
 - <https://theprint.in/health/the-four-stages-of-covid-19-transmission-why-india-maintains-it-is-not-yet-in-stage-3/395349>
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7288266/#CR28>
 - Singh, N., & Sanjay, P. (2020). COVID-19 Epidemic Analysis using Machine Learning and Deep Learning Algorithms. 1–10.
 - Dutta, S., & Bandyopadhyay, S. K. (2020). Machine Learning Approach for Confirmation of COVID-19 Cases : Positive , Negative , Death and Release. *Cdc*.
 - Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H., & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, 2(4), 230–243. <https://doi.org/10.1136/svn-2017-000101>
 - Wiens, J., & Shenoy, E. S. (2018). Machine Learning for Healthcare: On the Verge of a Major Shift in Healthcare Epidemiology. *Clinical Infectious Diseases*, 66(1), 149–153. <https://doi.org/10.1093/cid/cix731>
 - Chowriappa, P., Dua, S., & Todorov, Y. (2014). Machine Learning in Healthcare Informatics. In *Intelligent Systems Reference Library* (Vol. 56). <http://www.scopus.com/inward/record.url?eid=2-s2.0-84927559517&partnerID=tZOtx3y1>
 - Monteleone, M. (2016). NooJ local grammars and formal semantics: Past participles vs. adjectives in Italian. *Communications in Computer and Information Science*, 607(8), 83–95. https://doi.org/10.1007/978-3-319-42471-2_8
 - Wu, J., Roy, J., Stewart, W. F., Care, S. M., Comparative, S., Wu, J., Roy, J., & Stewart, W. F. (2010). Prediction Modeling Using EHR Data Challenges , Strategies , and a Comparison of Machine Learning Approaches. 48(6).
 - Informatics. In *Intelligent Systems Reference Library* (Vol. 56). <http://www.scopus.com/inward/record.url?eid=2-s2.0-927559517&partnerID=tZOtx3y1>
 - Chen, M., Hao, Y., Hwang, K., Wang, L., & Wang, L. (2017). Disease

prediction by machine learning over big data from healthcare communities. *IEEE Access*, 5, 8869-8879.

- 9.41. Michel V, Gramfort A, Varoquaux G, Eger E, Keribin C, Thirion B (2012) A supervised clustering approach for fMRI-based inference of brain states. *Pattern Recogn* 45(6):2041–2049
- 10.42. Lawhern V, Hairston W, McDowell K, Westerfield M, Robbins K (2012) Detection and classification of subject artifacts in EEG signals using autoregressive models. *J Neurosci Methods* 208(2):181–189
- 11.43. Schalk G, Brunner P, Gerhardt L, Bischof H, Wolpaw JR (2008) Brain–computer interfaces (BCIs): detection instead of classification. *J Neurosci Methods* 167(1):51–62
- 12.44. Majumdar K (2011) Human scalp EEG processing: various soft computing approaches. *Appl Soft Comput* 11(8):4433–4447
- Ma Z, Tavares J, Jorge R, Mascarenhas T (2010) A review of algorithms for medical image segmentation and their applications to the female pelvic cavity. *Comput Methods Biomech Biomed Eng* 13(2):235–246
- Peters J, Ecabert O, Meyer C, Kneser R, Weese J (2010) Optimizing boundary detection via simulated search with applications to multi-modal heart segmentation. *Med Image Anal* 14(1):70
- Suk HI, Lee SW (2013) A novel Bayesian framework for discriminative feature extraction in brain-computer interfaces. *Pattern Anal Mach Learn IEEE Trans* 35(2):286–299
- 5Han BA, Schmidt JP, Bowden SE, Drake JM. Rodent reservoirs of future zoonotic diseases. *Proc Natl Acad Sci U S A* 2015; 112:7039–44.
- https://www.mckinsey.com/~media/McKinsey/Industries/Public%20and%20Social%20Sector/Our%20Insights/Prioritizing%20health%20A%20prescription%20for%20prosperity/MGI_Prioritizing%20Health_Executive%20summary_July%202020.pdf
- Somvanshi, M., Chavan, P., Tambade, S., & Shinde, S. V. (2017). A review of machine learning techniques using decision tree and support vector machine. *Proceedings - 2nd International Conference on Computing, Communication, Control and Automation, ICCUBEA 2016*. <https://doi.org/10.1109/ICCUBEA.2016.7860040>.
- Voyant, C., Notton, G., Kalogirou, S., Nivet, M. L., Paoli, C., Motte, F., & Fouilloy, A. (2017). Machine learning methods for solar radiation forecasting: A review. *Renewable Energy*, 105, 569–582. <https://doi.org/10.1016/j.renene.2016.12.095>.
- Kim, S. Y., & Upneja, A. (2014). Predicting restaurant financial distress using

- decision tree and AdaBoosted decision tree models. *Economic Modelling*, 36, 354–362. <https://doi.org/10.1016/j.econmod.2013.10.005>.
- Cameron, Trudy Ann. "A new paradigm for valuing non-market goods using referendum data: maximum likelihood estimation by censored logistic regression." *Journal of environmental economics and management* 15.3 (1988): 355-379.
 - Mohammadi, M., Dawodi, M., Tomohisa, W., & Ahmadi, N. (2019). Comparative study of supervised learning algorithms for student performance prediction. *1st International Conference on Artificial Intelligence in Information and Communication, ICAIIC 2019*, 124–127. <https://doi.org/10.1109/ICAIIIC.2019.8669085>.
 - Borgelt C, Kruse R: *Graphical Models - Methods for Data Analysis and Mining*. Chichester, United Kingdom , J. Wiley and Sons; 2002.
 - Xue, Y., Chen, H., Jin, C., Sun, Z., & Yao, X. (2006). *NBA-Palm : prediction of palmitoylation site implemented in Naïve Bayes algorithm*. 10. <https://doi.org/10.1186/1471-2105-7-458>
 - Schapire, Robert E. "The boosting approach to machine learning: An overview." *Nonlinear estimation and classification*. Springer, New York, NY, 2003. 149-171.
 - Kim, S. Y., &Upneja, A. (2014). Predicting restaurant financial distress using decision tree and AdaBoosted decision tree models. *Economic Modelling*, 36, 354–362. <https://doi.org/10.1016/j.econmod.2013.10.005>.
 - Demšar, J., Zupan, B., Leban, G., &Curk, T. (2004). Orange: From experimental machine learning to interactive data mining. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 3202, 537–539. https://doi.org/10.1007/978-3-540-30116-5_58.
 - <https://orange.biolab.si/>.
 - Vuk, M., &Curk, T. (2006). ROC curve, lift chart and calibration plot. *MetodološkiZvezki*, 1(3), 89–108.
 - Montgomery, D. C., Jennings, C. L., &Kulahci, M. (2015). *Introduction to time series analysis and forecasting*. John Wiley & Sons.

Analysis of Health Sector for COVID-19 Pandemic

Vaibhav Bhatnagar*

Shilpa Sharma**

Linesh Raja***

Introduction

Human body is temple of the God. Diseases such as cardiovascular, diabetes, cancer, and thyroid affect human quotidian. According to [1], Data mining is a powerful process by which a disease can be diagnosed at earlier stage and treatment can be implemented effectively. Data Mining is originated from Statistics, which is nothing but a process for extraction of useful data (pattern) from large dataset. Data mining is a process required by intelligent methods to apply to pull out different patterns. Data mining is derived using various domains such as statistics, machine learning, pattern recognition, database systems, data warehouse, algorithms and visualization etc. [2]. The concept of Data mining was emerged in 1990s from knowledge discovery and data analysis. As an evolution of data mining before 1990, patterns are being identified using Bayes theorem in 1700s, regression is being introduced in 1800s, automatic data pre-processing and data clustering are being introduced in 1950s, decision tree is being introduced in 1960, and support vector machine is being introduced in 1980. The keyword *data mining* was registered in 2009-10 in Medical Subject Heading. Data mining has several benefits in health such as early diagnosis of diseases, health insurance, providing medical facilities at reasonable cost and identification of right treatment for disease etc. Data mining is often considered as synonym of *Knowledge Discovery in Databases* but it is only a step of KDD. These steps are Data cleaning, Data integration, data Selection, Data transformation, Data mining, Pattern evaluation and Knowledge presentation [3].

The objectives of this paper are firstly comparative study of different data mining tools, second is mention of state of the art of different data mining tools in healthcare and this is implementation of data mining technique with R. The proposed work will be beneficial for Data mining experts, statisticians, medical researchers and radiologists.

* Department of Computer Applications, Manipal University Jaipur, Jaipur, Rajasthan, India.

** Corresponding Author, shilpa.sharma@jaipur.manipal.edu, Department of Computer Applications, Manipal University Jaipur, Jaipur, Rajasthan, India.

*** Department of Computer Applications, Manipal University Jaipur, Jaipur, Rajasthan, India.

Comparative Study of Implementation Tools

Data mining uses computational algorithms, statistical analysis of data, database systems, machine learning and artificial intelligence. For quickly implementation of the different techniques of data mining it is better to have hands on knowledge of different software tools is required [4][5][6].

The comparison of these tools on the basis of functionality, price is depicted in Table 1.

Table 1: Data Mining Tools

S.N.	Name of Tool	Availability	Developed in	Price	Features supported
1	Rapidminer	Open Source	Java Programming Language	\$5,000 – \$10,000 per user	<ul style="list-style-type: none"> • Around 1500 algorithms are available • Support of ML Libraries for third party • Full automation • Data transformation and data cleaning
2	Orange	Open Source	Python Programming Language	Free of Cost	<ul style="list-style-type: none"> • Data visualization • Component based software • Interactive data analysis with large toolbox • Visual Programming • Useful for bio informaticians
3	Weka	General Public License	Java Programming Language	Free of Cost	<ul style="list-style-type: none"> • Data Clustering • Data Association Rule • Data Visualization • Portable • Easy touse
4	SSDT(SQL Server Data Tool)	Licensed	C# programming Language	Tool Along with SQL Sever	<ul style="list-style-type: none"> • Developed in Visual Studio IDE • Business Intelligence package • Schema and Data Compare • View and Edit Data • IntelliSense and Editing
5	Apache Mahout	Open Source	Java Libraries	Free of Cost	<ul style="list-style-type: none"> • Linear Algebra framework • Pre-defined Algorithms • Math experimentation environment • Multiple distributed back ends. Specially designed for Mathematical analysis
6	OracleDatamining	Proprietary License	Java Programming Language		<ul style="list-style-type: none"> • Mine data tables and Views • Can develop real time applications • Data Guard • Secured • Data base vault
7	IBM SPSS	Proprietary License	IBM Platform	\$499.0	<ul style="list-style-type: none"> • Support large number of data sources • Facility to develop model • Automatic Data preparation • Rich graphics • High automated modelling
8	SAS	Proprietary License			<ul style="list-style-type: none"> • Analyze big data • Best fir for text mining and optimization

Data Mining Algorithms

The primary objective of this research paper is to review all data mining algorithms which can be implemented in health-care sector. Data mining algorithms can be classified into two categories: unsupervised or descriptive and supervised or predictive techniques. Descriptive data mining technique identifies the similarity in the data as well as existing patterns whereas predictive data mining technique forecast about the existing data. Descriptive mining provides accurate data where predictive technique does not ensure about accuracy of data. Descriptive mining is reactive approach of describing characteristics of large data where predictive mining is proactive approach of that forecast on current data. Clustering and association are descriptive data mining techniques whereas predictive data mining techniques include regression and classification. In addition, neural networks have been devised with the exponential increase in data with time [7][8]. In this section, all these techniques are elaborated with their uses in health care as shown in Table 2.

Table 2: Data Mining Techniques

S. No.	Data Mining Techniques	Representation	Application
1	Regression	$Y = a + bX + E$	It points out the relationship between the defined special functions and the relevant function variables
2	Decision Tree (DT)	<ol style="list-style-type: none"> 1. Compute the entropy for the data set defined $(S) = \sum_{c \in C} -p(c) \log_2 p(c)$, $c = \{yes, no\}$ 2. For every feature/ attribute: <ol style="list-style-type: none"> 1. Entropy estimation for all categorical values 2. Consider average information entropy for the existing feature 3. Calculate gain for the existing feature $(A, S) = (S) - \sum_{t \in T} p(t) H(t)$ 3. Select the highest gain feature 4. Repeat until desired tree obtained 	It is used to offer a prognostic decision to solve imbalanced problems.
3	Bayesian Method	$P(b A) = \frac{P(A b) \cdot P(b)}{P(A)}$	It is concentrated on improving prediction precision as well as allowing more features to be extracted from the data without triggering over fitting.
4	K-Nearest Neighbor (K-NN)	$(p, q) = (q, p) = \sqrt{\sum (q_i - p_i)^2}$	It is used to use known points to discover unknown points.
5	Support Vector Machine (SVM)	$y_i(w \cdot x_i + b) - 1 \geq 0 \text{ for } +1, -1$	It is regulated by two variables, namely the training error and the calculated ability of the learning machine.

6	Clustering	$c_i = \frac{1}{ S_i } \sum_{x_i \in S_i} x_i$	It seeks to classify a finite set of data definition categories or clusters.
7	Association	$Support(X \geq Y) = P(X \cup Y)$ $Confidence(X \geq Y) = \frac{P(X \cup Y)}{P(X)}$ $Lift(X \geq Y) = \frac{Confidence(X \geq Y)}{P(Y)} = \frac{P(X \cup Y)}{P(X)P(Y)}$	It is convenient for formative rules in the database accompanied by implementation
8	Neural Network (NN)	$f(b + \sum^n)$	For large quantities of data, it is observed that the method becomes more effective with known performance.

As discussed, the review study of data mining tools and algorithms helps to identify the suitability of algorithms with respect to the various diseases. Hence, to move towards the pandemic Covid-19 spread, aforementioned algorithms or techniques or classifiers may support in order to understand and analyze it in detail.

COVID-19 and its Analysis

The spread of COVID-19 across the country has put the humankind in danger. The resources of some of the leading economies are stressed out due to the large infection and transmission of this disease. Due to the growing extent of number of cases and its subsequent pressure on the health sector management at micro level; some data mining tools and algorithms would be required for analysis. Acute shortages in healthcare facilities have been caused by the Novel Corona virus (COVID-19). The following is the number of beds and hospitals in various states and territories of the union. This data, together with the patient database, can be critical in predicting and supplementing acute medical infrastructure shortages where appropriate[38].

Table 2 shows the number of hospitals and beds in rural and urban areas of India, government-wise by State / UT, and as available in the National Health Profile Release.

Table 2 [43]

S. No.	Name of Attribute	Type	Description of Value
1	States	Categorical	Name of states
2	Rural Hospitals	Scalar	No. of Rural Hospitals
3	Rural Hospitals' beds	Scalar	No. of beds in Rural Hospitals
4	Urban Hospitals	Scalar	No. of Urban Hospitals
5	Urban Hospitals' beds	Scalar	No. of beds in Urban Hospitals
6	As on	Date	Date on which the data is retrieved.

The analysis of data is done as discussed:

There is a strong correlation between Number of Beds and Number of Hospitals, and Value of R Square is 89, so we can infer that Increase of Number of Hospitals can increase number of beds. Here, Linear Regression is applied for the analysis.

Model Fit Measures		
Model	R	R ²
1	0.947	0.897

Model Coefficients - NBGovt.				
Predictor	Estimate	SE	t	p
Intercept	401.75	112.691	3.57	0.001
NHGovt	4.88	0.284	17.19	< .001

Number of AYUSH hospitals and beds State / UT-wise, as defined in Table 3 and given by the Ministry of AYUSH.

Table 3 [43]

S. No.	Name of Attribute	Type	Description of Value
1	States	Categorical	Name of different states
2	Government Hospitals	Scalar	No. of Hospitals Government
3	Local Body Hospitals	Scalar	No. of Hospitals Local Body
4	Others Hospitals	Scalar	No. of Hospitals Others
5	Government Hospitals' beds	Scalar	No. of beds in Government Hospitals
6	Local Body Hospitals' beds	Scalar	No. of beds in Local Body Hospitals
7	Others Hospitals' beds	Scalar	No. of Beds in Others Hospitals

Here, we implemented clustering with K-means. The clustering algorithm K-means measures the centroids and iterates until the maximal centroid is captured. The number of clusters is believed to be determined in advance. It is also known as the Algorithm of Flat Clustering. The algorithms then find the number of clusters and are represented in K-means by 'K'. Later, the data points are assigned to a cluster such that the minimum square distance between the data points and the centroid will be the sum of the square distance. It is to be established that less variation within the clusters will lead to more similar data points within same cluster. For Table 3, K-means clustering with 3 clusters of sizes 2, 9 and 18 have been considered and the data analysis is as shown below:

Cluster means:		
S. No.	Total No. of Hospital	Total No. of Beds
1	13.50000	2962.0000
2	9.555556	1259.3333
3	2.111111	139.2778

Now, clustering vector are identified as follows for various records associated with the values of Table 3 as below:

3 3 3 3 3 2 3 2 3 2 3 2 3 2 2 2 3 1 3 3 3 3 3 2 2 3 2 3 1

Then, within cluster the sum of squares by cluster is identified as 86.2 %:

Cluster Size 2	654368.5
Cluster Size 9	1713254.2
Cluster Size 18	627197.4
(Between_SS) / (Total_SS)	86.2 %

As shown in Table 4, the number of Primary Health Centres (PHCs), Community Health Centres (CHCs), Sub-District / Divisional Hospitals (SDHs), District Hospitals (DHs) and beds, India, State / UT wise as uploaded by the State / UTs on the Ministry 's Health Management Information System (HMIS) portal.

Table 4 [43]

S. No.	Name of Attribute	Type	Description of Value
1	States	Categorical	Name of states
2	PHC	Scalar	No. of Primary Health Centres
3	CHC	Scalar	No. of Community Health Centres
4	SDH	Scalar	No. of Sub-District/Divisional Hospitals
5	DH	Scalar	No. of District Hospitals

Standard Distribution is analysed in Table 4 and important values have been found between their values. A probability distribution is a regular distribution, usually referred to as the Gaussian distribution. It is symmetrical with the mean and indicates that the data near to the mean occurs more often than the data far from the mean. Then, we used the Shapiro-Wilk normality measure. It is one of three general measures of normality aimed at identifying all deviations from normality. For the other two tests, it is comparably successful. The test rejects the normality hypothesis when the p-value is smaller than or equal to 0.05.

Descriptives				
	PHC	SDH	CHC	DH
N	36	30	36	36
Missing	0	6	0	0

Descriptives				
	PHC	SDH	CHC	DH
Mean	831	41.8	155	27.9
Median	519	21.5	80.5	21.5
Minimum	4	0	2	1
Maximum	3277	310	671	174
Shapiro-Wilk p	< .001	< .001	< .001	< .001

Thus, the following observations are drawn:

- Since P Value Shapiro Wilk Test of PHC is less than 0.05, so it can be inferred that PHC is not following Normal Distribution.
- Since P Value Shapiro Wilk Test of SDH is less than 0.05, so it can be inferred that SDH is not following Normal Distribution.
- Since P Value Shapiro Wilk Test of CHC is less than 0.05, so it can be inferred that CHC is not following Normal Distribution.
- Since P Value Shapiro Wilk Test of DH is less than 0.05, so it can be inferred that DH is not following Normal Distribution.

The Paired Sample T-Test has now been implemented to measure the substantial difference between the values. The paired t-test sample is a statistical tool used to demonstrate if there is zero in the mean difference between two sets of observations. Each subject or object is twice tested in a paired sample t-test, leading to pairs of observations.

Paired Samples T-Test					
			Statistic	df	P
PHC	CHC	Student's t	5.36	35.0	< .001

Null Hypothesis: There is no significant difference between PHC and CHC

Alternate Hypothesis: There is significant Difference between PHC and CHC

Since, p value is less than 0.05, it can be inferred that there is significant Difference between PHC and CHC.

Paired Samples T-Test					
			Statistic	df	P
PHC	SDH	Student's t	5.49	29.0	< .001

Null Hypothesis: There is no significant difference between PHC and SDH

Alternate Hypothesis: There is significant Difference between PHC and SDH

Since, p value is less than 0.05, it can be inferred that there is significant Difference between PHC and SDH

Paired Samples T-Test					
			Statistic	df	p
PHC	DH	Student's t	5.45	35.0	< .001

Null Hypothesis: There is no significant difference between PHC and DH

Alternate Hypothesis: There is significant Difference between PHC and DH

Since, p value is less than 0.05, it can be inferred that there is significant Difference between PHC and DH

Paired Samples T-Test					
			Statistic	df	p
CHC	SDH	Student's t	4.54	29.0	< .001

Null Hypothesis: There is no significant difference between CHC and SDH

Alternate Hypothesis: There is significant Difference between CHC and SDH

Since, p value is less than 0.05, it can be inferred that there is significant Difference between PHC and SDH

Paired Samples T-Test					
			Statistic	df	p
CHC	DH	Student's t	4.89	35.0	< .001

Null Hypothesis: There is no significant difference between CHC and DH

Alternate Hypothesis: There is significant Difference between CHC and DH

Since, p value is less than 0.05, it can be inferred that there is significant Difference between CHC and DH

Paired Samples T-Test					
			Statistic	df	p
SDH	DH	Student's t	1.63	29.0	0.114

Null Hypothesis: There is no significant difference between SDH and DH

Alternate Hypothesis: There is significant Difference between SDH and DH

Since, p value is less than 0.05, it can be inferred that there is significant Difference between SDH and DH

Conclusion

Here, many data mining tools and methods for medical data and diseases have been discussed. It has become important to use data mining techniques in order to help identify diseases in assessment and prediction in the healthcare area, as there is a lot of data unaddressed in the medical sector. Medical data mining thus contributes to business intelligence, which is useful for the identification of various discovered diseases. In addition, the distribution of COVID-19 is analyzed using data mining techniques used by the government, AYUSH hospitals and numbers of health centers for medical data from different hospitals. Primary Health Centers (PHCs), Community Health Centers (CHCs), Sub-District / Divisional Hospitals (SDHs), District Hospitals (DHs), and beds are among these health centers. It has been concluded that data from COVID-19 will more and more support the future of health informatics. Data mining applications may help to determine their effect on the healthcare industry due to the convenience of these algorithms. Nevertheless, it should be noted that this profit depends on how precise the information is. The collection, loading, training and mining of data must be critically considered to ensure the achievement of data mining applications. The future opportunities lies in diseases detection using data mining tools and techniques based on previous experiences. This may enhance the efficiency while choosing any of discussed algorithms to minimize the time required towards better results. Further, the data may be scaled to global level since the pandemic has touched all the corners of planet. Classification algorithm such as Regression may help to identify the disease factors relation and dependency. Then, Decision Tree and SVM may help to identify the scope in various classes of decision making while diagnosing. Also, KNN may further use to categorise on basis of similarities. Lastly, clustering shall impact the overall analysis with unidentified classes whereas Neural Networks will help to handle large medical datasets. Thus, the health industry across globe may be benefited.

References

- [1] C.Hattice & K. Metin, "A DIAGNOSTIC SOFTWARE TOOL FOR SKIN DISEASES WITH BASIC AND WEIGHTED K-NN", Innovations in Intelligent Systems and Applications (INISTA), 2012.
- [2] Dhanya P Varghese & Tintu P B, "A SURVEY ON HEALTH DATA USING DATA MINING TECHNIQUES", International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue: 07, Oct-2015.
- [3] DoronShalvi & Nicholas DeClaris, "AN UNSUPERVISED NEURAL NETWORK APPROACH TO MEDICAL DATA MINING TECHNIQUES", IEEE, 1998.
- [4] Gustavo Santos-Garcia & Gonzalo Varela & Nuria Novoa & Marcelo F. Jimenez, "PREDICTION OF POSTOPERATIVE MORBIDITY AFTER LUNG

- RESECTION USING AN ARTIFICIAL NEURAL NETWORK ENSEMBLE”, *Artificial Intelligence in Medicine* 30:61–69, 2004.
- [5] Harleen Kaur & Siri Krishan Wasan, “EMPIRICAL STUDY ON APPLICATIONS OF DATA MINING TECHNIQUES IN HEALTHCARE”, *Journal of Computer Science* 2 (2): 194-200, 2006.
- [6] Hojin Moon & HongshikAhn & Ralph Kodell & Songjoon Baek & Chien- Ju Lin & James Chen, “ENSEMBLE METHODS FOR CLASSIFICATION OF PATIENTS FOR PERSONALIZED MEDICINE WITH HIGH-DIMENSIONAL DATA”. *Artificial Intelligence in Medicine* 41:197–207, 2007.
- [7] I. Curiac & G. Vasile & O. Baniias & C. Volosencu & A. Albu, “BAYESIAN NETWORK MODEL FOR DIAGNOSIS OF PSYCHIATRIC DISEASES”, *Proceedings of the ITI 2009 31st Int. Conf. on Information Technology Interfaces*, Cavtat, Croatia, 22-25 June-2009.
- [8] Ilayaraja & T. Meyyappan, “MINING MEDICAL DATA TO IDENTIFY FREQUENT DISEASES USING APRIORI ALGORITHM”, *Proceedings of the 2013 International Conference on Pattern Recognition, Informatics and Mobile Engineering*, 21-22 February-2013.
- [9] IllhoiYoo & Patricia Alafaireet & Miroslav Marinov & Keila Pena-Hernandez & Rajitha Gopidi & Jia-Fu Chang & Lei Hua, “DATA MINING IN HEALTHCARE AND BIOMEDICINE: A SURVEY OF THE LITERATURE”, Springer, May-2011.
- [10] Jeong-Yon Shim & Lei Xu, “MEDICAL DATA MINING MODEL FOR ORIENTAL MEDICINE VIA BYY BINARY INDEPENDENT FACTOR ANALYSIS”, *IEEE.P1-4*, 2003.
- [11] J.J.Tapia & E. Morett & E. E. Vallejo, “A CLUSTERING GENETIC ALGORITHM FOR GENOMIC DATA MINING”, *Foundations of Computational Intelligence, Studies in Computational Intelligence*, Volume:204, 2009.
- [12] J.Yanqing & H.Ying & J.Tran & P.Dews & A.Mansour & R.Michael Massanari, “MINING INFREQUENT CAUSAL ASSOCIATIONS IN ELECTRONIC HEALTH DATABASES”, *11th IEEE International Conference on Data Mining Workshops*, 2011.
- [13] K.Sharmila & Dr. S.A.Vethamanickam, “SURVEY ON DATA MINING ALGORITHM AND ITS APPLICATION IN HEALTHCARE SECTOR USING HADOOP PLATFORM”, *International Journal of Emerging Technology and Advanced Engineering* ISSN 2250-2459, Volume: 05, Issue: 01, January-2015. *International Journal of Information Sciences and Techniques (IJIST)* Vol.6, No.1/2, March 2016 59

- [14] L.Chang & C.H.Chen, "APPLYING DECISION TREE AND NEURAL NETWORK TO INCREASE QUALITY OF DERMATOLOGIC DIAGNOSIS", Expert Systems with Applications- Elsevier, Volume: 36, pp. 4035-4041, 2009.
- [15] Markus Brameier & Wolfgang Banzhaf, "A COMPARISON OF LINEAR GENETIC PROGRAMMING AND NEURAL NETWORKS IN MEDICAL DATA MINING", IEEE.p1-10, 2001.
- [16] Michael Barnathan&Jingjing Zhang & Vasileios, "A WEB-ACCESSIBLE FRAMEWORK FOR THE AUTOMATED STORAGE AND TEXTURE ANALYSIS OF BIOMEDICAL IMAGES", IEEE. P1-3. 2008.
- [17] O.Er & N. Yumusakc & F. Temurtas, "CHEST DISEASES DIAGNOSIS USING ARTIFICIAL NEURAL NETWORKS", Expert Systems with Applications-Elsevier, Volume: 37, pp. 76487655, 2010.
- [18] Ping-Hung Tang & Ming-Hseng Tseng, "MEDICAL DATA MINING USING BGA AND RGA FOR WEIGHTING OF FEATURES IN FUZZY K-NN CLASSIFICATION", IEEE.P1-6, July-2009.
- [19] Pradnya P. Sondwale, "OVERVIEW OF PREDICTIVE AND DESCRIPTIVE DATA MINING TECHNIQUES", International Journal of Advanced Research in Computer Science and Software Engineering, Volume: 05 Issue: 04, April-2015.
- [20] Prakash Mahindrakar & Dr. M. Hanumanthappa, "DATA MINING IN HEALTHCARE: A SURVEY OF TECHNIQUES AND ALGORITHMS WITH ITS LIMITATIONS AND CHALLENGES", Prakash Mahindrakar et al Int. Journal of Engineering Research and Applications: 2248-9622, pp.937- 941, Volume: 03 Issue 06, Nov-Dec 2013.
- [21] Ranjit Abraham & Jay B.Simha & Iyengar, "A COMPARATIVE ANALYSIS OF DISCRETIZATION METHODS FOR MEDICAL DATAMINING WITH NAÏVE BAYESIAN CLASSIFIER", IEEE. P1-2, 2006.
- [22] R.Karthiyayini & J.Jayaprakash, "ASSOCIATION TECHNIQUE ON PREDICTION OF CHRONIC DISEASES USING APRIORI ALGORITHM", International Journal of Innovative Research in Science, Engineering and Technology, Volume: 04, Special Issue 06, May 2015.
- [23] Sarojini Balakrishnan & Ramaraj Narayanaswamy, "FEATURE SELECTION USING FCBF IN TYPE II DIABETES DATABASES", Special Issue of the International Journal of the Computer, the Internet and Management, Volume: 17 No. SP1, March-2009.
- [24] Sheetal L. Patil, "SURVEY OF DATA MINING TECHNIQUES IN HEALTHCARE", International Research Journal of Innovative Engineering, Volume: 01 Issue: 09, September-2015.

- [25] Syed Zahid Hassan & Brijesh Verma, "A HYBRID DATA MINING APPROACH FOR KNOWLEDGE EXTRACTION AND CLASSIFICATION IN MEDICAL DATABASES". IEEE. P1-6, 2007.
- [26] S. Soni & O. P. Vyas, "USING ASSOCIATIVE CLASSIFIERS FOR PREDICTIVE ANALYSIS IN HEALTH CARE DATA MINING", International Journal of Computer Applications, Volume: 04, No: 05, July-2010.
- [27] Tsang-Hsiang Cheng & Chih-Ping Wei & Vincent S. Tseng, "FEATURE SELECTION FOR MEDICAL DATA MINING: COMPARISONS OF EXPERT JUDGMENT AND AUTOMATIC APPROACHES", IEEE. P1-6, 2006.
- [28] U.Fayyad, G.Piatetsky-Shapiro and P.Smyth, "THE KDD PROCESS OF EXTRACTING USEFUL KNOWLEDGE FORM VOLUMES OF DATA", Communications of the ACM, pp. 27-34 Volume: 39, No: 11, November-1996.
- [29] Usama Fayyad & Gregory Piatetsky & Padhraic Smyth, "Knowledge Discovery and Data Mining: Towards a Unifying Framework" KDD-96 Proceedings, 1996.
- [30] WeiminXue & Yanan Sun & Yuchang Lu, "RESEARCH AND APPLICATION OF DATA MINING IN TRADITIONALCHINESE MEDICAL CLINIC DIAGNOSIS", IEEE.p1-4, 2006.
- [31] W.L.Zuoa & Z.Y.Wanga & T.Liua & H.L.Chenc, "EFFECTIVE DETECTION OF PARKINSON'S DISEASE USING AN ADAPTIVE FUZZY K-NEAREST NEIGHBOR APPROACH", Biomedical Signal Processing and Control, Elsevier, pp. 364373, 2013.
- [32] Zhong, L., Mu, L., Li, J., Wang, J., Yin, Z., & Liu, D. "EARLY PREDICTION OF THE 2019 NOVEL CORONAVIRUS OUTBREAK IN THE MAINLAND CHINA BASED ON SIMPLE MATHEMATICAL MODEL". IEEE Access, 8, 51761-51769, 2020
- [33] Souza, J., Leung, C. K., & Cuzzocrea, A. "AN INNOVATIVE BIG DATA PREDICTIVE ANALYTICS FRAMEWORK OVER HYBRID BIG DATA SOURCES WITH AN APPLICATION FOR DISEASE ANALYTICS", In International Conference on Advanced Information Networking and Applications (pp. 669-680). Springer, Cham, 2020
- [34] C Wang, P W Horby, FG Hayden, and G F Gao, "A NOVEL CORONAVIRUS OUTBREAK OF GLOBAL HEALTH CONCERN", *Lancet*, 395: 470–473, 2020.
- [35] Wang, S., Kang, B., Ma, J., Zeng, X., Xiao, M., Guo, J. & Xu, B. "A DEEP LEARNING ALGORITHM USING CT IMAGES TO SCREEN FOR CORONA VIRUS DISEASE (COVID-19)", Springer Cham, 2020
- [36] Pandey, R., Gautam, V., Bhagat, K., & Sethi, T., "A MACHINE LEARNING APPLICATION FOR RAISING WASH AWARENESS IN THE TIMES OF COVID-19 PANDEMIC", In Xiv preprint, 2020.

- [37] Yan, L., Zhang, H. T., Goncalves, J., Xiao, Y., Wang, M., Guo, Y., & Huang, X., "A MACHINE LEARNING-BASED MODEL FOR SURVIVAL PREDICTION IN PATIENTS WITH SEVERE COVID-19 INFECTION", Springer, Cham, 2020
- [38] Ronsivalle, G. B., Foresti, L., & Poledda, G. A PROTOTYPE MODEL OF GEOREFERENCING THE INHERENT RISK OF CONTAGION FROM COVID-19. Springer, Cham, 2020
- [39] Kirigia, J. M., Sambo, L. G., Aldis, W., & Mwabu, G. M., "THE BURDEN OF NATURAL AND TECHNOLOGICAL DISASTER-RELATED MORTALITY ON GROSS DOMESTIC PRODUCT (GDP)", In the WHO Africa Region. African journal of health sciences, 9(2), 169-180.
- [40] Abdelhak, S., Sulaiman, J., & Mohd, S., "A BOUNDS TESTING TO COINTEGRATION:AN EXAMINATION OF NATURAL DISASTERS AND GDP RELATIONSHIP IN SOUTHERN AFRICA REGION. Int. J. Applied Econ. Fin, 5, 213-225, 2019
- [41] Xu, H., Zhong, L., Deng, J., Peng, J., Dan, H., Zeng, X. & Chen, Q., "HIGH EXPRESSION OF ACE2 RECEPTOR OF 2019-NCOV ON THE EPITHELIAL CELLS OF ORAL MUCOSA", International Journal of Oral Science, 12(1), 1-5,2020
- [42] Yanwei Xing & Jie Wang & Zhihong Zhao & Yonghong Gao, "COMBINATION DATA MINING METHODS WITH NEW MEDICAL DATA TO PREDICTING OUTCOME OF CORONARY HEART DISEASE", International Conference on Convergence Information Technology, 2007.
- [43] <https://www.kaggle.com/sudalairajkumar/novel-corona-virus-2019-dataset>.

Transformation of Multi-Channel Retailing into Omni-Channel Retailing in the Post-COVID World

Ravikanth Reddy Vadamala*

Introduction

India is the second-most populous country in the world and its retail sector is transforming to meet the evolving market requirements. Consumers are now of the mindset where retailers need to provide Olympian services in product delivery in all interactions as a significant number of shoppers are opting for online buying. Implementing an omni channel retail strategy is an appropriate step for retailers at this juncture. Technological drifts from existing Information Technology (IT) environment to cloud services, big data, and real-time analytics is facilitating retailers in the implementation of new channels with significant IT budgets. The retailer's eventual aim is to merge the information-rich experience and the convenience of shopping online with the tangible atmosphere of shopping in physical stores.

This article delves into the Indian retail growth story and the retailers' journey from Kirana store setup to e-commerce, multichannel to Omni channel in the post COVID world. It highlights in detail the steps that may be ultimately contemplated by retailers towards building an omni channel strategy. The challenges that e-commerce players in India are facing in their day-to-day operations are examined. The typical nuances of Indian consumers are also discussed as they further define India's markets by applying Michael Porter's five-force model. This article is based primarily on secondary data resources.

Retail Landscape in India

India has a population of 1.34 billion people. Indian Retail industry reached US\$ 950 billion in 2018 at CAGR of 13 percent and expected to reach US\$ 1.1 trillion by 2020. Online retail sales are forecasted to grow at a rate of 31 percent year-on-year to reach US\$ 32.70 billion in 2018. Revenue generated from online retail is projected to grow to US\$ 60 billion by 2020.

* Research Scholar, Sri Venkateswara University, Tirupati, Andhra Pradesh, India.

Revenue of India's offline retailers, also known as brick and mortar (B&M) retailers, is expected to increase by Rs 10,000-12,000 crore (US\$ 1.39-2.77 billion) in FY20. India is expected to become the world's fastest-growing e-commerce market, driven by robust investment in the sector and a rapid increase in the number of internet users. Various agencies have high expectations about the growth of Indian e-commerce markets.

There were more than 15 million mom-and-pop stores in 2015. International major retailers in India are still confined to the cash-and-carry and wholesale formats like Metro and Walmart, or the single-brand retail formats where 100% Foreign Direct Investment (FDI) is allowed. Currently, many new entrants are choosing between partnerships with local companies (e.g. Gap, The Children's Place) and company-owned stores (e.g. Nike, IKEA, Sisley, and H&M), as only 51% FDI is allowed in multi-brand retail at the time of writing, though with riders such as 30% mandatory local sourcing, minimum \$100 million investment with 50% in the backend infrastructure, among others.

Market Penetration: Percentage of Traditional, Organized and Online to Total Trade

The emergence of online trade (or e-commerce, e-retail) has further changed the dynamics of the Indian retail sector, though the e-commerce market will remain challenging shortly. Until 2015, India had remained unranked in major reports, such as A.T. Kearney's Global Retail E-commerce Index. Indian online retail is just 2.5% of the total Indian retail market (eMarketer Chart 2016). Only 69% of India's population has access to broadband and mobile Internet (A.T. Kearney 2015a, b). There are only 39 million online buyers in India, which is approximately just 3% of the whole Indian population; this indicates potential growth in online trade.

Online Retailing

Major e-commerce players are Flipkart, Amazon India, and Snapdeal. Their websites serve as "Online Marketplaces" for other retailers and other companies to sell their goods. Companies store their products in the online retailer's warehouses, but ownership of the product does not transfer to the online retailer. Companies pay the online retailer a fee for the storage and distribution of its products and access to the website as a selling platform. In 2014, e-commerce spends in India increased by 27% to \$3.8 billion, and it is expected to grow over the next 5 years by 21%, which is slightly higher than the global average. A KPMG-CII report has identified the e-commerce market in India at \$27.5 billion in 2016 and is expected to reach \$80 billion by 2020 with a CAGR of 31% (Tanwar and Doger 2016).

In the recent past, online retailers have wooed consumers with deep discounts and promotions causing a substantial dip in the revenues of brick and mortar (physical, offline) retailers, as the consumers shopped online. To cope with the

competition, physical retailers like The Future Group, Spencer's Retail, and Aditya Birla Group are gradually shifting to e-commerce. While some are launching their websites with cloud-based services from Google Business, GoDaddy, Wix to name a few, others are making their products available online through the marketplace platforms like Flipkart, Snapdeal, and Amazon. The concept of omni channel retailing in India thus originated as a response by offline retailers to mitigate the threat that was posed by purely online retailers.

From Multi-Channel to Omni channel Retailing

Technically omni channel retailing can be referred to as integrated multichannel touch points for consumers. The consumer decides where and when to shop and from which device. A consumer can look for a product in the physical store and if it is unavailable, browse for it on the website or through a mobile app to complete the order. The consumer may then pick up a purchase from the store, at a delivery location or through home delivery, decide on appropriate delivery windows, and can return purchased products in any of the retailer's physical stores without any encumbrances.

Customers connect across the range of platforms, searching for means to integrate their buying experiences, providing seamless interaction for the consumer across the various platforms, when the lines between channels are disappearing and focus is on brand, not channel management (Piotrowicz and Cuthbertson 2014). The physical and online formats are seamlessly developed so that the consumer's convenience remains the focal point of the retailer's strategy. Indian retailers are still in a reactive phase and it may take some years before they can fully leverage the synergies between their physical stores and online presence to generate a competitive advantage.

Online Retail in India

Online retail growth has been broadly envisaged as a disruptive business model across the world. Disruptive innovation is described as "an innovation that creates a new market and value network and eventually disrupts an existing market and value network, displacing established market leaders and alliances" (Bower and Christensen 1995).

The factors that cause retail disruption are the changing nature of retail competition, the increase in the digitally-influenced shopping experience, and the availability of the numerous technologies as enablers.

E-Retail Growth Phases

Similar to other disruptive business models, e-retail growth has revealed three successive phases worldwide—the incubation phase, the inflection phase, and the acceleration phase (Sharma and Flamind 2015). The incubation phase in India lasted

broadly from 2007 to 2012 when India was marked by a period of slow growth in Tier-1 and Tier-2 cities, during which e-retailers developed new capabilities in technology and infrastructure, investors opened up funding the new businesses, and consumers adapted to the new forms of consumption. CAGR was relatively low at 38% during this period.

The inflection phase was from 2012 to 2014 during which point of time e-retailers reached the necessary level of development to match the market's needs. Growth increased remarkably with a CAGR of 80%.

The acceleration phase from 2014 onwards is expected to be a longer phase during which the pace of growth will further increase, transforming e-retail into a conventional market space. India has already passed the inflection phase and moved into the phase of accelerated growth. Presently though e-retail is less than 1% of the total retail sales, it is a matter of contemplation to many as to how fast e-retail can expand in this phase of development, given the huge size of the overall Indian market.

Online Consumer Behaviour

In the Asia Pacific (APAC) region, millennial-aged between 16 to 30 years spend about 2.8 hours a day on their mobile devices like phones, tablets, and laptops. Across Mobile usage differs across age groups and countries with Thailand has the highest daily usage at 4.2 hours, China is at 3.9 hours. India clocks 2.2 hours and Japan has the lowest daily usage rate at 1.6 hours (Connected Life—TNS 2015). 46% of millennials spend their time on mobiles browsing social media platforms like Instagram, Facebook, YouTube to name a few 42% watch videos, and 12% shop online.

When compared to the other BRIC economies, India has a higher proportion of internet users between the age of 15 and 35 years though fewer women go online (Ernst & Young 2016). The fact about lady web client populace in India is the least in contrast with the other BRIC economies. It suggests that the 'high gaining high spending' ladies populace matured over 35 years are at present more open to shopping disconnected than on the web. As the other BRIC nations, web use in India is mostly an urban marvel however the client blend is right now moving toward provincial territories. This has been driven by the simple access to cell phones in country zones. The provincial section is unreasonably noteworthy for web-based business players to overlook. An ongoing review of 700 online clients across six urban areas by Ernst and Young uncovers that in India 71% of online customers favor cashless installments and 64% of online customers have worries about sharing card subtleties. 55% don't have any desire to pay for home conveyance. 86% normally search for limits and 96% of ladies' shoppers beneath 21 years old purchase just for limits. Most online high-spending people are over 35-years and are overwhelmingly from urban communities. Space for online business development in Tier-1 and Tier-2 urban communities despite everything exists.

It is likewise imperative to take note that the more seasoned ages who for the most part have higher discretionary cash flow and set up purchasing behaviors are investing more energy on the web. This is the place a significant test is presented to advertisers. They are investigating approaches to market to the carefully most-exceptional millennial purchasers on the freshest computerized stages and the need to ensure that they are concentrating on the substance driven, shareable crusades that are successful with this gathering. Simultaneously advertisers need to hold up under at the top of the priority list that the more seasoned clients can't be focused on just through conventional media as their examples of conduct are likewise moving. A layered showcasing methodology with customized informing and media designs that additionally considers the higher spending intensity of the more established ages will best address the computerized partition brought about by the double pace of buyer's advanced media reception rates. To connect adequately to the two portions, advertisers should make important substances for each fragment, convey in a noteworthy way to each section utilizing the media channels, and draw in them with the brand.

Challenges Faced by e-Commerce Companies in India

Even though the development potential imagined in online business is promising, there are sure difficulties that render significant obstructions to the division. Among others, four key zones that can be recognized are the Indian buyers' purchasing propensities, absence of fundamental framework, ruthless evaluating systems, and absence of availability in omni channel innovation.

Buyers' Buying Habits Indian customers have an inborn inclination to contact and feel an item before purchasing which is impracticable to satisfy by online business organizations. To a few, shopping as an action isn't viewed as an errand yet as a social action that permits them to collaborate with companions and associates that can't be completely reproduced in an internet shopping condition. Be that as it may, for clients who are time-compelled, internet shopping will in general be less upsetting than regular shopping since it assists with sidestepping delays in the lines and route of traffic in top hours. Shopping at adaptable occasions from the comfort of their homes just as day-and-night item conveyance administrations make internet business alluring to such clients. It is likewise imagined that buyers spend less while shopping on the web as drive purchasing happens prevalently while shopping in surrounding conditions in physical stores. Online customers have questions on the unwavering quality of the sites in depicting the real item that they will get after requesting. They are additionally uncertain about the arrival arrangements and cash discount should the need emerge.

The security of online installments additionally stays a reason for worry to purchasers. Customers so far will not in general have unwaveringly to a particular internet business stage. They value delicate and look at costs between web-based business stages before picking the best arrangement.

Absence of Necessary Infrastructure As India has a moderately low web entrance of 34.8% of the nation's all-out populace (India Internet Users 2016), perusing items on the web and shopping is disabled. Achievement in web-based business requires having a vigorous flexibly chain set up and guaranteeing last-mile conveyance at the most reduced conceivable expense. Dissemination costs in Tier-2 and Tier-3 urban areas are exceptionally high as the physical foundation for a web-based business, for example, distribution centers or satisfaction focuses and mechanical framework like worldwide situating frameworks (GPS), is as yet divided and in a condition of advancement. The street framework is a basic issue. India's street and roadway thickness are immature with numerous streets being unpaved and ineffectively kept up in the hinterlands. There is no normalized road address framework for which buildings and road names and tourist spots are frequently expected to find a house.

Different difficulties looked by e-retailers incorporate gracefully anchor issues identifying with the conveyance workforce and request taking focuses, stock administration, stockpiling necessities for various item classes, mistakes in conveyance, and convenient conveyance of items in great condition. A deficiency of gifted labor is another significant test as internet business organizations require an ability pool of, particularly advanced specialists. The organizations need to focus on building pertinent abilities by enlisting individuals with the correct capacities, particularly in promoting and deals groups.

Savage Pricing Strategies A key reason for concern is that right now e-retailers steeply rebate their item costs to draw in both online clients and clients of physical retailers. E-retailers embrace steep limiting to get clients, fabricate client reliability, and increment their piece of the pie. Every player trusts that once the client finds the most reduced cost on its entrance and makes rehash buys for a continued timeframe, the client will in the end quit looking at costs and have a higher brand review towards that specific e-retailer, consequently constructing dependability. In any case, such steep limiting renders organizations unreasonable for e-retailers without profound pockets and drives existing players out of the market while making an imposing section boundary for new players. It likewise upsets the physical retailers who don't have the money related muscle and have no goal to work with extreme misfortunes. Item brand esteem is another issue for the physical retailers and makers, likewise with the overwhelming limits offered on similar items by the online business players on their foundation, the picture of the brand could be dissolved. This would prompt a failure to successfully value the item even in the physical stores. It is a typical recognition that lofty limiting is the consequence of the undue measure of subsidizing that e-retailers are acquiring. Flipkart has raised \$3.4 billion and Snapdeal \$1.7 billion through speculator financing since initiation in 2007 and 2010 separately, while Amazon has put an aggregate of \$47.43 million in India since 2014. As Amazon

keeps on contributing forcefully, Flipkart and Snapdeal keep on spending intensely on limits, publicizing and coordinations to guard their pieces of the pie. To empower their exercises the three organizations require crisp subsidizing at standard interims. The profound limits that are financed by speculators' assets disintegrate the e-tailer's main concern, while the assets are unmistakably required for interest in improving innovation, employing applicable ability, and getting new clients in an imaginative style.

Absence of Readiness in Omnichannel Technology Customers is consistently turning out to be channel freethinker and need a consistent encounter over the channels that they decide to shop in. However retailers have some separation to go in redesigning and incorporating the back-end frameworks that will assist them with delivering the clients' desires. As of now retailers are investigating innovation extends in storehouses, in their endeavor to giving new encounters to the clients, and not as a component of an incorporated guide.

Retailers are understanding that their current center frameworks of product arranging, stock administration, request the board, and POS (Point of Sale) won't have the option to help a thorough omnichannel change and furnish them with the drawn-out adaptability and nimbleness that they should encourage the change. To elaborate, omnichannel usage involves that the retailer fabricates a solitary perspective on the client, of the item, of the stock, just as the requests. To get a solitary perspective on the client, retailers can store the information from their sources like POS, promoting, advertising, dependability programs, online life, web journals, social shopping administrations, and sites, in a typical client database and create investigative capacities to use that information. To get a solitary perspective on the item, retailers need to unite item data, for example, item qualities and portrayals, related substance, for example, producer's data and directions, computerized resources like item pictures, and item connections, for example, suggestions and adjacencies, to empower better buy choices for the clients across channels. To acquire a solitary perspective on stock and requests, retailers must incorporate their graceful chain, marketing, store tasks, and internet business arrangements, just as they request the executives' frameworks. This will assist retailers with optimizing the area from which they select a stock to satisfy a request while limiting expenses and guaranteeing quick conveyance.

In any case, retailers' present frameworks have detached programming that brings about divided perspectives on their activities. So for retailers, this omnichannel change implies a crucial change in ventures. Significant IT framework venture choices should be made and financial plans must be changed following factors in the change. These choices need generous considerations as in the short term when the progress to omnichannel is in process, it might be hard to quantify the individual commitment of

the various channels to the retailer's arrival on speculation: for instance, estimating whether expanded footfalls in the store have been brought about by site correspondence or advancement in the store window. At the appropriate time however when the change to omnichannel has been incorporated, store Wi-Fi gadgets and large information use may help give such replies.

Online Retail Terminology: Showrooming, Webrooming, m-Commerce, Apps

An investigation of shopping conduct by statistical surveying firm Openbravo uncovers that 52% of customers like to check the costs before choosing an item, half trust audits and data, 39% have confidence in taking the assessment of a relative or companion, and 30.2% are customary customers who favor the in-store shopping experience. It is clear that buyer ventures are getting progressively confused and that retail phrasing presently incorporates words, for example, "Showrooming" and "Webrooming".

Show rooming is when a customer is in a store and checks on a mobile device whether a better price is available online.

Webrooming is when a customer researches a product online, makes a purchase decision online, and goes to the store to make the final purchase. Gradually consumers are seeking to control their shopping experiences and marketers strive for the consumers' loyalty by enabling them with multi-channel experiences.

The spurt in the growth of m-commerce is increasingly more important than desktop-based sales. A report by Mary Meeker shows that India (at 41%) ranks higher than China (at 33%) in its mobile usage as a percentage of total e-commerce sales. It has also the highest share across major economies like Brazil (20%), Russia (13%), UK(20.5%), and the USA (15%) (KPCB 2015). With smartphones becoming cheaper and more readily available, these upward trends are expected to continue further. A strong focus towards the development of m-commerce infrastructure is essential for a retail player as simply converting an active e-commerce website into a mobile website will not yield the desired outcome. It calls for reinvention and establishing a mobile-centric infrastructure. Providing targeted content such as personalized notifications to the customer at the right time through mobile apps would be a key value proposition. One major obstacle is the diverse regional languages in India. There is limited usage of the English language beyond the Tier-1 cities and marketers will have to invest considerably in localizing their content.

From the middle of 2014 e-commerce players have been promoting and offering discounts to customers on purchases made through their mobile apps. While smartphones are equipped with powerful web browsers that let a consumer do any activity that was once confined to a desktop computer, navigating through a URL bar on a mobile phone can prove to be a cumbersome experience. Online sites and services provide the app in an attempt to provide users with superior control and

simpler usage techniques. Apps enhance the functionality in a simplistic yet more user-friendly manner. A study by Nielsen has shown that users with expensive handsets (exceeding INR 15,000) spend 1.6 times more time on shopping apps as compared to those with cheaper phones, and some correlation exists between higher time spent on mobile phones with higher spending in mobile shopping (Jha and Varma 2015). Flipkart is the leader in mobile shopping apps in terms of both penetration (35%) and engagement (60 min per month) followed closely by Snapdeal (penetration 20%, user engagement 35 min a month). Amazon India Shopping is a more recent launch and has ranked third.

With the emerging familiarity of shopping apps among consumers, it is an opportune time for the organized retailers to take the cue and develop mobile-based platforms and apps for their customers to browse, purchase, and have the goods delivered to them without requiring them to visit the physical stores. This will help the physical store retailers expand their markets.

Benefits of apps however do not negate the benefits of websites. A case in hand was when online fashion retailer Myntra shut down its website to operate as an app-only platform in February 2015 as its mobile sales had exceeded its sales from personal computer figures. Myntra's sales figures had indicated that 70% of its sales were generated from smartphones. Shutting down the website meant that users were not left with any alternative but to download the Myntra app. Within 6 months, the app-only strategy failed as Myntra faced a loss of sales. A plausible reason would be that the Indian shoppers were not ready to completely abandon shopping from their personal computers or mobile browsers and found the app-only option too restrictive. Myntra has thereafter reworked and come up with a mobile site, which is a lighter mobile version of its website, rather than being present in an app-only format. As Myntra still relies on Google searches for new users, being available on the website put Myntra back on the Google search platform.

Analysis of e-Retail Sector Using Porter's Five Forces Framework

In the ensuing helter-skelter market condition, it is necessary to assess where the power lies in the e-retail sector. This analysis will provide an understanding of the e-retailers' competitive situation in India and the position that they are attempting to move into, as well as the profitability and the attractiveness of the e-retail sector:

- **Competition in the industry:** Overall industry rivalry is high with an oligopolistic market large and limited number of e-retailers entering the market who have low differentiation in terms of their product offerings. A high degree of polarization is evident with larger players like Flipkart, Snapdeal, and Amazon existing with numerous small e-retailers. The market is showing signs of consolidation with bigger e-retailers acquiring smaller players who have developed certain competencies. Lot of chain retailers have already gone into multichannel mode in Apparel, Pharmaceuticals to mention a few.

- **Power of Suppliers:** The suppliers in e-retail indicate the sellers, who generally have moderate power. The marketplace model provides an attractive channel for vendors to sell their products and they have several alternatives available to them in the online landscape. With cues from Amazon and Flipkart some of the retailers are taking help of new website offerings like Wix, GoDaddy and Google Business Sites and are choosing to change the technology providers to their websites, and are looking for cost effective alternatives in going online indirectly competing with big players.
- **Power of Customers:** The overall power of customers is at its peak as the products are seldom differentiated across the various platforms and switching costs being negligible in most of the segments. The differentiated services, like free home delivery for any billing amount, are fundamentally unsustainable and e-retailers are opting out of such service offerings. The retention strategies of multi-channel operators are mostly absent owing to price war.
- **Threat of New Entrants:** The threat of an existing player's market share depletion by new players joining the market is moderate. The regulatory framework is currently being drawn up and FDI investment is restricted for an inventory-based model. The number of product categories that are required to be developed fore-retail requires time as the e-retailer has to build the infrastructure and competencies. Gaining consumer trust also is time-consuming for a new entrant. However, compared to brick and mortar stores relatively low capital investment is required for online retail in such a vast country.
- **Threat of Substitute Products:** The threat from substitute services is relatively low for e-retail. Though its market share is currently small, a lot of growth is expected to happen in this segment. Traditional retail, direct marketing by manufacturers, and tele-retailing exist as shopping substitutes to customers, yet the advantages of e-retailing have generated profound interest among the consumer base.

As the market is evolving, retailers are working out their business models on a trial-and-error basis. Which of the retailers will profitably survive will predominantly be governed by their ability to innovate and evolve in ways that can best serve today's empowered consumers?

Recommendations and Conclusion

India is a country with 134 crore people, 29 states, 14 official languages, and multicultural customers. In India, online shopping may not be difficult but, product delivery is a logistics nightmare for retailers. Yet India has a market of 130 crores of consumers who are distinguishing their habits and view shopping as an important journey of collecting information and pointing their preferences homogeneously across

several platforms. Paradoxically, it is the consumers who appear to be orchestrating the change and not the retailers. The established retailers appear to have a reactive, not proactive, stance in this market evolution. The connotation of omnichannel suggests that retailers be omnipresent to consumers.

The market dynamics made government to allow 100% FDI in the online retail of goods and services under the marketplace model through the automatic route in an attempt to legitimize the existing businesses of e-commerce companies operating in India. FDI is however prohibited in e-commerce companies that own inventories of goods and services and sell directly to consumers using online platforms. Also, the marketplaces are prohibited from offering deep discount on the products and warranty/guarantee of the goods. These can only be offered by the sellers and their contact details have to be displayed online in the marketplace platform. Sales from an individual vendor in such a marketplace are capped at 25% of the total sales. The e-commerce retailer can continue to provide support services like warehousing, logistics, order fulfillment, call center, and payment collection to the individual sellers. These directives of the Government can potentially end the price wars in the e-commerce space and level the playing field with physical stores. As the retailers in the online place prepare towards implementing the modalities laid down by the Government, it is evident that their transformative role in the Indian market has been duly acknowledged. Over the next few years, it will be of much interest to monitor the retail landscape and analyze the market dynamics that unfurl among the dominant stakeholders.

References

- A.T. Kearney. (2015a). The 2015 global retail development index. Global retail expansion: An unstoppable force.
- A.T. Kearney. (2015b). The 2015 global retail e-commerce index. Global retail e-commerce clicks on clicking.
- Bower, J. L., & Christensen, C. M. (1995). Disruptive technologies: Catching the wave. *Harvard Business Review*, 73, 43–53.
- Connected Life – TNS Mobile. (2015). Millennials in Asia Pacific. <http://www.tnsglobal.com/sites/default/files/Millennials-on-Phone-A4.pdf>
- CRISIL Opinion, “e-tail eats into retail”, CRISIL Research. (2014, February). <http://www.crisil.com/pdf/research/CRISIL-Research-Article-Online-Retail-Feb14.pdf>
- Doger, K., & Tanwar, P. (2015, November). Fulfilled! India’s e-commerce retail logistics growth story. KPMG and CII.
- eMarketer Chart. (2016, August). Total retail and retail ecommerce* sales in India 2015–2020 (billions, % change and % of total retail sales). <https://www.emarketer.com/Chart/Total-Retail-Retail-Ecommerce-Sales-India-2015-2020-billions-change-of-total-retail-sales/194284>

- Ernst & Young. (2016). What will it take to sustain e-commerce growth?.
- India Internet Users. (2016). <http://www.internetlivestats.com/internet-users/india/>
- Jha, D., & Varma, K. (2015). Mobile shoppers turn App-happy – Delivering consumer clarity. Nielsen India, Nielsen Informate Mobile Insights – India Smartphone Users Panel.
- Piotrowicz, W., & Cuthbertson, R. (2014). Introduction to the special issue information technology in retail: Toward omnichannel retailing. *International Journal of Electronic Commerce*, 18(4), 5–16.
- Sharma, D., & Flamind, V. (2015, September). The Elephant charts the Dragon, charting the future of e-retail in India, *images retail*, pgs. 46–53.
- Tanwar, P., & Doger, K. (2016, August). Fulfilled! India's e-commerce retail logistics growth story. KPMG and CII.



Work from Home: A Prospective Model of Working Post COVID 19 Outbreak in India

Ms Vidushi Bajpai*
Dr. Bhawna Chahar**

Introduction

Changes are the only constant that exists in life. From the time when the whole world was struck by the pandemic called as COVID 19, the frequency of the occurrence of changes doubly increased. With new normal came up new ways of surviving the scenario. The uniqueness with changes is that it does not come alone. They are always accompanied with certain challenges. Those challenges are difficult to overcome but not impossible to do the same. Some of the changes are as follows:

- **Study from Home:** In the educational sector, for students, right from taking classes, uploading assignments and taking examinations, everything was done online. Whereas, for teachers, from making video classes, taking live sessions, taking doubt solving sessions and checking the assignment and examinations, everything was done online. Respective homes became the schools/ colleges for each and every individual of the educational sector.
- **Work from Home:** In the professional world, huge and minute business operations were carried forward from home. There were a lot of changes that was brought in various other traits like pay structures, working hours, flexibility in schedules and other aspects. Work from home became the safest and most accessible solution to address the problem.
- **Technological Progression:** It was technology which took the lead in the adverse situation of COVID 19 and made the lives of a humongous people easy and convenient. Earlier, in companies where technology was just a part of it, today it became the reason of the survival. Every operation, product manufacturing and service delivery was done with the help of technology.

* Alumni, Manipal University Jaipur, Jaipur (Rajasthan), India.

** Associate Professor, Department of Business Administration, Manipal University Jaipur, Jaipur Rajasthan, India.

- **Convenience:** The key concept during the COVID 19 outbreak was convenience and safety. Earlier, a considerable part of the Indian population did not go for online purchasing because of their immense belief on “touch-feel concept”, whereas today convenience is what the Indian audience looking while making the purchase. Thereby, choosing convenience over concept of touch-feel has been vividly witnessed post the COVID 19 pandemic.
- **E-Commerce Boom:** Since survival was the main intent for existing, regular companies, E-Commerce companies faced a boom in their profit graphs. From basic necessity products to luxurious items, from medicines to medical assistance, from accommodations to transportation and from educational items to educational services, everything was made available to the Indian customers at their doorsteps just by few clicks with uttermost convenience and comfort.

Following the changes are the challenges that is imperative to face:

- **Difficulty in Acceptance:** The problem with Indian population is not designing the change but the problem with them is to deal with those changes. Majority of the Indian population find it extremely difficult to welcome the change and inculcate it into their lives. Inculcating the change causes a lot of disturbance to the existing scenario and therefore, makes majority to refrain themselves from taking into account.
- **Financial Imbalance:** Welcoming a change often involves financial investment. During the COVID 19, there were a lot of individuals who could not afford to inculcate such changes due to financial crisis that they were undergoing.
- **Resistance to Change by the Weaker and Backward Section of the Society:** A major portion of the population of India belongs to the weaker and backward section. It is so because they choose to stay back with their primitive methods and not willing to move forward with the change. It could be due to lack of information regarding that particular change. They opt to not see on the brighter side of the change and advance themselves with time.
- **Illiteracy:** Illiteracy is one of the existing issue that restricts many individuals to modernize the thought process and living patterns. Illiteracy is basically the lack of knowledge and lack of information due to which they fail to understand the importance to move into that change. Such element of illiteracy also makes the training of such people extremely difficult.

Work from home is a term that has been ranging since past few years but has gained certain relevance during the COVID 19 outbreak. Work from home, is basically a mode of working where a business/company brings together all its employees virtually

over a technological platform in order to carry out important business operations with a vision to accomplish real company goals. History speaks about inventions and inventions occur not out of will but out of necessity. It was of great necessity to come up with a solution to serve the issue where the whole world could not move outside and work from their office spaces. Work from home became the solution that immediately served the situation. Making technology was a big change taken by the companies whereas it was also imperative to serve the business operations.

For few companies, acquiring the work from home model was to gather profits and praise by taking the harsh conditions as an opportunity whereas for others, resuming work from respective homes was done to survive through the phase. Although profit remained in the quotient, but survival was the prime motive. Companies belonging to health sectors, FMCG sector did not completely keep their mode of working as work from home, whereas few operations which were necessary to carry forward received allowance to work from the office. A study stated that work from home became a concept wherein big companies like TCS, Tech Mahindra, Wipro, Infosys wished to continue with the same mode of working where only 10% of the employees worked in office only for few days.

Work from home is the future of professionalism which makes not only the working easy but also improves the quality of life of employees. Therefore, effective inculcation of the same need to be the next step in every company keeping in mind the efficiency and the extent of results it can bring into the management.

Review of Literature

Vijay A., Sekar P.C., (2013), measured about the work-related quality of life and productivity of every employee who is working from home. The paper deducted a prominent association of quality of life and productivity at work where 59% of the employees were extremely satisfied. It brought to light the nature of the work environment and the association of quality of work life and work productivity. It concluded that work life quality improves the productivity is automatically witnessed.

Chattopadhyay S. (2021), emphasized on the two most important element of the COVID 19 outbreak which work and home. The paper reflected the problems in the notion of working from home as home was considered to be an intimate place whereas work was highly formal discipline oriented which would create a lot of difficulty in maintaining equilibrium whereas, at the same time gaining the sense of momentum between the two.

Bandyopadhyay P. K. (2020), implied upon the perception that employees had over work from home. The paper witnessed that work from home was considered to be for limited employees. Whereas work from home implication depends on sector to sector. The paper brings light the extent of effectiveness of work from home model in software industry particularly, ascertaining the perception of various employees in regard to this concept.

Felstead A., Jewson N. (2000), stated two most important terminology when it comes to home working. It brought to light the difference between home-based production and home working. It stated that home-based production is basically the business carried from home whereas home working is doing the job from home. It stated about the history, origination, and the status of the two concepts that are existent in the world.

Indian express (2021), the article implied the structure of the work from home model post the pandemic in India, simplifying the certain points of importance like pay strategy, working hours, flexibility of schedule and other perks provided by the company. It stated that government ordered to let an employee work from home under adverse situations and to inculcate various rules and regulations to let this model successfully move forward. The article laid stress on sectors like manufacturing, service and mining.

Economic Times (2021), brought to light the transformation of the Indian work force to work from home and the various hurdles that might arouse while the shift. It even discussed about the issue of mixing of responsibilities of work and home. Also, the paper suggested few ways to overcome it making time as the most significant element as the work from home model will gradually become a day-to-day mode of operations for the employees.

People Matters (2020), emphasized on the work life balance irrespective of the model being followed. It stated the brighter side of bringing work from home into place. It statistically defined that 74% of the people preferred work from home. It defined physical and emotional well-being to being the key pillars to effective productivity through various well-being programs. It also brought to light the concept of work- life balance being the most important future element as work and home would merge, therefore maintaining individuality would be a significant feature. Live Mint (2021) highlighted the most prominent sector of the Indian industry which is Information Technology. It laid down a fact that major companies like Tech Mahindra and TCS which kept it clear to make work from home a permanent mode of working and making it accessible to 75% of the employees by 2025. Adopting a gig working, dissecting roles that requires in person interaction in office and roles that would easily be carried forward from home. Having stated the same, it brought the hybrid model into place, being the pillar of resilience for almost every IT firms. India Today (2021), brought to light a reverse concept of resuming work from office. It stated that work from office is a must-to-do model as the company needs to operate big functions which is not possible at home. Certain companies wish to see their workforce in office and therefore, have started building a framework regarding the same. The article stated that safety measures like, sanitizing booth, social distancing and extending work area in order to accommodate all employees in office are the main points in the list.

Research Methodology

The process of carrying out the research was a systematic and fruitful phenomenon. The population taken into account was professionals and business officials who were dissected into two strata and then simple random sampling was applied where each and every individual had an equal opportunity to take part in the research. The primary data being the only source of collection was collected by circulating questionnaires among the prescribed samples. The data so collected is then analyzed and final deductions are drawn henceforth.

Statement of Problem

The basic problem or the reason to conduct the research is to touch the new, evolutionary, and relevant concept of work from home model. The next problem is to ascertain the various features that revolve around this model and the certain recommendations that could prove to be helpful in the execution of the same in the real scenario.

Scope of Study

The present study revolves round the professional world, the study has the boundary set within those individuals who are either professionals or non-professionals (business officials) which mean the targeted audience for the research is the people who are prone to the changes culture of work from home and therefore, have a better understanding of the situation.

Research Design

The research design is basically the outline of the research plan, the various elements that need to be brought into place in order to carry out the research process. A descriptive research design which defines what, when, where and how of the situation is used in the research process. The descriptive research design describes the topic under fire of work from home as well as elaborates the various features of the scenario

Objectives

- To assess the perception of employees regarding the concept of work from home.
- To investigate the various traits of the work from home model.
- To suggest measures to streamline the process of work from home in India.

Sample Size and Sampling Technique

Sample size refers to the number of respondents that are chosen by the researcher for participating in the research. The sample size for carrying out this research process is 152 respondents. The respondents for this study were from the professionals and business officials who work in company or owns a business and have well witnessed the scenario of work from home. Simple random sampling was used to collect the data.

Sources of Data

The data can be collected through two sources: firstly, primary data which is collected for the first time by the researcher. Secondly, there is secondary data which has already been collected previously by other researcher and therefore, can be used for a prescribed research. The source of data being used for this particular research is primary in nature as it collected in real time instant.

Research Instrument

The research instrument used in this research is structured questionnaire. The questionnaire is circulated in the form of Google form, to each prospective respondent.

Limitation of the Study

- Since research is carried forward to ascertain the perception of the respondents in regard to the work from home, it cannot be measured quantitatively, making it subjective in nature.
- Due to the global pandemic, it was not possible to witness the scenario myself and authenticate the data in an extended fashion.

Data Analysis and Findings

The first indication into place is to ascertain the kind of professionalism that the respondents handle. 89.5% of the respondents are reported to be professionals whereas only 10.5% of the respondents are noted to be business officials. This states that most of the respondents who filled the questionnaire were people employed in organizations at various positions and have self- experienced the scenario closely whereas less number of respondents are non-professionals (business officials) who are well aware about the scenario. Another indication in the analysis is of the kind of family structure that the respondents possess. It vividly states that 53.3% of the respondents stay in a nuclear family whereas, 46.7% of the respondents belong to the joint family. This deducts that most of the respondents have less family members which makes it possible for the professionals and business officials to successfully carry out work from home as less responsibility needs to be carried in nuclear family structure than joint family structure.

Next depiction is in regard to the position that respondents hold in the company. It basically, states the level of management, the respondents belong to. 54.6% of the respondents belong to the mid-level management whereas, 15.8% of the respondents belongs to the higher level of the management. Also, 29.6% of respondents are the ground level staff in various companies. It states that most of the respondents have self-deducted the situation of work from home. Some of them have experience in working from home as well as making the ground level employees also work from home. Another implication lies in the prevalence of work from home activity in the respective organizations of respondents. 82.2% of the respondents have work

from home as a prevalent activity during and post COVID 19 situations whereas, 17.8% of the respondents did not have a work from home mode in their organizations. It could be because such respondents either belong to the health care sector or are working in hotel sector where employees of the hotels were also asked to assist the patients when the hotel were converted into quarantine center or such respondents are general store employees.

Another depiction represents the working hours followed by organization during work from home. 45.4% of the respondents stated that working hours from 8 to 12 hours was followed during home working model and only 21.7% of the respondents have less than 8 hours of working hours. Also, a considerable amount of respondents (32.95%) has working hours extending to more than 12 hours. This depicted that working hours relatively, increased during work from home mode. Another indication lies in the salary decrease of the respondents while working from home. It states that most of the respondents (68.4%) witnessed a decrease in the salary while they were working from home. It states that work from home rendered lesser financial benefits to employees than what is given when work is done from office. Another important element of analysis was the break-taking hours. It states that 71.7% of the respondents noticed a decrease in the break taking hours. This shows that the side perks which are an essential part of the professional work has taken a dip in work from home mode. Employees must be getting an appropriate time to rest and take respective breaks so that they may be energetic in work and not dull and mundane throughout the day.

Next important element of analysis is the weekly offs provided to the employees which have seen a deep as 66.4% of the respondents has witnessed a decrease in the weekly holidays given to them while they were working from home. It is a separately essential perk as break from their job or business is required. Too much involvement into their job would be beneficial for the company only at the initial level but eventually, the employee will lose interest in the same. Another indication of analysis is the extent of flexibility provided to the employees while they are on work from home. 56.6% of the respondents find the prevalence of flexibility to some extent whereas, only 18.4% of the respondents feel there is complete flexibility rendered in work from home. The flexibility given in work from office is more, but it is often essential give the same flexibility in work when employees are working at home. This element would then help in maintaining the balance between work and life as well and, lead to completion of assigned task.

Next depiction is in regard to the supervisor availability to employees while they are working from home which states that 51.3% of the respondents witness that supervisor availability is only to some extent whereas only 26.3% of the respondents have witnessed a complete availability of the same. Work from home has become a

new concept for every individual and therefore, instant availability of supervisor is required which is currently through this research, is deducted to be absent. Therefore, supervisory availability is a difficult element to acquire in work from home, but it is not impossible.

One of the most significant concepts to be deducted during work from home is the balance between work and life. 61.2% of the respondents do not witness equilibrium between their work and life. It holds true as well as most of the respondents find it very difficult to maintain a balance due to longer working hours, inflexibility and less weekly offs and break taking hours given in work from home. This concept has gained importance in the few months because it is of immense importance to have it as a balance in work and life to maintain the enthusiasm and zeal among employees towards their work as well as life. Lastly, the indication lies on the preference of respondents to work from home over work from office. In this 61.8% of the respondents does not prefer work from home as it is highly hectic and unapt to work from home and would love to resume work from office soon. Making work from home a prospective model of working in various companies is difficult because various elements and perks is hugely absent in work from home model.

Conclusion and Discussion

Work from home, is considered to be a permanent set of model for the professional culture. Earlier, it was considered to be the most convenient, cost-effective and safe mode of work whereas, now when almost every individual has commenced work from home, then the various area of improvement has been brought to light. The notion is complicated by the merge of both work and home due to which several employees find it difficult to cope with the same. Also, the companies are trying to impose as much as work possible because it is understood by the companies that working from home itself involves home chores also while they work at home. However, it should not be the case.

Firstly, there should a proper standard operating procedure set for work from home. Since the work from home model was adopted not out of will but out of urgent situation, therefore companies did not have apt time to inculcate various rules and guidelines to execute the same. However, it is high time now for the companies to inculcate certain effective rules, guidelines and framework in regard to work from. Every policy and regulations must be in line with the labor laws. Working hours, break taking hours and weekly offs are essential perks which must be rendered to the employees. Irrespective of the space one is working, but the fact which remains is that one is working, therefore, must be given the essential perks.

Secondly, financial support can easily be increased in work from home. Since when employees work from office, then there are various cost incurred like rental cost, electricity cost, cost for other facilities etc. therefore, in work from home such cost is

eradicated and can easily be compensated to the employees pay package so that they can remain motivated and do their respective work with double zeal and vigor. Thirdly, a humane touch must be given to the policies and regulations made for work from home. The employees are working irrespective of the space; therefore, it is of immense importance to be humane to some extent and render all imperative essentials to the employees, providing them the ambience of the way when they used to work from office.

Fourthly, proper infrastructural facilities must be established to all the employees to carry out smooth work from home functions. It includes proper laptop or desktop, proper internet bandwidth, disturbance free environment and essential devices like tab and SD card if required. If there will be systematic infrastructure, then most of the employees would be highly comfortable in carrying out functions of work from home. Next is an appropriate amount of gestation period must be provided to the employees to effectively inculcate the change into their respective lives. It is of immense importance to give time to employees in order adapt and adjust to a changed work culture. Rendering a gestation period might seem to be a waste of time to some employers; however, it will surely provide long term enhancements to the company success graph. Lastly, regular practice of the work from home is essential so that the employees themselves become observant of any bugs present in the process. This would be more effective as the employees would get a feeling of belonging and want involvement and at the end will remove all unwanted elements from the model and improve it to the considerable level.

Thus, work from home model can be a successfully installed prospective model if a proper setting and facilities be provided to the employees. Alongside, the employees must not take irrelevant advantage of the model and utilize it to the best of their potential in terms of work. There should not be a conflict between discipline and distraction and maintenance of work life balance should be attained.

References

- <https://trak.in/tags/business/2020/10/28/99-staff-at-tcs-infosys-wipro-will-work-from-home-20-staff-at-hcl-tech-mahindra-will-work-from-office/>
- Vijay, S. ARUN, and P. C. Sekar. "Work-related quality of life and its association with work productivity among the employees of the Information Technology Enabled Service (ITES) Industries in India." *International Journal of Human Resources Management* 2.2 (2013): 17-26.
- Chattopadhyay, Suchismita. "The Pandemic of Productivity: The Work of Home and the Work from Home." *Anthropology in Action* 28.1 (2021): 47-51.
- Bandyopadhyay, Prabir Kumar. "Impact of 'Work from Home' on Employee Performance/Productivity in Software Industry during COVID 2019 Lockdown-

Result of Perception Survey in India." *The Management Accountant Journal* 55.7 (2020): 82-85.

- Felstead, Alan, and Nick Jewson. *In work, at home: Towards an understanding of homeworking*. Psychology Press, 2000.
- <https://indianexpress.com/article/business/post-covid-world-flexible-hours-work-from-home-among-norms-7130516/>.
- <https://hr.economictimes.indiatimes.com/news/workplace-4-0/post-covid-19-is-india-inc-ready-to-work-from-home-forever/76437854>.
- https://www.peoplesmatters.in/site/interstitial?return_to=%2Farticle%2Flife-at-work%2Fthe-work-life-post-covid-19-from-collision-to-integration-27979.
- <https://www.livemint.com/industry/human-resource/for-indian-it-companies-hybrid-work-models-could-be-part-of-post-covid-world-11609226450111.html>.
- <https://www.indiatoday.in/education-today/jobs-and-careers/story/work-after-covid-19-4-changes-to-prepare-for-as-you-go-back-to-office-1768210-2021-02-11>.



Covid-19 Prediction using Supervised Models for Machine Learning

Shilpa Sharma*
Harshal Patil**
Devershi Pallavi Bhatt***

Introduction

Over the last decade, ML has showed as a protruding area of research by providing solution to complex and sophisticated real-world issues. Almost all the areas of the world, like healthcare, Automotive Vehicles, Expert Systems, natural language processing (NLP), Image and Video Processing, were included in the technology areas. The learning of ML algorithms is generally dependent on the method of trial and error, quite contrary to conventional algorithms, that obey the instructions of programming based on choice statements such as if-else [1]. Disease prediction, one of the most important areas of ML is prediction [2]. Various neural network models and regression models are widely applicable in estimating potential outcomes for patients with a particular disease [3]. There are numerous studies conducted using machine learning techniques to predict various diseases [4], cardiac and vascular disease prediction [5], and breast cancer prediction [6]. Especially, the learning in [7]

* Manipal University Jaipur, Jaipur, Rajasthan, India.

** Amity University Jaipur, Rajasthan, India.

*** Corresponding Author, pallavi25.bv@gmail.com, Manipal University Jaipur, Jaipur, Rajasthan, India.

focuses on real time prediction of reported cases of COVID-19 and the study[8] also focuses on forecasting the outbreak and early response of COVID-19. When deciding how to tackle a current problem, prognosis can help guide early intervention for very effective treatment of these conditions.

The purpose of this study was to provide a prognosis for a new disease, also known by the World Health Organization (WHO as SARS-CoV-2, also known as COVID-19) [9]. At present, COVID-19 poses a significant threat to human life worldwide by the end of 2019, when symptoms such as pneumonia develop by many, the virus was first seen in Wuhan [10].

It has a number of effects on the human body, in addition to excessive acute respiratory syndrome and multiorgan failure, which can lead to death in a very short time [11]. Thousands of people around the world are affected by this epidemic, thousands of deaths every day. The different aspects of the pandemic are studied by several researchers and the results are created to allow humanity to contribute to this aspect of knowledge [12].

In this report, our attempt to pay to the present pandemic crisis is to build a forecasting framework for COVID-19. The three significant variables of the epidemic, like newly reported cases numbers, death rate and recovered rate, are predicted. In this analysis, this problem prediction was treated as a problem learning machine, so the study is based on modern types of visual regression models such as line reversal (LR), tree end (DT) and Naïve. Bayes (NB). Using the Johns Hopkins Patient Statistics COVID-19 Data Package, research methods were studied. The information package was first prepared and divided into two subgroups: the training set (85% entry) and the exam set (15% entry). For significant variables, including R-square score (R2 score), R-square score variation (R2 Adjustment), error square attribute (MSE), error attribute (MAE) and root error square attribute, RMSE was performed.

Supervised Learning

Classification learning is ideal for any issue where it is useful to subtract a classification and the classification is easy to identify [15], The predictions comes at the end are [16], unsupervised learning. Both approaches rely heavily on the information provided by the predetermined classifications [17]. Making a classifier that can be used to simplify from new occurrences [18].Data training and pre-processing of information is the second stage. Investigators have a range of approaches to select from to treat missing data depending on the conditions, and have recently presented a study of modern noise discovery techniques. Case collection is used not only to deal with noise, but also to solve the problem of impossibility of training on very large datasets [20]. Case selection in these databases is an optimization problem aimed at maintaining production efficiency with a minimum sample size [21].

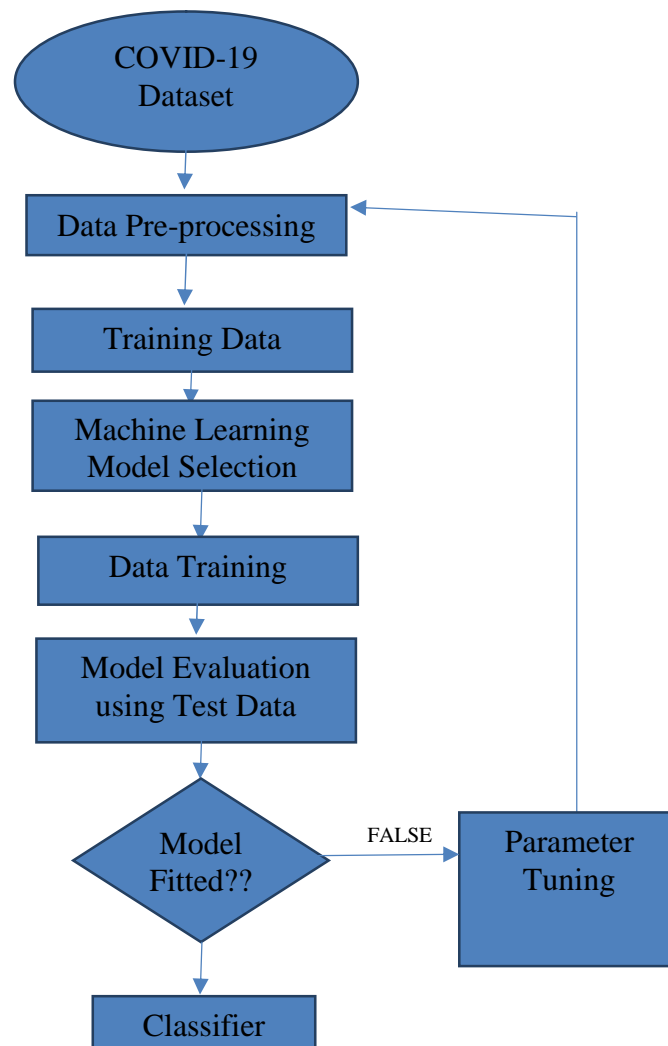


Figure 1: Model Evaluation and Algorithmic Details

This problem can be solved by adding new features to the basic feature collection. This approach is known as characteristics related to construction/transformation [22]. These recently spawned characteristics can result in the development of more succinct and accurate classifiers [23]. Moreover, Bayesian networks also relies on certain monitoring elements in order to modify parameters in order to minimize errors on the inputs given [24].

It has been noted that the learning algorithm objectives emphasize on minimizing the error related to given inputs in the classification problem. These inputs, also called the "training set". But it is not always the right thing to do to master the training set well. Similarly, data overfitting is memorising the training set compared to learning a more any classification method.

Supervised Learning Models Types

The domain of supervised learning that deals with classification in large part are of the forms is represented in table 1.

Table 1: Widely used Machine Learning Algorithms

Algorithm	Concept	Advantages	Disadvantages
Logistic regression	Linear regression algorithms are all about using data to find the best match rows. Logistic regression illustrates modification of the algorithm over linear regression such that problems can be projected where data is divided into classes. If you want to identify data that belongs to a group, such as finding an object, or if you want to find the likelihood of an event occurring, then use Logistic Regression [21]. It is a model of linear classification, so it seeks correlations between independent and dependent variables. The probabilities of outcomes are modelled using a logistic function [22].	Fast to train and anticipate. Good for the classification of small issues with results. Easy to comprehend.	Not very specific. For nonlinear data, do not use it. Often it ends up over fitting, not versatile to adapt to the dynamic data model[22].
Nearest Neighbors	If the known data properties (such as products purchased by customers) and choice to use the data forecast, new events (such as finding which products to suggest to a new customer based on similar products purchased by current customers) will then use nearest neighbors to locate sample data that is closest to the target object in the distance. For calculating new data points, the Euclidean distance may be used [23].	Simple adaptability to the problem. Accurately Correct Easy to comprehend. Using special trees to improve problems with space [24].	Intensive memory. Expensive. In decision making, all training data may be involved. Slow efficiency, thanks to IO activities. Choosing the wrong measure of distance will produce inaccurate outcomes[25].
Random Forest	If you have a large data set, and forecasting knowledge is based on multiple choices, then you can use random forest with random forest, break data, give it to multiple decision trees, combine multiple forest trees, and use majority vote to find the best decision possible. An example may be to find next year's best-selling TV brand based on various categories, such as price, last year's TV sold, warranty, screen size, etc [27].	Choosing the wrong measure of distance may be extremely accurate. A good starting point for solving a problem. A number of different data will be scalable and will suit. To execute rapidly. Missing values can be modelled easily to use for regression and classification problems. It has high efficiency [28].	Slow at training. Overfitting. Small changes in training data alter the model, so it's not ideal for small samples. For very complicated problems, it may be a little too basic. [26].
k-means	If you want to cluster the data into a number of segments, then using k means that k stands for the number of segments or clusters in your algorithm. Recursively, k means that the nearest	Better clusters can be computed faster than hierarchical clustering using k means, if the	It needs numerical attributes for every data point, does not work with categorical values,

	<p>cluster is identified by the algorithm. For each point of data. For each point attribute in the cluster, the clusters are generated once. Find each cluster's average and then discuss the points in the clusters again. Find the average of each cluster, then address the points in the clusters again. This practice is then repeated until the points do not move from the clusters, known as convergence k.</p>	<p>optimum k value is selected, then the algorithm works very well. To improve performance, k clusters can be computed in batches. When all the clusters are equal in size, it is good [28].</p>	<p>does not work well. Clusters can be quite slow when they overlap. If incorrect values are chosen as a competitor based on the number of clusters</p>
--	---	--	---

Parameters for Analysis

There exist various parameters to analyse such as R-squared (RPOW2) score, Modified R-Square (RPOW2 adjusted), Mean Square Error (MSE), Mean Absolute Error (MAE), and Root Mean Square Error (RMSE).

R-squared score: It can be found as:

$$RPOW2 = \text{Variance explained by model} / \text{Total variance}$$

Adjusted R-squared score: The RPOW2 adjusted can be defined as:

$$RPOW2_{\text{adjusted}} = 1 - (1 - RPOW2) \frac{n - 1}{n - (k + 1)}$$

In the regression equation, n denotes the sample size, and k denotes the number of independent variables.

Mean Absolute Error (MAE): It is the average magnitude of the errors.

$$MAE = \frac{1}{n} \sum_{j=1}^n |y_j - \hat{y}_j|$$

Mean Square Error (MSE): MSE can be calculated as:

$$MSE = \frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

Root Mean Square Error (RMSE): It is error rate calculated by the square root of MSE shown as follows.

$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2}$$

Conclusion & Future Scope

Although the swab test (PCR test) is the world's most widely used laboratory test to detect the prevalence of corona virus in patients, reports show that the sensitivity of this laboratory test is lower, which is not good for this form of pandemic. If a positive patient from this test is found negative, so the patient can unknowingly spread this infection and this can raise the list of patients infected by the corona virus. Medical imaging methods such as CT and X-ray scans can aid in the detection of the new corona virus.

A paradigm focused on deep learning could play an important role in the rapid and effective detection of medical imaging techniques. X-rays are cheaper for diagnosis than CT scans, although the level of precision in the classification of CT scan images is higher. Several researchers have indicated that diagnosis based on

CT scans may play an important role in assisting the medical staff. The data statistics shows the various comparative results that itself very much elaborative and shows the various location based as well as the other criteria based pandemic implications. The world is waiting over the mitigation of the effects of this deadly disease.

References

1. Torrente-Rodríguez, Rebeca M., et al. "SARS-CoV-2 RapidPlex: A Graphene-Based Multiplexed Telemedicine Platform for Rapid and Low-Cost COVID-19 Diagnosis and Monitoring." *Matter* (2020).
2. Min, Jihong, et al. "Wearable electrochemical biosensors in North America." *Biosensors and Bioelectronics* 172 (2020): 112750.
3. Behera, S., Rana, G., Satapathy, S., Mohanty, M., Pradhan, S., Panda, M. K., ... & Singh, Y. D. (2020). Biosensors in diagnosing COVID-19 and recent development. *Sensors International*, 100054.
4. Datta, Shoumen. "SARS-CoV-2 and COVID-19: Current Topics." (2020).
5. Hernández-Rodríguez, Juan F., Daniel Rojas, and Alberto Escarpa. "Electrochemical Sensing Directions for Next-Generation Healthcare: Trends, Challenges, and Frontiers." *Analytical Chemistry* (2020).
6. Ménard-Moyon, Cécilia, Alberto Bianco, and Kouros Kalantar-Zadeh. "Two-Dimensional Material-Based Biosensors for Virus Detection." *ACS sensors* (2020).
7. Yousefi, Hanie, et al. "Detection of SARS-CoV-2 Viral Particles using Direct, Reagent-Free Electrochemical Sensing." (2020).
8. Fan, Deng-Ping, et al. "Inf-Net: Automatic COVID-19 Lung Infection Segmentation from CT Images." *IEEE Transactions on Medical Imaging* (2020)
9. Wang, Guotai, et al. "A noise-robust framework for automatic segmentation of COVID-19 pneumonia lesions from CT images." *IEEE Transactions on Medical Imaging* 39.8 (2020): 2653-2663.
10. Albahri, O. S., et al. "Systematic review of artificial intelligence techniques in the detection and classification of COVID-19 medical images in terms of evaluation and benchmarking: Taxonomy analysis, challenges, future solutions and methodological aspects." *Journal of infection and public health* (2020).
11. .H. Wang et al., "Recognizing brain states using deep sparse recurrent neural network", *IEEE Trans. Med. Imag.*, vol. 38, no. 4, pp. 1058-1068, Apr. 2019.
12. D. Shen, G. Wu and H. Suk, "Deep learning in medical image analysis", *Annu. Rev. Biomed. Eng.*, vol. 19, no. 1, pp. 221-248, Jun. 2017.
13. D. Karimi, H. Dou, S. K. Warfield and A. Gholipour, "Deep learning with noisy labels: Exploring techniques and remedies in medical image analysis" in *arXiv:1912.02911*, pp. 1-17, 2019.
14. A. Ghosh, H. Kumar and P. S. Sastry, "Robust loss functions under label noise for deep neural networks", *Proc. AAAI*, pp. 1919-1925, 2017.
15. .H. Zhu, J. Shi and J. Wu, "Pick-and-learn: Automatic quality evaluation for noisy-labeled image segmentation", *Proc. MICCAI*, pp. 576-584, 2019.

16. .O. Ronneberger, P. Fischer and T. Brox, "U-Net: Convolutional networks for biomedical image segmentation", Proc. MICCAI, pp. 234-241, 2015.
17. .Z. Zhang and M. R. Sabuncu, "Generalized cross entropy loss for training deep neural networks with noisy labels", Proc. NIPS, pp. 8778-8788, 2018.
18. S.Wang, B. Kang, J.Ma, X. Zeng, M. Xiao, J. Guo, M. Cai, J.Yang, Y.Li, X.Meng, Bo Xu, "A deep learning algorithm using CT images to screen for Corona Virus Disease(COVID-19)", doi.org/10.1101/2020.02.14.20023028, 2020.
19. L. Yan, H. Zhang, Y.Xiao, M.Wang, C.Sun, J.Liang, S. Li, M.Zhang, Y. Guo, Y.Xiao, X. Tang, H. Cao, X.Tan, N. Huang, B. Jiao, A. Luo, Z. Cao, Hui Xu, YeYuan, "Prediction of criticality in patients with severe Covid-19 infection using three clinical features: a machine learning-based prognostic model with clinical data in Wuhan", medRxiv 2020.02.27.20028027 , 2020.
20. C. Zheng, X. Deng, Q. Fu, Q.Zhou, J.Feng, H. Ma, W. Liu, X. Wang "Deep Learning-based Detection for COVID-19 from Chest CT using Weak Label", DOI: 10.1101/2020.03.12.20027185, 2020.
21. O. Gozes, M.Frid-Adar, H.Greenspan, P.D. Browning, H. Zhang, W.Ji, A. Bernheim, E.Siegel, "Rapid AI Development Cycle for the Coronavirus (COVID-19) Pandemic: Initial Results for Automated Detection & Patient Monitoring using Deep Learning CT Image Analysis", arXiv:2003.05037 [eess.IV], 2020.
22. F. Shan, Y. Gao, J. Wang, W. Shi, N. Shi, M. Han, Z. Xue, D. Shen, Y. Shi, "Lung Infection Quantification of COVID-19 in CT Images with Deep Learning", arXiv:2003.04655 [cs.CV],2020.
23. X. Qi, Z. Jiang, Q.YU, C.Shao, H. Zhang, H. Yue, B.Ma, Y. Wang, C.Liu, X. Meng, S. Huang, J. Wang, D. Xu, J. Lei, G.Xie, H. Huang, J. Yang, J.Ji, H. Pan, S. Zou, S.Ju, "Machine learning-based CT radiomics model for predicting hospital stay in patients with pneumonia associated with SARS-CoV-2 infection: A multicenter study", medRxiv 2020.02.29.20029603,2020.
24. X. Xu, X. Jiang, C.Ma, P. Du, X. Li, S.iLv, L. Yu, Y.Chen, J. Su, G.Lang, Y. Li, H.Zhao, K. Xu, L. Ruan, W. Wu, "Deep Learning System to Screen Coronavirus Disease 2019 Pneumonia", Medical Physics, arXiv:2002.09334 , 2020.
25. L. Huang, R. Han, T. Ai, P. Yu, H. Kang, Q. Tao, L. Xia , "Serial Quantitative Chest CT Assessment of COVID-19: Deep-Learning Approach", Radiology: Cardiothoracic Imaging, Vol. 2, No. 2, RSNA,2020.
26. L. O. Hall, R. Paul, D. B. Goldgof, G. M. Goldgof, "Finding COVID-19 from Chest X-rays using Deep Learning on a Small Dataset", Image and Video Processing (eess.IV), arXiv:2004.02060 [eess.IV],2020.
27. A. Abbas, M. Abdelsamea, M. Gaber, "Classification of COVID-19 in chest X-ray images using DeTraC deep convolutional neural network", doi: 10.1101/2020.03.30.20047456,2020.
28. I. D. Apostolopoulos and T. A. Mpesiana , "Physical and Engineering Sciences in Medicine", Phys Eng Sci Med (2020). Doi: 10.1007/s13246-020-00865-4,2020.



Post Covid-19 Opportunities and Challenges in India

Prof. Fatima Begum Saderkhan*

Introduction

India is a nation in South Asia. It is the second-most crowded country in the world and the seventh-largest country by region, and the most populous democratic system in the world. COVID-19 has come as a shock to society, health systems, economies and governments worldwide. Unusual challenges, Uncertainty and Opportunities come across the world. In this Covid-19 Pandemic disease India took preventive measures to control spreading of disease, also faces numerous personal tragedies, leaders are under stress to make decisions on managing the instant impact of the pandemic and its consequences, decisions that will outline the state of the world for years to come. What may be the silver linings in the disaster and how might leaders utilize this moment to build a more successful, equitable and sustainable world? In this Research Paper, I look clear of the current crisis to the potential challenges and opportunities in the post-COVID-19 world. The result is a range of expert opinions from a geographically varied set of leaders. They are intended to offer new perspectives on the post-pandemic future, in support of efforts to proactively and collectively shape the future we want.

Need of the Study

The study helps to know the potential challenges and opportunities available in these conditions. To know, how to prevent from Pandemic "COVID-19" disease in India. To overcome from the crises occurs due to Covid-19. It will generate useful information to every reader this provide data which is relevant to past and present, it helps to predict future.

This study has helped me to know what opportunities and challenges are there to prevent myself from this disease and how to control spreading of disease to others with the help of following social distancing in work place.

* Assistant Professor, B.L.D.E.A's, A.S. Patil College of Commerce (Autonomous), M.Com Programme, Vijayapur, Karnataka, India.

Review of Literature

The review of literature helps me to know the present status of covid -19 in the world and what challenges and opportunities derived by this pandemic disease in worldwide. Several studies have been approved out to apply Technical Analysis in practice in various financial markets. A single of them is quoted below.

According to Anbesh Jamwal, Sumedha Bhatnagar, Prakarti Sharma Coronavirus Disease 2019 (COVID-19) : Current literature and status in India

The new COVID-19 virus outbreak has challenged the medical, economic and public health infrastructure of many countries especially the China, Italy, Iran and Japan, as per WHO report 60. It clearly stated that there is no community transmission occurred in India yet which can be prevented by the avoiding mass gathering and proper screening of the people. Also, the COVID-19 hits hard to the global economy. There is a great slowdown in the global economy due to COVID-19 attack the spread of COVID-19 infection can be reduced by minimizing the H-H transmissions.

Research Gap

Most of the studies emphasized the challenges and opportunities available due to Covid-19 disease, but still there are many research gaps in the COVID-19 research area as there is still lack of Anti-COVID-19 drug which will replace the supporting therapies for the treatment of infection. Since SWOT Analysis plays an important role to take an advantage of opportunities are available.

Objectives of Study

- To know about Pandemic disease Covid-19.
- To know present status of infection in the world and India.
- To understand the practical concept of preventive measures from Covid -19
- To know Strengths, weakness, opportunities and threats due to Covid-19 in India.
- To know, how to overcome with the economic crises?

Scope of the Study

The first human cases of COVID-19, the infection caused by the novel corona virus causing COVID-19, consequently named SARS-CoV-2 were first reported by officials in Wuhan City, China, on 31st December 2019. And the **first case** of **COVID-19** infection reported in Kerala, **India**. On 27th January- 2020, a 20 year old female to be had to the Emergency Department in General Hospital, Thrissur, Kerala, with a one-day history of dry cough and painful throat. There was no history of fever, rhinitis or shortness of breathing. Scope of my project is limited to the One country i.e. India, to know strength, weakness, opportunities and threats available in the country, this study is based on 1 year 6 months data from January, 2020 to till June, 2021. The tool used is "SWOT Analysis" for analyzing the potential challenges and opportunities available due to Pandemic Covid-19 disease.

Research Methodology

Data Collection Method

- **Secondary Data**

The data is collected from worldometer website, Wikipedia, News Websites and Research Papers etc.

- **Use of Worldometer Website**

The information about the number of infections spread over the world and country is collected from the worldometer website. worldometer website give information about Corona Virus cases, deaths & Recovered and also information about active cases and closed cases etc. also provides Historical data and various time period graphs and other information.

Tools Used for Analysis

- **SWOT Analysis**

SWOT analysis (or SWOT matrix) is a strategic planning technique used to help a individual or organization recognize strengths, weaknesses, opportunities, and threats related to business competition or project planning. It is designed for use in the beginning stages of decision-making processes and can be used as an instrument for valuation of the strategic situation of a city or organization. It is intended to specify the objectives of the business enterprise or project and identify the internal and external factors that are favorable and unfavorable to achieving those objectives. Users of a SWOT analysis often ask and response questions to create meaningful information for each kind to make the tool helpful and identify their competitive advantage. SWOT has been described as the tried-and-true device of strategic study.

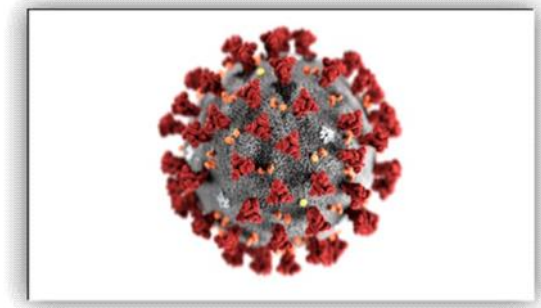
Strengths and weakness are frequently internally-related, while opportunities and threats commonly focus on the external environment. The name is an acronym for the four parameters the technique examines:

- **Strengths:** characteristics of the business or project that give it an advantage over others.
- **Weaknesses:** characteristics of the business that place the business or project at a disadvantage relative to others.
- **Opportunities:** elements in the surroundings that the business or project might exploit to its advantage.
- **Threats:** elements in the environment that could cause problem for the business or project.

Limitations of the Study

- It is limited to only 1 year and 6 months data.
- It depends on historical infections data and history is not always an accurate predictor of the future.

An Overview of Coronaviruses



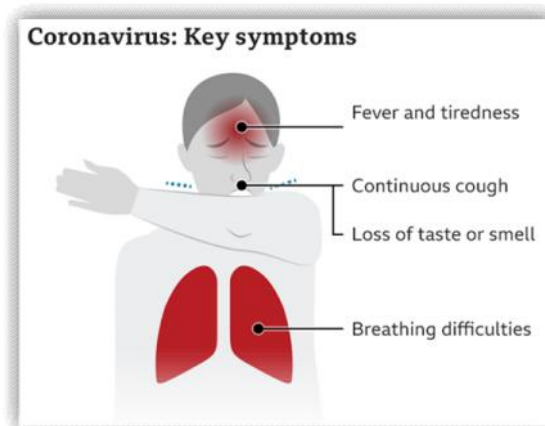
Corona viruses are a great family of viruses which may cause sickness in animals or humans. In humans, several corona viruses are recognized to cause respiratory infections ranging from the familiar cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most newly exposed corona virus causes corona virus disease COVID-19.

Brief about Covid-19

COVID-19 is the infectious disease caused by the most recently discovered coronavirus. This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019. COVID-19 is now a epidemic affecting lots of countries globally.

Symptoms of Covid-19

The mainly common symptoms of COVID-19 are fever, dry cough, and fatigue. Other symptoms that are fewer common and may have an effect on some patients include aches and pains, nasal congestion, headache, sore throat, diarrhea, conjunctivitis, loss of taste or smell loss or a skin rashes or discoloration of fingers or toes. Possible symptoms are habitually mild and begin slowly. Many people become infected but only have very mild symptoms.



Around 80% of the people recover from the disease without any need of hospital treatment. Around one out of every five people who gets COVID-19 becomes critically ill and faces difficulty in breathing. Most of the time Older people, and those who are having medical troubles like high blood pressure, heart diseases, lung problems, diabetes and cancer patients are at higher risk of developing serious illness. However, anyone can catch COVID-19 and grow to be seriously ill. People of all ages who are experiencing fever or cough and cold associated with difficulty in breathing or shortness of breath, chest pain or pressure, loss of speech or movement should seek medical attention without any delay. If possible, it is recommended to call the health care provider or medical facility first, so the patient can be directed to the medical unit.

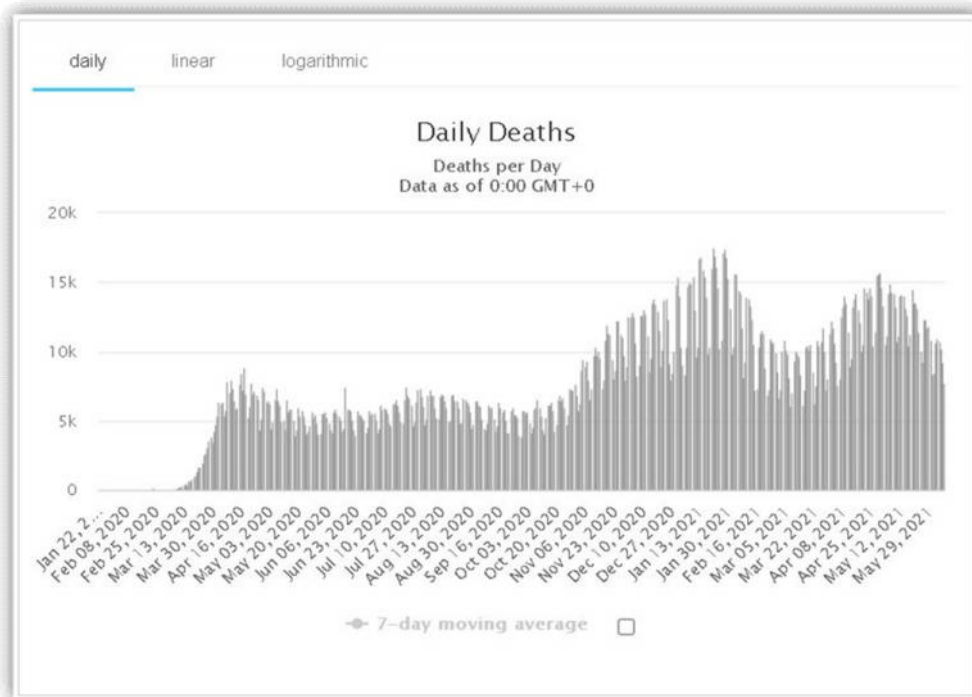
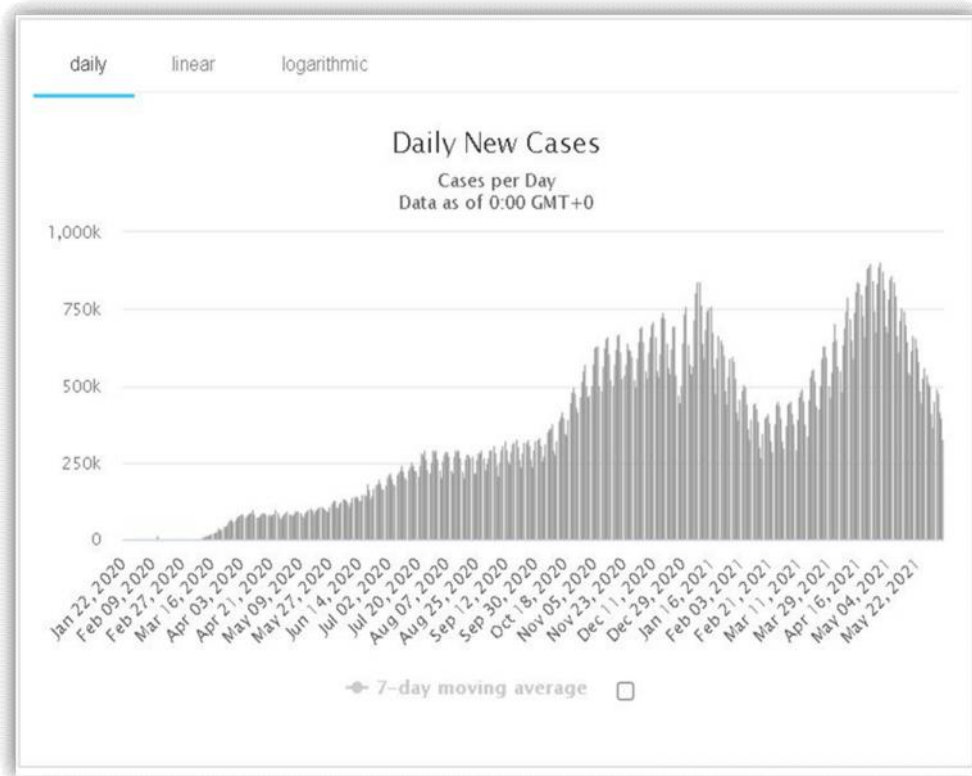
Present Status of Infection in the World and India

- **World Data: on 7th – June-2021**

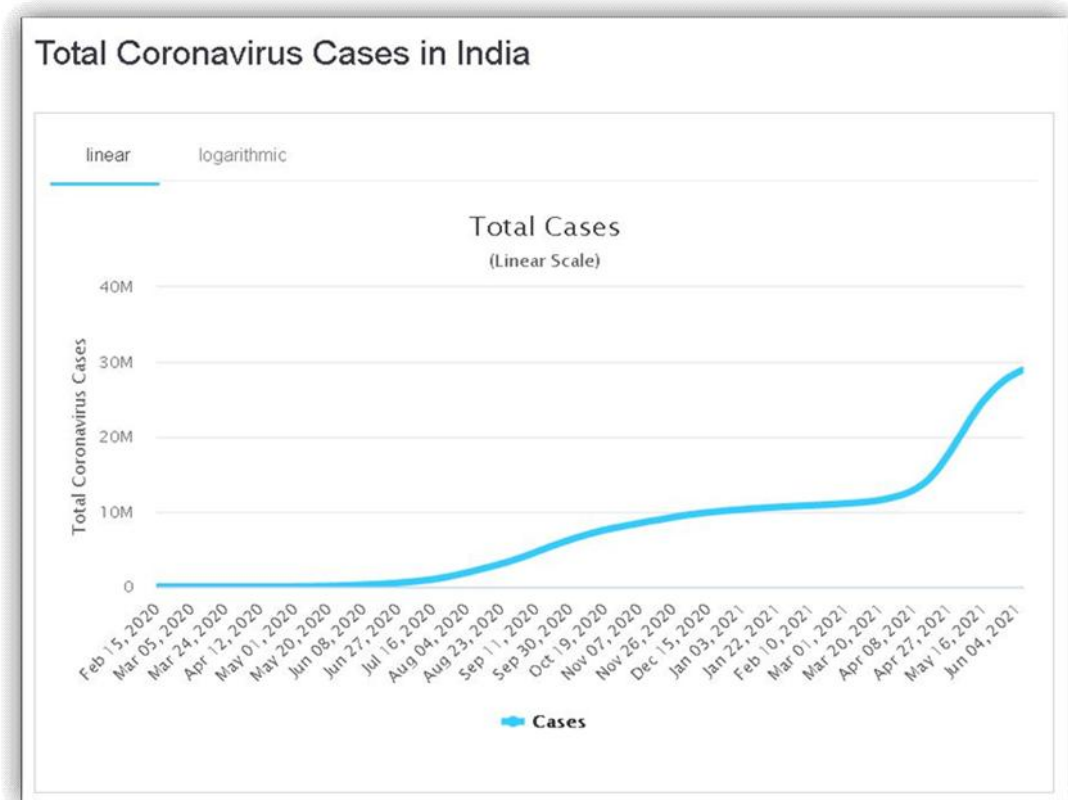


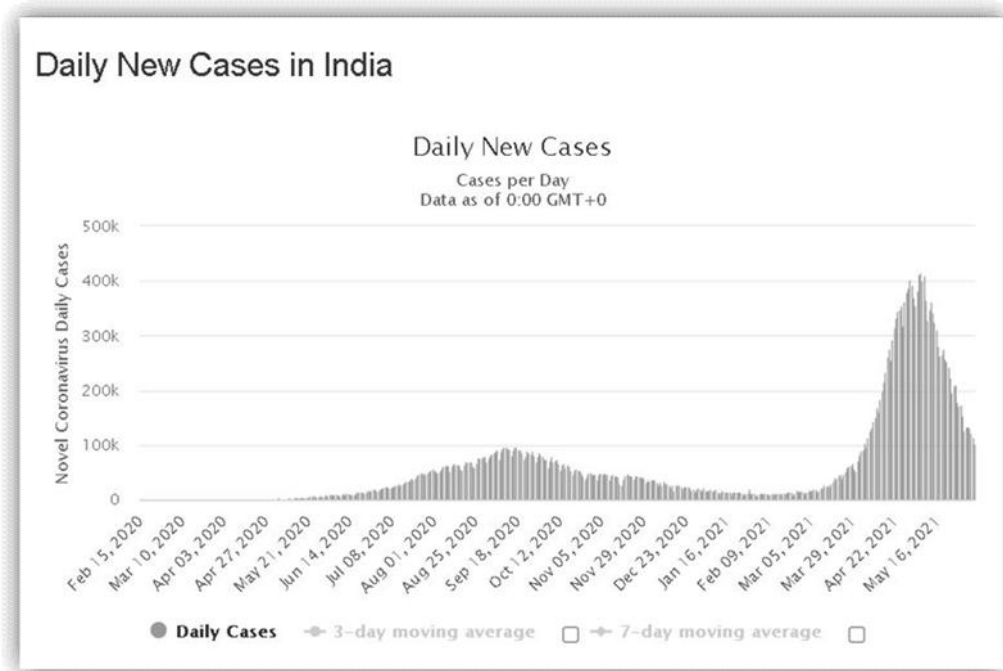
The **corona virus** COVID-19 is affecting **220 countries and territories**. The **day is reset after the midnight GMT +0**. The list of the countries and their regional arrangement is based on the United Nations Geoscheme. Sources are provided under "Latest News."





- INDIA's PRESENT DATA: inveterate COVID-19 cases in India stands at 2,89,09,975. The death toll from the outbreak in India is at 3,49,229. Maharashtra, Kerala, Karnataka, Tamil Nadu, Uttar Pradesh, Andhra Pradesh, Delhi and West Bengal have accounted the highest add up to of cases.





Swot Analysis

India has undergone multiple phases of national lockdown. The Honorable Prime Minister Narendra Modi had foremost given the call for a countrywide lockdown on 24th March 2020 in order to limit the raise of the Covid cases. Since then the countrywide lockdown had been extended. Lockdown for India is a significant and needed step for respond to the spread of the virus. In the interim, the government undertook many initiatives to secure the country against COVID-19. An effective approach is required for fighting COVID-19 for reducing the risks and maximizing the results, and for that it is critical to identify the external and internal factors correctly.

A SWOT analysis gives an idea about nation's present position to tackle the pandemic situation. This analysis examines India's Strengths, Weaknesses, Opportunities and Threats (SWOT) on the COVID front and aims to come out with recommendation that can help fight the crisis.

Strengths

- Existing Infrastructure like railway coaches, hotels, schools, offices etc. were transformed into Isolation wards.
- India is the largest supplier and producer of hydroxychloroquine, a prospective drug for treating COVID-19 in 2020. Oxford's AstraZeneca vaccine is being manufactured locally as Covishield by the Serum Institute of India, which is the world's leading vaccine manufacturer. The vaccine is made from a undermined version of a common cold virus (an adenovirus) from chimpanzees.

- Rapid measures were undertaken such as imposing lockdown and travel restrictions that enabled India to balance its demand and supply.
- All international and domestic travelers and offices are mandated to go through a compulsory thermal screening check.
- The health system is gradually gearing up to take on the new challenge.
- Robots have deployed at entry to buildings, offices and other public places to distribute hand sanitizers and to carry public health messages about the virus. Robots are also being deployed in isolation wards of the hospital to transmit medicines and food, which eases the difficulty on medical staff.
- In early April 2020, the Indian government launched a COVID-19 tracking app called 'AAROGYA SETU' which uses Bluetooth and GPS to bring up to date people when they are at danger in proximity of contact to COVID-19.
- Development of a low-cost ventilator (portable) that can be useful for COVID-19 patients and named it 'PRANA-VAYU'.

Weaknesses

- Lack of testing kits and relief materials like PPE (Personal Protective Equipment), medical equipment, ventilators and masks.
- Challenge in manufacturing relief material and testing kits indigenously, makes us dependent on imports.
- Lack of awareness/ consciousness among specific sections of the society.
- People fear the quarantine conditions: Psychological barrier relating to isolation.
- Poor immunity and highly vulnerable to diseases.
- Incubation period is high ranging from 1 day to 14 days.
- Shortage of emergency healthcare infrastructure and health professionals.
- Doctor to patient ratio is 1:1,564.
- Hospital beds to people ratio is 0.1:1,500.
- A ventilator to population ratio is 35,000:1.3 billion.

Opportunities

- Creation of a healthy 3rd tier structure of governance for monitoring and spreading awareness.
- India can emerge as a world leader by setting example for other nations on how to fight the crisis like India's Minister of Health and Family Welfare Dr. Harsh Vardhan took charge as the WHO's Executive Board by replacing Japan.

- India scored perfect 100 on 'OXFORD COVID-19 Government Response Tracker' by the University of OXFORD and identified India's response as one of the most stringent in the world.
- Development of standard operating procedures and policies in the form of emergency awareness and response plan for the present and upcoming outbreaks.
- Development of a vaccine/antidote for COVID-19.
- Engage start-ups, MSME, Corporate Research and Development (R&D) and educational Institutions for providing new solutions for fighting COVID.
- Glance at the related sectors that became most important due to the COVID-19 pandemic, including technological interventions like video conferencing for carrying out work from home and education.
- People became more health conscious than before. And also increased awareness of technology to be had to health.
- Requirement of sanitizers, hand wash increases and also N95 masks.

Threats

- Failure in contact tracing may lead to decline of the present state and increase in the probability of being hit by the second wave of COVID-19.
- Corona virus has attained level 3 of the epidemic i.e. community transmission stage.
- Break of lockdown protocol and social-distancing norms.
- Increased chances of spread of infection (with 27.9% people lying below the poverty line which is a high population density).
- High chances of frontline workers succumb by the disease.
- Shrink the economy and overall development of the nation.
- Impact on national and local trade as well as global stock markets.
- Worldwide lockdown slowed down into downturn leading to increase the unemployment and poverty levels.

Findings, Suggestions & Conclusion

Findings

With active support of the people of India, Government can able to hold the spread of the Virus in our country. The main important factor in preventing the spread of the Virus in the locality is to empower the people of the nation with the right information and taking safety measures as per the advisories being issued by Ministry of Health & Family Welfare. Government of India is taking all essential steps to face the challenge and risk posed by the increasing powerful disease of COVID-19 the Corona Virus.

Suggestions

Suggestions to Government

India can use strengths to maximize opportunities by:

- Development of strong 3rd tier governance system (panchayat level) for educating and monitoring people.
- Carrying ahead intellectual repository created to clash the crisis into the post-pandemic world.
- Making use of Research and Development (R&D) for rapid development of COVID-19 antidote /vaccine.
- As a direct fall out of the COVID-19 pandemic, many international with manufacturing plants in China are looking to shift operations out. India has to make its move by welcoming those MNCs.

India can use strengths to minimize threats by:

- Extending health pledge benefits to the bigger masses.
- Accomplishment of the strong operating policies and procedures for future and present outbreaks.
- Providing a strategy boost to existing MSME, start-ups, and manufacturing sectors for uplifting the economy and employment generation.
- Build investor trust by taking initiatives to promote Foreign Direct Investments (FDI).

India can use opportunities to minimize weakness by:

- Make use of start-ups, MSMEs and Indian labs for the production of PPEs, testing kits, ventilators etc.
- The government has to increase domestic manufacturers of PPE kits in the country.
- Discover and manufacture testing kits for COVID-19.
- Developing the cloth material for the preparation N-95 masks that have been in huge demand of late in the fight against corona virus. 'N-99 masks' which would be better in quality than the N-95 masks are to be developed.
- To minimize job losses, develop necessary technical infrastructures to make sure smooth and flexible employee working measures.

India can prevent weaknesses turning to threats by:

- Ensure sufficient infrastructure and the protection of frontline workers and healthcare staff.

Suggestions to Community

- Practice social distancing to protect the at risk
- Follow the guideline provided by the Government.

Conclusion

Covid-19 is a viral infection, this spreads through the Novel Corona Virus, this is not the only one virus in the world, like wise so many viruses have existence and maybe we face some new kind of viruses in future, so the point is to be aware, be healthy, and maintain at least a 1 meter distance between yourself and others. This is especially important if you are standing by someone who is coughing or sneezing. Since some infected persons may not yet be show signs of symptoms or their symptoms may be mild, maintaining a physical distance with everyone is a good initiative if you are in an area where COVID-19 is spreading. Practicing respiratory hygiene and hand hygiene is important at every moment in time and is the greatest way to protect others and yourself and follow the guidelines and rules provided by the government and take part in economic development of the nation.

References

1. <https://www.worldometers.info/coronavirus/>
2. https://en.wikipedia.org/wiki/SWOT_analysis
3. <https://www.preprints.org/manuscript/202004.0189/v1>
4. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses>
5. https://en.wikipedia.org/wiki/SWOT_analysis
6. <https://www.google.com/search?q=covishield+vaccine&rlz>
7. <https://www.mygov.in/covid-19>.



Rebooting Indians Economy Post Covid-19 Pandemic

Bhader Singh*
Vinod Shant**

Introduction

Corona viruses are large group of viruses that cause illness in human and animals. China reported an outbreak of novel corona virus on 31 December, 2019. The outbreak was initially noticed in a seafood market in Wuhan city in Hubei province of China in early December, 2019 and in short span has spread to all the provinces of China. Temporally called 2019-nCov (novel corona virus), the Wuhan corona virus with pneumonia like symptoms has been officially named by world health organization (WHO) as "COVID 19". WHO has also declared this outbreak as a Public Health emergency of International concern (PHEIC) on 30 January, 2020. Common signs of infection include respiratory symptoms, fever, cough, shortness of breath, and breathing difficulties. In more severe case, infection may lead to pneumonia, severe acute respiratory syndrome, kidney failure and even death.

Many of the epidemiological parameters such as incubation period, mode of transmission, sub clinical infection period of virus shedding etc are still researched. Human to human transmission has been noticed in the case of Noval Corona virus. It also spread through droplets/aerosols in person having close contact.

The economic behavior of developed and developing countries have been hard hit by the covid-19. Rural sector which is the back bone of our country, being an agricultural and farm based economy and is linked with the continued progression of the nation. The govt. has commenced many initiatives on the path of success of becoming a five trillion dollars economy by emphasizing it's efforts to boost the rural sector. With the emerging crisis of covid-19 and projected economic depression across the globe, rural economy in particular is sure to emerge as the life line for the country. As per the census of 2011, 68% of population in India lived in rural areas and 72.4% of workforce resides in rural areas. Therefore, the need of the hour is to

* Lecturer in Economics, Doda, UT, J & K, India.

** District Employment Officer, Doda, UT, J & K, India.

accelerate the rural economy by generating skill based employment, opportunities enhancing rural production and productivity, implementing technological practices and establishing requisite infrastructure. In India, agriculture is the prime sector which can pay pivotal role in boosting the economy and rural employment. India is under taking visionary steps in all segments of the economy to sustain the economy even during the crisis. It is matter of fact that India has an estimated 497 million workers, of which about 94% work in private or unorganized sector, the government is emphasizing more on the unorganized sector which primarily affects the rural economy. With many strategic and utilitarian schemes aimed at rebooting and boosting the rural economy to achieve doubling of farmers income.

With the outbreak of covid-19 pandemic, the world has witnessed unprecended crises in the areas of consumption, manufacturing exports and capital flows, which posed numerous challenges before the economy in general and rural economy in particular. The United Nations has projected shrinkage of the global economy by 1% in 2020 in contrary to the previous forecast of 2.5 % growth. Worldwide millions of workers and professionals are facing the prospect of losing their jobs. The economic scenario is not much different in India due to challenges posed by covid-19 pandemic. The complete closure of urban and semi urban based industries, manufacturing and construction unit and agricultural activity in rural areas due to current pandemic has affected country's economy in many unpretended ways. The situation made everyone to think about the past lapses and how to reshape the world. Today, the entire nation is poised towards *Aatamnirbhar Bharat*. Indeed, it is a good opportunity to give direction to our efforts by rebooting our agricultural sector, which has tremendous potential to achieve the goal of creating a powerful economy and to lead world with this example. The challenge is for everyone to harness the untapped potential of our village, our roots the ingenious science and the diversity we are bestowed upon. The rural economy needs a rapid transformation to become economically viable and to further reduce the rural-urban migration. The villages need to be reshaped as a pivot of economic-growth in order to reduce undue pressure on the cities and to act as a savior in crisis. Thus to fully leverage the potential of the agriculture sector and reboot the economy in general and rural economy in particular we need to upscale our farmers real people who working hard to provide food on every one's plate.

The govt. understood the plight of the migrant labor and has been extremely proactive in taking steps to ensure that lives as well as livelihood are taken care of in a balanced manner. The prime minister Shri Narendra Modi in his *man ki baat* address to the nation on 31st May said that "And how, considering the migrant labor, the need of hour is deriving a new solution_paradigm we are taking steps in that direction .For instance, at sites skill mapping of labours is being carried out, at other places startups are carrying the same. The establishment of migration commission is

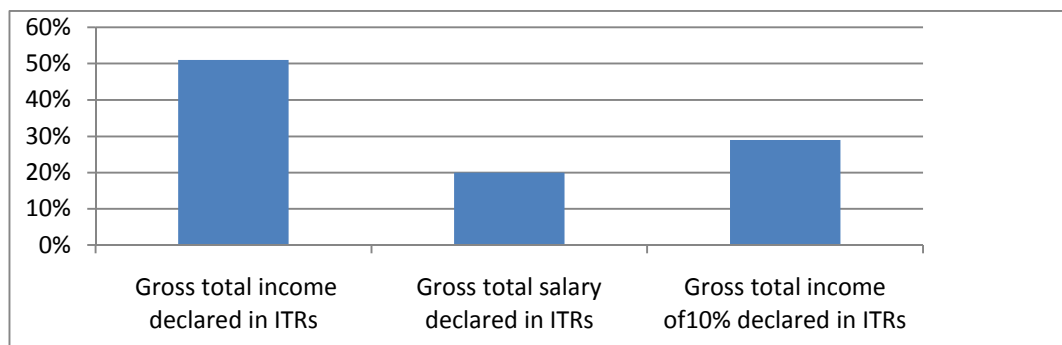
being deliberated upon. Besides that, recent decision taken by the central govt. has opened up wide opportunities of village employment, self employment and small scale industries. The objective of their decision is finding solution to the situations for the sake of self reliant. India had our villages, towns, districts, and states been self reliant, problem facing us would not have been of such magnitude as in evident today". But moving from darkness toward light is a human trait. Providing a plank to glide over darkness and move forward the light of well being the government has taken cognizance of the distress of the migrant workers in its covid-19 response strategy.

Importance of Salaried/Non Salaried rich for the Macro Economy

Modern economies are deeply integrated in nature. This makes it difficult to speculate on the economic importance of different classes. A highly paid executives, income might depend on a very low price mass consumption product and relatively a poorly paid worker in a tourist resort or a high end restaurant is dependent on the rich coming and spending there. The share of total income declared in ITR's in 2017-18 GDP was 30%. Of this income declared by the salaried person was 11.7%. As a share of PFCE, the share was 19.9%, for all salaried persons incomes declare. The top 8% of salaried persons had a share of just 14% in total PFCE. This is less than even 10% of the overall GDP. Even if one were to assume that this class spends all of its income. It is an realistic to assume that it can generate significance upswing for the economy on its own. If we put it otherwise, the rich cannot drive growth on their own.

The Importance of the rich in Indian Macro Economy

Columns shows share of incomes and private final consumption expenditure in 2017-18.



So far, the role of rich from macroeconomic perspective is considered, the rich save more, they brings in bulk of domestic resources of investment, especially equity and debt. Equity markets in India are extremely overvalued if the current price to earnings multiple is any indicator. To be sure this has also been aided by surge of inflows from advanced countries where interest rate have plummeted to an all time low and investors are looking for more attractive options globally. This inflow has led to a

substantial India's foreign exchange reserves. Because their dollar reserves can more at very short notice, they cannot be invested in long term productive purpose and must be held the risk free and highly liquid forms. A section of agencies have exulted over headline growth printing a "better than expected". 7.5% rate on a year ago basis on the other hand others including RBI has remarked that this puts India in its first ever technical recession. According to the National Bureau of Economic Research (NBER) in the US defines a technical recession to be one where the growth is negative for the consecutive quarters. But the growth rate is measured on a quarter-over quarter, not year ago basis. According to JP Morgins estimates suggest that on a quarterly basis, India's GDP plunged 25% in 2Q 20 and recovered by 21 % in 3Q20. India did not suffer two consecutive quarters of negative growth, and thus it is not in a recession.

Covid-19 Pandemic and the Economy

With the outbreak of covid-19 Pandemic, the world and India has witnessed unprecedented crisis in the areas of consumption, manufacturing, exports and capital inflows. Deeming the impact of slowdown on these four issues, the Govt. of India launched 'Self Reliant India Mission'. With special focus on healthcare, employment and financial support. The package provides enough budgets for emergency healthcare requirements of the hospitals, safeguarding the employees and employment during the crisis as well as post crisis, and for the support of the poor and vulnerable sections in the form of direct financial assistance, food and livelihood support. Cherishing the principles of the welfare state, the government rose to the occasion and announced the financial package of Rs. 20 lakh crores which was widely hailed as game changer in time of crisis. This historic announcement heralded the new beginning of the reformative steps to negate the adverse effects of the pandemic on the marginal sections of the society.

Agriculture role pivotal to Economic Revival

As we know that Indian economy is an agrarian economy, thus has to emphasize on rural areas that has tremendous capacity to reboot and revive the economy. Today the entire nation is poised towards *Aatamnirbhar bharat*. Infact, it is a good opportunity to give direction to our efforts by rebooting our agricultural sector which has the tremendous potential to achieve the goal of creating a powerful economy and to lead the world with this example. The United Nations has projected shrinkage of global economy by 1% in 2020 in contrary to the earlier prediction of 2.5% growth. Millions of workers worldwide and professionals have lost their jobs. So far the Indian economy is concerned; the economic scenario is not much different in India due to COVID-19 pandemic. To avert a sharp slowdown of Indian economy, the govt. of India already started deeming new way to revamp the economy. Indian economy being an agrigranian economy has to emphasize on rural areas particularly that have huge potential to reboot and review the economy.

Agriculture Role in the Indian Economy

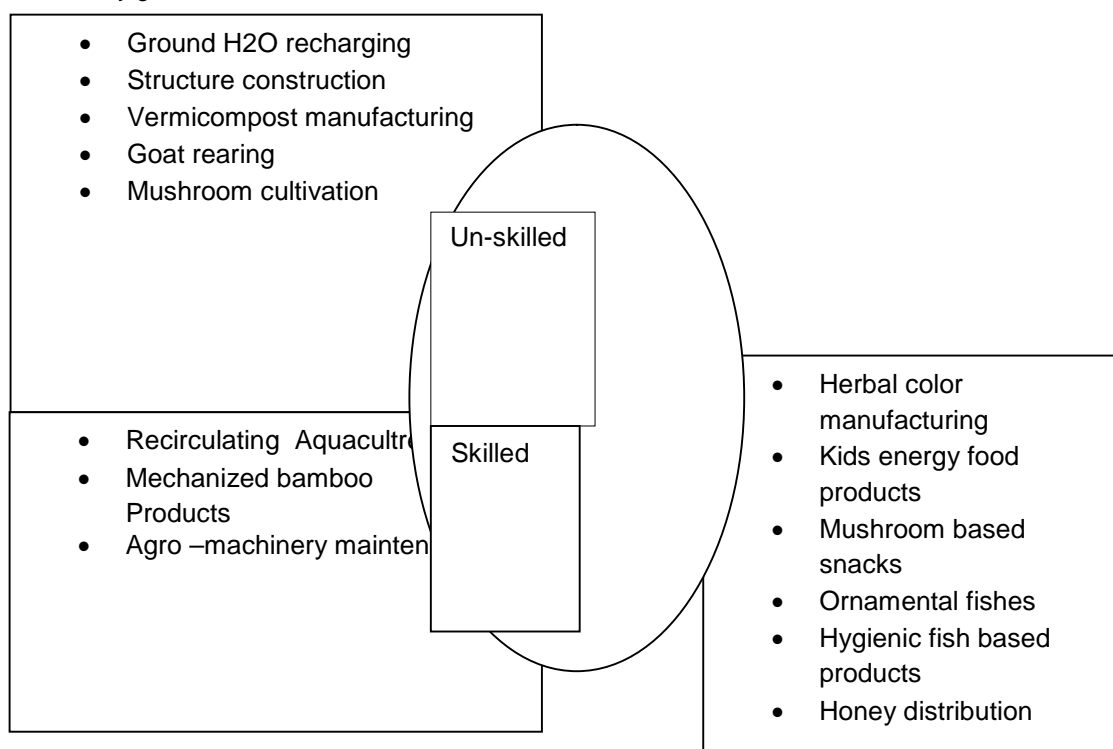
The agriculture sector constitutes to 265 billion dollars which is 17 % GDP and employee 60-70% of Indian population directly or indirectly.

According to NITIAAYOG. The agriculture sector is the life line for the Indian economy and expected to grow at the rate of three percent in the current fiscal year 2020-21, and is presently growing 60% more than the non agricultural sector and it is estimated at 40-60 % higher than the last year. The share of agriculture in Indian economy is around 17% which is much higher when it compared to the manufacturing sectors.

Agriculture leads the way for economy recovery as agriculture operation faced least disruption during lockdown as considering the importance of agriculture sector. Govt. of India eases restrictions for this sector. The least agriculture operation disruption during country wise lockdown is cleared from the below table:

Kharif Crops	Sowing area July,2020	Sowing area July,2019
Rice	68.8 lakh ha	49.23 lakh ha
Pulses	36.82 lakh ha	9.46 lakh ha
Coarse Cereals	70.69 lakh ha	35.20 lakh ha
Oil seeds	109.20 lakh ha	33.63 lakh ha
Cotton	91.67 lakh ha	45.85 lakh ha

Source: my govt.



The least disruption to agriculture operation is due to sustained government support and sufficient fund availability resulted in higher productivity, income support to over 9.9 crore farmers through PM Kisan and credit support through KCC loans, expansion of e - NAM network from 585 markets to 1000 markets benefitting more farmers, innovations and technology interventions for direct marketing, procurement of farm products etc. The policy framework needs to be more supportive to agricultural activities developing skills amongst low income farmers in Morderner farming and other agriculture activities is a right move towards self sufficiency in domestic for production and must be at the centre of a plan for sustainable recovery.. The need of hour is to farm and re-skill these laborers depending upon their required skill in respective field. The workers ought to be trained in the new priorities areas and we must value their potential. We can broadly categories them in four types (see graphics-1)

The role of women farmers is extremely important in the farming as their male counterparts moved to urban areas and started doing other jobs. Women share almost 40% of total workforce in agriculture in India. The surge in the women farmers also shows that a rural agriculture to a large extent depends upon women's participation. However, only less than 10% of India's land is owned by women and still there access over resources remains very low as compared to their male counterparts. Thus, this is best time to curb the measure of gender inequity for better outcome at the farm land. The women farmers needs recognition and rewards to boost their morale and to become a role model so as to influence and motivate other female farmers too.

The bamboo states definitely will be an important component of India's post covid-19 economy. As rightly said by Dr. Jitender addressing a webinar on July10, 2020 with various clusters of cane and bamboo technological centers (CBTC) and persons associated with bamboo trade so said bamboo will propped the Aatamnirbhar Bharat Abhiyan in the North Eastern region and is going to be an important vehicle of trade for India and Sub-continent. The bamboo is not only crucial to north east India post covid-19 economy but will also herald a new hope and momentum for prime minister clarion call of "vocal for local".

Aatmanirbhar Bhart Abhiyaan

Much before the launch of Aatamnirbhar Bhart Abhiyan, the government has strategically planned and implemented doubling farmer's income by setting a target of 2022.

- This DFI drive got further support when the Prime Minister Shri Narendra Modi launched the Rs. 20 lakh crore economic packages under the Aatamnirbhar Bhart Abhiyaan. It is one of the significant moments in the history of India economy where the government is committed to developing a self reliant India

and this in turn shall result in uplifting the rural economy. The concept of Aatmanirbhar Bharat Abhiyaan was integrated with the announcements of the economic package to tackle the corona virus pandemic on 12th May, 2020. The policy initiatives of the mission were announced by the Finance Minister in five tranches from 13th may, 2020. Under the mission, special provisions have been made for the poor including migrants and farmers. Some of these are listed as under;

- 25 lakh new Kisan credit cards sanctioned with a loan limit of Rs.25, 000 crore. It in turn will incentivize the rural farmers to continue their farming without being affected by the pandemic.
- The support of Rs 4,200 crore is also provided under rural infrastructure development fund to states during March, 2020 for rural infrastructure.
- Approximately 63 lakh loans of worth Rs 86,000 crore approved in agriculture from March 2020 to April 2020.
- Free food grain supply (5kg of grains per person and 1 kg channa per family per month) is also being provided to the migrants. The free food grains supply is also extended to the existing beneficiaries of Pradhan Mantri Garib Kalyan in addition to their existing entitlements. Migrants workers are seriously affected by the outbreak of COVID-19 as majority of them were forced to go back to their respective places without any surety and certainty about the source of income to meet their needs. Seriously deeming this issue, govt. of India has made provisions for migrant workers to access the public distribution system (PDS) through one nation one ration card scheme.
- Under Pradhan Mantri Kisan Yojna Rs. 2000 has been transferred directly to the 8.7crore farmers. This move will provide a good amount of financial support to the rural farmers.
- “Vocal for local” initiative under it must importance will be given to locally available products. Pirating to it Rs 1000 crore has been given to the unorganized food processing industries. Thus it is good initiative to avert the damage caused to the economy due to COVID-19 pandemic.

Garib Kalyan Rojgar Abhiyan

This Scheme was launched by the Prime Minister via video conferencing from Kagaria, district in Bihar. Garib Kalyan Rojgar Abhiyan is specifically for migrant workers who have returned back to their respective villages owing to paucity of livelihood opportunities in urban areas. The Prime Minister explained the thought behind this program wherein he explained that “some migrant workers who were quarantined in a government school in Unnao, Uttar Pradesh decided to utilize.....

The programme is being steered by Ministry of Rural Development in coordination with 11 other Ministries including "Panchayati Raj, Road Transport and highways, Mines Drinking water and sanitation, environment, railways, petroleum and Natural gas, New and renewable energy, Border roads, telecom and agriculture". It is a visionary move by the government to envisage a framework which covers a wide range of employment opportunities which can be taken up in myriad fields. This route takes the path of sustainable Mechanisms to reach the destination of social and economic welfare.

The Garib Kalyan Rojgar Abhiyan has the following objectives:

- Provide for immediate Employment opportunities to returnee migrant workers and similarly affected rural population.
- Saturate villages with public Infrastructure and assets.
- Set the stage for enhancing longer term livelihood opportunities.

About the Abhiyan

The programme is Mindful of the fact that the returning migrants have specific skills which can and should be utilized for augmenting the rural economy. The campaign will focus on undertaking 25 different types of employment opportunities. (Table1). Overall 25 schemes of the government will be brought under this campaign and up to 6.7 lakh migrant workers will benefit from the programme.

Table 1: Different works being proposed for PM Garib Kalyan Rojgar Abhiyan

Sr. No.	List of Work
1	Construction of community sanitation centre.
2	Construction of poultry shed.
3	Construction of vermicompost.
4	Construction of Gram Panchayat Bhavan.
5	Construction of cattle shed.
6	Construction of goat shed.
7	Work under finance commission funds.
8	Construction of National Highway Work.
9	Training through Krishi Vigyan Kendra for livelihood.
10	Work under PM Urja Ganga Project.
11	Work through District Mineral Foundation trust.
12	Solid and liquid waste management work.
13	Farm ponds work.
14	Water conservation and harvesting work.
15	Plantation (including through CAMPA funds) work.
16	Horticulture work.
17	Railway work.
18	Shyama Prasad Mukherjee RURBAN Mission
19	PMKusum

20	Laying of fiber optic cable under Bharat net.
21	Construction of Angawaadi centre.
22	Work under jal jeevan Mission.
23	Construction of rural housing works.
24	Rural connectivity (PMGSY) & Border road works.
25	Construction of wells.

The professional tasks selected will ensure suitable utilisation of the aptitude and skill of workers through skill mapping of the returner migrant workers. For women workers, there is a plan to augment their collaboration with self help groups to bolster their efficiency. The Abhiyan comes with meticulous planning pivoted around 125 days of working in mission mode starting from 20th June, 2020. Its envisions amongst other things, the creation of productive infrastructure in the rural regions of the country which would be of use to the economy beyond the immediate term. The resource allocated for this campaign by the government is a massive 50,000 crore.

A total of 116 districts with more than 25000 migrant workers each across Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, Jharkhand and Odhisa have been selected for this campaign. These districts also include 27 aspirational districts. The break up has been in Table 2.

Table 2: Geographical Break-up of Districts identified under PM Garib Kalyan Rojgar Abhiyan

Name of State	Number of Districts Identified	Including Aspirational Districts (Number)
Bihar	32	12
Uttar Pradesh	31	5
Madhya Pradesh	24	4
Rajasthan	22	2
Odhisa	4	1
Jharkhand	3	3

MSMEs: The Catalyst of Development

The future of India lies in its villages reminds us of the vision of father of the nation Mahatma Gandhi of a self reliant village for economical prosperity of Rural India. Micro, small and medium enterprises (MSMEs) are amongst the life line for the self reliance on the rural India. Today, MSMEs are the strongest drivers of economic development, innovations and employment for the world economy. These enterprises are responsible for significant employment and income generations opportunities across the world and have been identified as a major driver of poverty alleviation and development. As per data gathered by the International council for small business (ICSB), formal and informal MSMEs make up over 90% of total employment and 50% of the world GDP.

In developing countries like India, where majority of the population resides in the rural areas these MSMEs are crucial socially and economically. Because these enterprises are wide dispersed across rural areas, they are extremely important for rural economic development and they have the ability to absorb a significant large number of workers. Further, these enterprises play a key role as a place for entrepreneurship and business skill development, especially in rural areas due to their easy accessibility.

Growth and Development of MSMEs

The MSMEs sector also contributes in a significant way to the growth of the Indian economy. The country has vast aggregates of 6.33 crore MSMEs out of which 99.4 percent are micro enterprises. The sector contributes about 45 percent to manufacturing output, more than 40 percent of exports, over 28 percent of GDP while creating employment for about 111 million people. The value of micro small and medium enterprises (MSME) related products exported during 2017-18 reached \$124.4 billion as per data receive from the directorate general of commercial intelligence and statistics (DGCIS). As per the data available with Central statistics office (CSO). Ministry of statistics and programme implementation (MOSPI), the country's GVA and GDP at current prices is given in the table 1. The MSME sector tends to play a great role in employability in the rural areas to augment the agro based economy. The periodic labour force survey (PLFS) of the National sample survey office (NSSO) pegged the unemployment rate in the country in FY18 at 5.3 percent in rural India and 7.8 percent in urban India, resulting in overall unemployment rate of 6.1 percent. The potential of MSMEs in terms of their presence in the vast landscape of the country and employability capacity is evident from the table 2 and 3.

Table 1: Contribution of MSMEs in Country's Economy at Current Price (in Rs. Crore)

Year	MSME in GVA	Growth (percent)	Total GVA	Share of MSME in GVA (%)	Total GDP	Share of MSME in GDP (%)
2012-13	2977623	15.27	9202692	32.36	9944013	29.94
2013-14	3343009	12.27	10363153	32.26	11233522	29.76
2014-15	3658196	9.43	11481794	31.86	12445128	29.39
2015-16	3936788	7.62	12458642	31.60	13682035	28.77
2016-17	4405753	9.44	13841591	31.83	15253714	28.90

Table 2: Category wise preunce of MSMEs in Rural and Urban Areas

Activity Category	Rural	Urban	Total	Share (%)
Manufacturing	174.14	82.50	196.65	31
Trade	108.71	121.64	230.35	36
Other services	102.00	104.85	206.85	33
Electricity	0.03	0.01	0.03	0
All	324.88	309.00	633.88	100

Source: Annual report of ministry of MSME.

Non-captive electricity generation and transmission and attribution by units not registered with the central electricity authority.

Table 3: Category wise Employment in MSMEs in Rural and Urban Areas

Broad Activity Category	Rural	Urban	Total	Share (%)
Manufacturing	186.56	173.86	360.41	32
Trade	160.64	226.54	387.18	35
Other services	150.53	211.69	362.22	33
Electricity	0.06	0.02	0.07	0
All	497.78	612.10	1109.89	100

The Road Ahead

There is dire need to create skill training hubs in each district of the country with a dedicated nodal office in each district by roping in all the stakeholders. Krishi Vigyam Kendras and Industries department with their presence in each district of the country should have need based area specific and continuous round the year durations for the youth and the women. There is need to establish higher institutions of learning to impart knowledge and skills that can train the manpower in the efficient management of resources, human resource issues, tax laws, labour laws etc. The course curricula should also be customized to suit the requirement of MSMEs specifically like MBA programme of two years in entrepreneurship etc. Innovations, diffusion of new strategy, skilled manpower, and availability of finances in the MSMEs can mute the lives in the rural economy of the country. To conclude we need to remember the vision of the central Government- 'our small hands to make you large' - the champions.

References

- Ramesh Chand, S. K Shrivastava and Jaspal Singh. Changing Structure of rural Economy of India implications for employment and growth https://niti.gov.in/writereaddata/files/doucuments_publications/rural_economy_DP.pdf
- Ministry of Rural Development. Vision Document 2019 -2014.https://rural.nic.in/sites/default/files/Vision_Document_2019-2014pdf <https://transformingindia.mygov.in/aatmanirbharat/>
- India Rural Market. <https://www.ibeforg/industry/india-rural-market.aspx#:~:text=India's%20per%20capita%20HDP%20in,%24%20100%20billion%20by%202025%40..>
- NITI Policy Paper No. 1/2017: Doubling Farmers' Income
- NITI Policy Paper No. 1/2017: Doubling Farmers' Income
- Government of India (2020), 'Annual Report 2019-20', Ministry of Rural Development, New Delhi.
- Government of India(2020), www.bip.nic.in.



Impact of Covid-19 on Banking Business: A Review

Dr. Neelam Sethi*

Introduction

The Indian economy rests mainly on three sectors: primary, secondary and tertiary and all three are backed mainly by the banking sector. The banking industry offers all of these industries financial support by disbursing their typical work loans, advances, short-term credentials, lending letters, bank guarantees, etc. Other things like giving forex assistance, digital banking, e-commerce, telebanking, electronic kiosk and much more are similar to the new Indian Banking phase. Without financial assistance, you cannot conceive a fast-growing economy. If the bank sector is affected by any difficulty, all the three sectors that form the cornerstone of the Indian economy would definitively bear its repercussions.

It was a "black swan occurrence" in which urgent action by the government was required to help restore financial stability by means of the banking channel. Different economic instruments hint to global economic slump of varying proportions based on an approuph recovery period from this worldwide pandemic. At the time the country had a lowest growth rate of the last 10 years, Covid-19 damaged India's economies. In the last few years, the Indian economy tried to progress by recovering slowly. The rehabilitation process is, however, greatly affected by this pandemic. India has seen negative GDP growth, as in the last two quarters. Before the Covid-19 outbreak, the Indian economy was already ailing, but the Covid-19 outbreak worsened further. In a recent assessment by the RBI (Central Bank of India), the virus has affected more businesses, corporations and companies well before the epidemic. Now, in the process of restructuring loans, banks have to limit risks and utilise the high risk-averse strategy of debt reorganisations by providing poor debts due to lower risk appetite.

* Assistant Professor, EAFM, Government P.G. College, Nimbahera, Rajasthan, India.

Some factors have been compelled to reconsider and improve the business and operational structure of corporate banks, customer needs, disturbing competitors, new technology and better regulatory requirements. The key participant can be those who invest in and have the proper goal in digital platforms and data, instruments and partners. The focus was on aggressive expenses to boost efficiency and increase the experience of the customers and employees and continued drive into a new digital future. Many banking institutions based on these investments have taken advantage of their data. Some of them have moved beyond investment and reinvention of operation and CRM to fully digital players for all analogue operations. Market leaders have made considerable use of AI and predictive analytical solutions and have therefore developed their organisations with more effective decisions in real time.

Review of Literature

(Barua & Barua, 2021) studied “*COVID-19 implications for banks: evidence from an emerging economy*” The COVID-19 pandemic caused devastating effects throughout the world economic and financial world since it became, as of 2008-09, the greatest test of the financial institutions (GFC). The Asian Development Bank forecasts that the pandemic’s worldwide economic cost might range from 5.8 to 8,8 trillion dollars. Above all, macroeconomic and health system shocks in a variety of ways have unprecedented spillover effects on financial systems in every country.

(Mishra, Patel, & Jain, 2021) studied “*Impact of Covid-19 Outbreak on Performance of Indian Banking Sector*” The pandemic COVID-19 badly affected different economic sectors in India and elsewhere worldwide. In India, economic expansion has a negative influence. Before the epidemic, a number of industries were doing well, but were now pushed down. Thus, data on those sectors that are seriously affected by pandemics need to be analysed and catered to and played a significant part in the Indian economy. One of India’s most important sectors is the banking sector, which is responsible for all financial activity in the country and which supports the financing, credit, transactions, collection and payment industries of all industries etc.

(Mishra et al., 2021) studied “*The Effect of COVID-19 on the Banking Sector*” and determined that there was a major impact on the worldwide economy of the COVID-19 epidemic. COVID-19 contains three elements: short-term, longterm and systemic hazards for the Chinese banking sector. It is necessary to promote diverse pandemic prevention and control financial services by increasing credit support. Special credit lines, reduced loan interest rates, deferred repayments and the formation of long-term credit systems are essential for medium-sized to small companies.

(Melamedov, 2020) studied “*Coronavirus (COVID-19) and the Banking Industry: Impact and Solutions*” I noticed that in light of this latest coronavirus outbreak, Banks certainly have full hands (COVID-19). The infection is still spreading over the world, with borrowers and companies facing job losses, slowing sales and

decrease profitability. Banking consumers will probably start to seek financial assistance, which is encouraged by federal bank regulators in the US to support banks. Besides addressing the immediate economic effects of the coronavirus, banks require a plan to protect their personnel and customers against their spread. Many banks are already encouraging certain workers to work remotely.

(Bhaskar Roy, 2021) studied *“COVID-19: Impact and way forward for corporate banking”* The demonstrable influence of the COVID-19 on people’s lives and the global economy was substantial. Corporate and commercial banks have a vital role to play in aiding the global economy during this crisis and ensuring that the recovery is rapid and ongoing. In addition to conventional business finance, these banks will play an important part in achieving many of the goals of the government to support small companies and companies. Many strategies can assist banks speed up reaction to crises. Some factors have been compelled to reconsider and improve the business and operational structure of corporate banks, customer needs, disturbing competitors, new technology and better regulatory requirements.

(Kishore, 2020) studied *“70% of banking sector debt affected by Covid-19 impact”* and noted that even before the Covid 19 epidemic, the Indian economy did not take fantastic shape, making the situation worse. This is clearly expressed in a report by the Committee of Specialists of the Reserve Bank of India (RBI) under the leadership of former ICICI chairman K V Kamath. The report says that the epidemic "has hit the finest corporations" and enterprises that had previously been viable. Experts think that the banks may this time be more risky against restructuring loans since the past restructuring initiatives had experienced major losses. The Rs 15.5 lakh crore of debt is accounting for 19 industries that were not stressed before the epidemic, but hit before it.

(Unnikrishnan, 2020) studied *“Is COVID-19 impact on banking sector exaggerated?”* The Reserve Bank of India studied that, in a quarter sooner than originally, the Indian economy would be able to return to positive Q3 growth. Certainly RBI predicts GNP growth to be negative at 8.6% in Q2, indicating a decrease in its Economic Activity Index. This is even less than the provision of a negative 9.8 percent contraction in the October policy. In Q3, a potential recovery is discussed in the RBI research. The rebound in the economy is intimately connected with banks’ asset quality. When company cash flows increase, people are employed and bank reimbursements are resumed. Projects in suspension will be on track again.

The Places most Affected by COVID-19 are:

- **Credit Management and Profitability / Risk Cost**

Together with the serious impact of COVID-19 on mature markets, the low rate situation diminishes vital banking profits. Financial institutions are therefore changed to commission-based income from payments and technology firms.

One of the direct effects of a health emergency on the global Real Economy is the increased credit risk to businesses and retail institutions. Banks are called upon to distinguish between fundamentally ephemeral reabsorption events, which requires management and reclassification actions, from long lasting effects in order to maintain funding and assist the real economy's recovery.

The main considerations are: The following

- **Future Update Information:** in particular, taking into account the special nature of the COVID-19, the incorporation of fresh information into the risk parameters. It could take less time than the cyclical downturns of the economy and finance;
- Update the default rate to consider all exemptions granted by authorities for transitional creditworthiness expiry occurrences by themselves;
- establishing most acceptable timescales for updating return rates to contribute to the benefit, but necessarily medium-term, of credit recovery plans that could include types of late payment or long maturity agreements.

The fall in business activities has negative consequences on credit quality, since banks are increasing credit loss provision. Some European banks already declared significant losses in Q1'20 (Jan-Mar) in order to address the predicted increase in bad lending.

- **Securitization Landscape**

- Corrective actions by governments aim at mitigating risk profiles via greater incentives for disposal.
- The reactivation of synthetic securitisations is expected to occur in the future market after recent events and severe economic consequences.
- During the past few years, a number of European banks finished significant loan disposal operations that contributed to a substantial fall in the NPL ratio. One of the main developments in the market might identify high interest on improbable loans, the establishment of an exciting secondary market with regard to bad debt as well as the blending of uniform huge asset classes in the development of the so-called single-name portfolios.

- **Customer Relationship and Commercial Models**

- While COVID-19 may lead to the real economy crisis, the sector's digitisation and customer experience, both with regards to the financial system and the banking relationship, could nevertheless be seen as "positive discontinuity." • COVID-19.

- Banks are compelled to promote the use, even the most territorial or branch-centric, of channels that never constitute their strategic priorities. This stage would be especially challenging to address by the banks with their proximity to their customers.
- The obvious identification of a service gap that can be realiser than ever with COVID-19 can inspire banking companies through partnerships and collaboration in the fintech sector to speed up their digital transformation operations.
- **Operational Resilience and Business Continuity Management**
 - Providing and improving robotic solutions or artificial intelligence and mobility could be a key factor to ensure the continuity of business for the banks when vital processes are employed, therefore providing easier security where there are no staff.
 - Given the need for unforeseen infrastructural resources, a clear opportunity for the financial sector to evaluate the value of appropriate Cloud technology is also available.

High Volatility in Stock Markets Depressed Banks' Valuation...

On global financial markets, COVID-19 has created tremendous volatility and volatility. The financial sector has been one of the worst hits, with bank evaluations falling in all countries throughout the world. The P/NAV level in North American banks at regional level remains 1,15x, and Asian and European banks currently have large discount level.

Conclusion

The exponential spread of COVID-19 resulted in a substantial decrease of key indexes, reflecting its effect and potential for considerable GDP growth. Although COVID-19 is projected to have a negative overall effect on credit growth across most sectors, the degree and type of the impact will probably vary according to the length and amount of the interruption. The shutdown to prevent the Covid-19 spread has halted economic activity across many sectors, with significant consequences for companies and individuals. Corporations that depend on direct interaction with customers – such as hotels and transport – lose their revenue, and the families working in these areas lose their income from employment. The financial industry, albeit mainly indirectly, is also impacted. Although banking may be rendered remotely and does not depend on direct client interaction, the sector's connection with the actual sector as a payment, savings, loan and risk management services provider has a detrimental impact on banks and other financial institutions due to the Covid-19 problem. At the same time, in this era of reduced earnings, the banking sector has the responsibility of supporting companies and families, which has prompted significant regulatory measures by financial regulators and governments.

References

1. Barua, B., & Barua, S. (2021). COVID-19 implications for banks: evidence from an emerging economy. *SN Business & Economics*, 1(1), 1–28. <https://doi.org/10.1007/s43546-020-00013-w>
2. Bhaskar Roy, P. O. (2021). COVID-19: Impact and way forward for corporate banking. *Fractal Analytics Inc.* Retrieved from <https://fractal.ai/corporate-banking-during-covid-19/>
3. Kishore, R. (2020). 70 % of banking sector debt affected by Covid-19 impact.
4. Melamedov, L. (2020). Coronavirus (COVID-19) and the Banking Industry: Impact and Solutions | Lightico. <https://www.Lightico.Com/>. Retrieved from <https://www.lightico.com/blog/coronavirus-covid-19-and-the-banking-industry-impact-and-solutions/>
5. Mishra, A. K., Patel, A., & Jain, S. (2021). Impact of covid-19 outbreak on performance of indian banking sector. *CEUR Workshop Proceedings*, 2786.
6. Unnikrishnan, D. (2020). Is COVID-19 impact on banking sector exaggerated ?
7. S. M. Dev, R. Sengupta, Covid-19: Impact on the Indian economy, Indira Gandhi Institute of Development Research(2020), Mumbai April.
8. B. Rakshit, D. Basistha, Can India stay immune enough to combat COVID-19 pandemic? An economic query. *Journal of Public Affairs* (2020), 20(4), p.e2157.
9. T. Kanitkar, The COVID-19 lockdown in India: Impacts on the economy and the power sector. *Global Transitions* (2020), 2, 150-156.
10. Demirguc-Kunt, A. Pedraza, C. RuizOrtega, Banking sector performance during the covid-19 crisis (2020).



Collective Actions of Women Self-Help Groups and their Functioning in Rural Areas during Covid-19 in India

Dr. Vikas Batra*

Introduction

The gender aspect of the impact of COVID-19 has been studied globally covering various aspects such as care work, domestic violence and livelihood. After the COVID-19 outbreak in the country, the rural economy is affected in various ways such as disruptions in the supply chain and labour and unemployment issues. On the gender aspect, it is now documented by various scholars that the COVID-19 has made a negative impact on women especially in rural areas and gender-based violence increased during this time. Moreover, this also created an obstacle for women to discuss various domestic issues in the group and thus women lost their space of discussing such matters. The unemployment problem is severe among women as more women are found in informal sector employment than men in India (Government of India, 2019) and the COVID-19 has impacted badly the informal sector employment. In rural areas, almost 75 per cent of women are involved in the agriculture sector as compared to 55 percent of male workers (Government of India, 2019). So here we can take the idea that these are women who are being badly affected by this prevailing pandemic situation because they have less or opportunities for employment (Agarwal, 2021). In due course of time, digital mode communication started in some groups in which the facilitators and took the lead especially NGOs.

In India, the self-help group¹ movement was started in the 1980s to remove poverty, income enhancement and women empowerment. More than 85 percent of the members of these self-help groups come from families with lower social and

* Associate Professor, Department of Economics, Indira Gandhi University, Meerpur, Rewari, Haryana, India.

¹ A Self Help Group is an information association of 10-20 members who come together with the objectives to enhance their savings, income, expenditure, livelihood activities and also women empowerment. Mobilization of community through SHGs is also one of the significant objectives of these groups.

economic status and this SHG movement has opened a vast scope for women to enhance their capacities in terms of income and empowerment (Shylendra, 2018). Apart from some other features cooperation is a very important aspect for the smooth function of these SHGs and to maintain the cooperation trust is very significant component (Sabhlok, 2011). There are many promoting institutions at both government and non-governmental level and the SHG movement especially the NABARD Bank linkage programme is the world's larger and most successful women-owned community network based microfinance programme (NABARD). The second very important programme is the National Rural Livelihood Mission of the Ministry of Rural Development, Government of India in which more than 60 million poor women are mobilized and the programme is helping and assisting them to explore and start livelihoods activities in rural areas.

An attempt is made in this paper to address the issues related to COVID-19 and its impact on SHGs in India. Two dimensions are covered such as the contribution of self-help groups at the community level and the impact of COVID-19 on various activities of SHGs. This paper is based on the study undertaken by scholars and institutions. New papers and web sources also added to analyze various initiatives undertaken by SHGs. The secondary data is majorly from web sources and ministry of Rural Development and other reports.

Section-I

Contribution and Engagement of Self-Help Groups during Pandemic

- **Production of Mask, Kits and Sanitizers**

During the pandemic, the Government of India under NRLM initiated giving orders to large numbers of self-help groups to produce face masks. These groups are making PPE Kits, sanitizers. The State Level Livelihood Missions were also given instructions to create awareness. Kerala and Odisha took the initiatives to prepare masks and sensitizers. In Bihar, a total of 540 units that are associated with the self-help groups were involved in the production of masks and the labour who were returned from other states during the pandemic was also involved in this process (Naqvi, 2020). Food supply was also ensured through community kitchens and other states also followed the league. Hand sanitizers in thousand liters were made by almost 900 micro-enterprises units in nine states of the country and were distributed (Naqvi, 2020). SHGs from Haryana and Himachal Pradesh were also involved in the production of masks and sensitizers (Siwach et.al.2020).

- **SHGs and Community Support**

The community has always strong support for the welfare of the society through various ways and its contribution is more effective the network and link with local government are strong. In the states where the state level livelihoods missions and local government has greater linkages, the community support is better. With the

help of community kitchens, the members of these groups supplied ration to the people with the help of the government's mission manpower. A state like Tripura, Odisha, Madhya Pradesh, Bihar, Jharkhand and Kerala. took a lead in these kinds of services. In Bihar, '*Didike Rasoe*' under Bihar State Rural Livelihood Mission was instrumental to provide food at a concessional rate to the patients who were admitted to quarantine centre in four districts of the state (Naqvi, 2020). These SHGs have also supported health care professional to provide various services including the supply of essential food and nutrition diet to women and children in the villages. One of the very significant organizations in the self-help group movement is Kudumbashree of Kerala and this organization has played a vital role in community support during COVID-19 and involved itself in microfinance. A volunteer portal named Sannadhasena was also started for making coordination during covid (Siwach, et.al 2020). The group has been formed by the organization to curb the fake news about COVID-19 and spread authentic and relevant news. In Jharkhand, with the help of the local village level government, the SHGs have helped to prepare Quarantine Centre for covid patients. The similarly cooked meal was provided by the members to the vulnerable section of the society and migrants in Odisha Utrakhand and Maharashtra. Health-related awareness was also done by various organizations and SHGs in various states (Singh and Mishra, 2020). In a very significant initiative, the Bihar State Livelihood Mission under its '*EkMuthiAnaz*', the grain was collected from villages by self-help group members and delivered to the needy persons who lost their livelihoods during COVID-19. Similarly, these SHG members also helped to distribute the food at the doorsteps of the villages. First, they collected the food from the ration depot and then distributed it to the concerned as per their entitlements (Naqvi, 2020). This helped the local administration to follow the norms of social distancing and COVID-19 protocols.

Similarly, the Government of Haryana established 'Atal Kisan Mazdoor Canteen' being operated by Haryana State Rural Livelihood Mission and run by women self-help groups. The operation of the canteen was coming to halt after COVID-19 but the government restarted it because it was the main source of livelihoods for many women members in the state. So these women have shown an act of courage to serve the people in the tough time of the pandemic. (Yadav, 2021). Apart from this various other state governments and organizations have put their efforts through self-help groups for community development (Tanka, 2020).

- **Financial Services by SHGs**

Members of women SHGs have also helped to disbursed loan at the doorstep of the villages under PMJDY under the direct benefit transfer scheme. (Siwach, et.al 2020). The Community Resource Persons (CRP) are one of the strongest pillars of the Mission and they helped the rural poor during COVID-19 as they provided financial services at the doorsteps of the people. The Business Correspondence Sakhis/Bank

Sakhis under NRLM made a huge amount of financial transactions under the COVID-19 relief package and under Pradhan Mantri Garib Kalyan Yojana, Pradhan Mantri Kisan Sammanand Pradhan Mantri Jan Dhan Yojana. This community-based arrangement with the help of self-help groups helped the rural people to get the required money for the households.

- **Community Mobilization**

The SHGs have worked on various issues of importance such as the spread of accurate information on social distancing, production and appropriate use of masks, addressing the psycho-social issues of migrant labour, health and wellbeing, creation of awareness and care of elder population etc. (Bhowmick, 2020). Mobile Vani in Bihar is also such an initiative in this direction.

- **Online Training to SHGs**

Because of a recent hike in the COVID-19 positive cases in April 2021, it was planned to give online training to SHGs by master trainers and community resource persons under Deendayal Antoyaday Yojana- National Rural Livelihoods Mission to spread wide level awareness programme for vaccination, COVID-19 appropriate behaviour and ways to enhance the immunity etc. by women members in their respective areas. It is also planned to mobilize the community through SHG leaders. Earlier in June 2020, such pieces of training were also offered. Information dissemination through various means is also taken into consideration. Health and diet-related awareness and information were also provided.

- **SHGs and Farmers during COVID-19**

In Odisha, a very unique business to business model emerged during the lockdown period some group members of SHGs purchased the vegetables and sell them to the markets. This situation emerged because of the high supply of fruits and vegetables and low demand for the same. With the inspiration of block-level government functionaries, the SHGs started to purchase fruits and vegetables and sell them to nearby areas. In a unique plan, the state livelihood official first asked on the set of SHGs to procure fruits and vegetables and sell to another set of SHGs and these SHGs were active in selling the same to local markets and doorsteps of the consumers. The SHGs also delivered the vegetables to community kitchens being run by the state and local run quarantine centres. (Baisakh, 2020).

- **Migrant Workers and SHGs**

It has been observed that the self-help group members have helped the migrant workers who lost their jobs during this pandemic. The government support canteen provided food to the migrant workers in various areas. In Jharkhand, under State Rural Livelihood Mission, the SHGs members provided proper information and counseling to the migrant labour who returned to the villages from other states (Kejerwal, 2020).

Section-II

Impact of Covid-19 on Self Help Groups

COVID-19 has made a significant impact on the functioning of groups. Meeting, credit requirement, livelihood constraints and scaling up of the SHG movement in the country are identified by various studies.

Meetings of Group Members

The lockdown and other related measures to curb COVID-19 had impacted the groups in a variety of ways and posed various challenges before self-help groups. Regular meetings of group members are common features and other related issues need meetings, but the lockdown and other restrictions related to the COVID-19 protocol hampered this process (Ghimire, 2020). All regular meeting, savings, investment and activities came to the halt (Sanyal, 2020). Although some SHGs while taking the lead switched to online mode these have some inheriting limitations and cannot be replaced with physical meetings.

Availability and Disbursement of Credit

Because of COVID-19, lockdown and social distancing norms, the flow of credit from banks to groups hampered and the members of the groups have faced constraints in getting the loans and further repayments of loans are also affected. This has adversely affected the disbursement of loan among members (Ghimire, 2020). These constraints of non-availability of loans have postponed their plans. Although, it is claimed that these groups are being supported through enhancement in revolving funds and various concessions in loan a proper and comprehensive plan is required. Female members of those migrant labour who have returned to their home are encouraged to be part of self-help groups under the livelihood missions (Naqvi, 2020). In this difficult time, SHGs came forward to support the members and provided loans and financial assistance for their enterprises and these groups also provided various information related to the government's schemes for their enterprises (Bargotra, 2021).

Household Income and Livelihood Challenges in Groups

The SHG members are normally from the lower economic strata of the society where the main informal work and labour are main sources of income and these prevailing circumstances have affected the economic activities badly. This has resulted in low income, low savings and low capital investment by SHG members in livelihood activities at group or individual levels. This is one of the most significant issues being confronted by SHG members as because of lockdown and other restrictions, the members faced difficulties in selling their products. Further, this resulted in a decline in the livelihood activities and production process. This negatively affected their income level and livelihood patterns and thus weaken their resilience.

Use of Technology in the Groups

As a result of social distancing norms, the regular physical meetings stopped and many state-level missions started to use technology to meet this crisis and many persons were trained to do so. SRLM Maharashtra took a lead in this direction. NABARD introduced E-Shakti for the digitalization of SHGs in the country and the same model can be replicated by other organizations also. As discussed earlier, the Kudumbashree in Kerala, organized the virtual meeting of self-help groups and spread the right information about COVID-19 among the masses (Rashmi and Lekshmi 2021). Digital literacy is a very urgent requirement along with financial literacy among SHG members but it has its limitations that this lack social capital. Solidarity and a sense of association between all members (Sanyal, 2020). Online marketing of Products is a very important solution for this problem. Efforts should be made to provide training to groups so that they will be able to market their products properly. The use of social media can also be beneficial under such circumstances. A new partnership model is required where the interests of SHGs member can be taken into consideration.

The Way Forward

The SHG movement has a noble mission of inclusive growth with women empowerment and in the prevailing time, various challenges are being faced by these groups. There is a need to strengthen this movement and prepare special strategies under these circumstances. The digital way of meeting and transaction is not a permanent solution under such circumstances but this technology has the inbuilt strength to utilize then human resource and a new technology model based on local requirement should be framed. Efforts should be made to continue the group activities and livelihood promotion while adopting the social distancing norms. Poor households cannot afford to discontinue their income generation activities and other programmes as it is very crucial for them, A community-based initiatives with the involvement of local functionaries, health professional, skilled youth having IT background, private sector professionals and the government is required to rebuild this platform of a self-help group robustly. The supply chain is disrupted now and women members cannot sustain too long. Here is the responsibility of the state and state-led institutions to give a new and innovative model so that these SHGs can sustain themselves and generate the proper market linkages. On the issue of state support, these groups should be covered under social safety nets to improve their present economic condition. The convergence of self-help groups with other scheme or programmes can help them to enhance livelihood opportunities and also reduce their vulnerability in terms of less availability of food, health services, education and other basic amenities and rights (Tanka, 2020). These self-help groups should be trained to deal with the issues related to disaster and alternative mechanism to secure and promote livelihood

activities under such circumstances. The government has launched various schemes cluster development, Pradhan Matri Jan Dhan Yojana, MGNREGS, Public Distribution Systems and many more to assist the poor and their livelihood promotion and now there is a need to re-look these policies and their implementation because of the loss of livelihood for women in rural areas. Further, evidence-based analysis is required on the tackling of such pandemic based on feminist theory, evidence and practices to deal with such issues (Agarwal, 2021).

References

1. Agarwal, Bina (2021). Reflections on the Less Visible and Less Measured: Gender and COVID-19 in India, *Gender and Society*, Volume: 35 issue: 2, 244-255, <https://doi.org/10.1177/08912432211001299>
2. Baisakh, Pradeep (2020). How self-help groups in rural Odisha helped both farmers and consumers during lockdown, available at <https://www.thehindu.com/society/how-self-help-groups-in-rural-odisha-helped-both-farmers-and-consumers-during-lockdown/article32294535.ece>
3. Bargotra, Nilanjana et.al. (2021). How did India's Women Enterprises Fare during the COVID-19 Lockdown? *Economic and Political Weekly*, Engage online
4. Bhowmick, Soumya (2020). COVID19 and women's self-help groups, available at <https://www.orfonline.org/research/covid19-and-womens-self-help-groups/>
5. Ghimire, Sanjib (2020). Exploring Emerging Threats and Challenges Put Forth by Covid-19 Pandemic: Perspectives from The DAYNRLM Promoted SHGs in Assam, *PARIPEX - Indian Journal of Research*, Volume – 9 (7), pp 26-28
6. Government of India. 2019. *Annual report: Periodic Labour Force Survey, 2017–18*. Delhi: National Statistical Office. http://mospi.nic.in/sites/default/files/publication_reports/Annual%20Report%2C%20PLFS%202017-18_31052019.pdf?download=1.
7. Kejerwal, Nita. (2020). Covid-19: In times of crisis, women self-help groups lead the way, available at <https://www.hindustantimes.com/analysis/covid-19-in-times-of-crisis-women-self-help-groups-lead-the-way/story-SyXJVNPLUdVbSljkeaszN.html>
8. Ministry of Rural Development (2021). DAY-NRLM promotes appropriate behaviours, health seeking and uptake of COVID-19 vaccination among rural population through its network of Self Help Groups, Posted On: 09 APR 2021 3:28PM by PIB Delhi, available at <https://rural.nic.in/press-release/day-nrlm-promotes-appropriate-behaviours-health-seeking-and-uptake-covid-19-vaccination>

9. M Rashmi, M and V Nair Lekshmi (2021). Community mobilization during epidemic emergencies: Insights from Kerala, *Qualitative Social Work*, Vol 1-2, pp 336-342, <https://doi.org/10.1177/1473325020973360>
10. NABARD (2019). Status of Microfinance in India, Published by National Bank for Agriculture and Rural Development, Mumbai, available at <https://www.nabard.org/auth/writereaddata/tender/1207192354SMFI%202018-19.pdf>
11. Naqvi, Hena (2020), Corona Kaal men Swayam Sahayta Smoohonka Grammen Arthvyvstha men Yogdan, *Kurukusketra*, Vol 66 ,No 10, pp. 44-47
12. PIB (2020). NRLM Self Help Group Network Rises to the Challenge of COVID-19 Situation in the Country, Ministry of Rural Development, Press Information Bureau, 12 April,
13. <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1613605>.
14. PIB (2020). Community Kitchens Run by SHG Women Provide Food to the Most Poor and Vulnerable in Rural Areas during the COVID-19 Lockdown, Ministry of Rural Development,
15. 13 April, <https://pib.gov.in/PressReleaseDetail.aspx?PRID=1613866>.
16. Sabhlok, Smita, G (2011). Development and Women: The Role of Trust in Self-Help Groups, *Indian Journal of Gender Studies*, Vol. 18(2) 241–261, DOI: 10.1177/097152151101800206 <http://ijg.sagep>
17. Sanyal, K. A. (2020). Can COVID-19 provide opportunities to strengthen the SHG movement? Retrieved from <https://iwwage.org/can-covid-19-provide-opportunities-to-strengthen-the-shg-movement/>
18. Shylendra, H.S (2018). Federating the Self-Help Groups (SHGs) in India: Emerging Conceptual and Policy Challenges, *International Journal of Rural Management*, Vol. 14(2) 154–181, DOI: 10.1177/0973005218798199 <http://journals.sagepub.com/home/irm>
19. Siwach et.al.(2020). SHGs and Covid-19: Challenges, Engagement, and Opportunities for India's National Rural Livelihoods Mission, available at <https://womensgroupevidence.org/shgs-and-covid-19-challenges-engagement-and-opportunities-indias-national-rural-livelihoods-mission>
20. Yadav, Shiv Kumar (2021).Self-Help Group (SHG) and COVID-19: response to migrant crisis in Haryana, India during the pandemic, *Social Work with Groups*, Vol 44 (2) pp, 152-158, <https://doi.org/10.1080/01609513.2020.1805974>
21. <https://telanganatoday.com/telanganas-shg-women-unmask-skills>.



INSPIRATM
Reg. No. SH-481 R- 9-V P-76/2014

Published by:
Shyam Sunder Modi
INSPIRA Publications
25, Sudama Nagar, Opp. Glass Factory, Tonk Road, Jaipur - 302018 (Raj.)
Phone No.: 0141-2710264 Mobile No.: 9829321067
Email: profdrssmodi@gmail.com

₹690/-

Printed at:
Akrati Advertisers
B-45, Ganesh Marg, Bapu Nagar, Jaipur - 302015 (Raj.)
Phone No.: 0141-2708129 Mobile No.: 9829013246



Copyright © publisher

Website : inspirajournals.com