

Innovations and Applications of Information Technology during Covid-19

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ABSTRACT: Technology cannot prevent the onset of the pandemics however it can help prevent the spread, educate, warn and empower the knowledge of covid-19 to the people. The novel Coronavirus disease has forced the Health authorities and government officials to urge people in quarantine allowing them to leave the safety of their homes under specific circumstances. The severity and reach of the coronavirus pandemic has drastically changed the lives of the people. With Great Impact and transmissibility Covid-19 has created a Global Health Crisis that has kept a deep impact on the way we perceive our world and our everyday life. Covid-19 has effected the world on every level were people are suffering the huge losses with respect to their lives, daily activities and employment. As this pandemic is raising its effect without the limitation of any speed it is necessary to have a control over this pandemic to save the lives of the people and maintain peace and dignity in the present world scenario. The developing Information Technology in the world has created a vast change in the current world environment. Today, with converging technologies like mobile, cloud, analytic, robotics, AI/ML, 4G/5G, and high-speed internet, it is becoming a possible to test several innovative approaches to pandemic response. Information technology has gone through many breakthroughs and advancements over the last couple of years and has infiltrated every part of our daily lives. As it provides convenience and makes our lives easier, we find ourselves investing more resources into upgrading and keeping it around. This has definitely paid off during difficult times because it makes things much more manageable in times of crisis. Hence the emerging new methods and innovations in Information Technology can help to bring a drastic change in the prevention of covid-19 world wide and bring a new hope in the life of the people.

KEYWORDS: Covid-19, Pandemic, Information Technology, Applications, Innovations.

I. INTRODUCTION

Corona viruses belong to the big family of Coronaviridae in the Nidovirales order. Corona represents crown-like spikes on the outer surface of the virus; thus, it was named as a coronavirus. Coronaviruses are minute in size (65–125 nm in diameter) and contain a single-stranded RNA as a nucleic material, size ranging from 26 to 32kbs in length. The subgroups of coronaviruses family are alpha (α), beta (β), gamma (γ) and delta (δ) coronavirus.

The corona virus was first detected in Wuhan china in Late 2019 and has set off to a Global Pandemic. Experts says SARS-COV-2 originated from Bats. That's how the coronavirus behind **the Middle East Respiratory Syndrome (MERS)** and **Severe Acute Respiratory Syndrome (SARS)** got started. Scientists first identified human coronavirus in 1965. It caused a common cold, later the decade researchers found a group of similar human and animal viruses and named them after their crown like appearances.

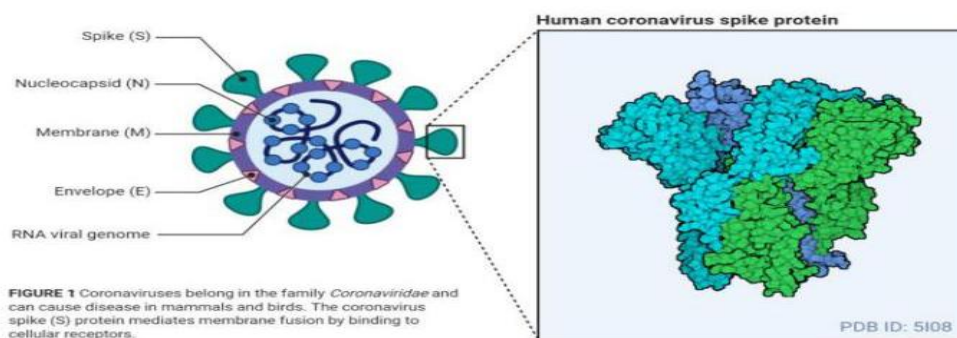


Fig 1.1 Detailed structure and protein visualization of Corona virus.

The rapid spread of Covid-19 has forced different countries to use every trick from the sources to get solution for pandemic covid-19. Some countries like south Korea, Italy, Singapore has done a better job by adopting the new trends of Information Technology. Asian Countries have used a wide range of technologies to fight against the pandemic. Information Technology can facilitates the pandemic strategy and response in ways that are difficult to achieve manually. Information Technology Can help forecasting the need and requirements of various equipment, methods and treatments that are difficult to achieve physically. The following data provides the vast framework how different applications of Information Technology in pandemic management are Responsive and Highlighting.

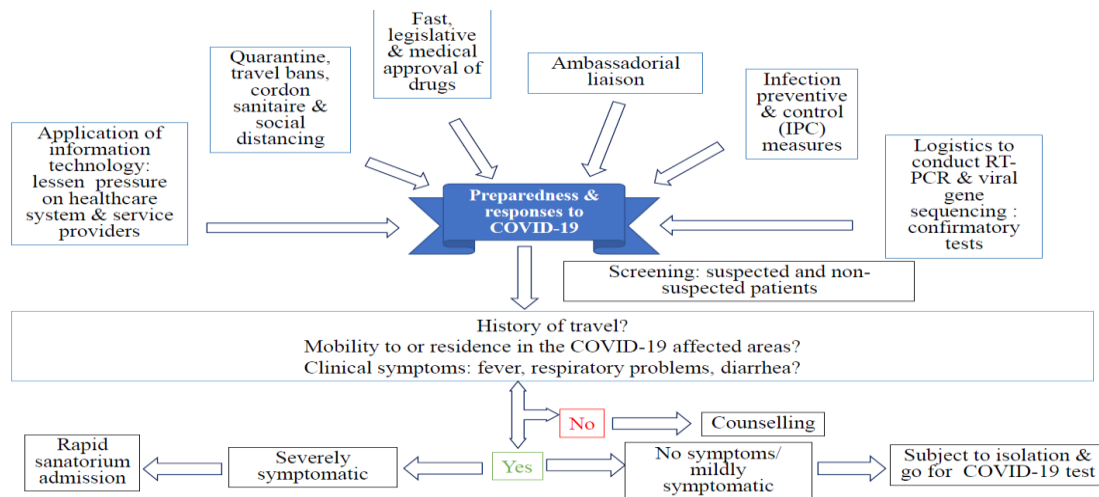


Fig 1.1 Schematic diagram illustrating the preparedness and responses to Covid-19.

Using different Applications of Information Technology helps to lessen the pressure on Health care system and service providers. Information Technology helps in screening and planning suspected and non suspected patients. Digital Technology helps in monitoring the travel history of patients so that they can be quarantined. Different AI and Digital Algorithms are used to monitor the mobility o patients travel history and suggests rapid admission to covid-19 test.

II. OBJECTIVES

- ❖ To know history and origin of Coronavirus.
- ❖ To know brief idea of trending Information Technology Applications.
- ❖ To know new innovations during Covid-19 pandemic.
- ❖ To analyse how Information Technology fundamentally helps in improving disease detection.

III. INFORMATION TECHNOLOGY APPLICATIONS WHICH HELPS TO PREVENT THE PANDEMIC

1) Health Care Systems

One of the biggest field that Information Technology is making a difference during Covid-19 pandemic is Health care. Technology has played a huge part in improving standards in WHO hospitals, Testing Facilities and Laboratories. Information Technology has proved that it has extremely provided useful methods in helping people all around the world. Some of the most important resources which are developed using the Information Technology related to keeping critical patients Stable are Ventilators. It is estimated that about 30% of patients that experience Life Threatening Covid-19 symptoms will require mechanical ventilation to stay alive. Hence this problem can be resolved Using IT as source to share schematics and blueprints that enable Institution to create their own functional ventilation. Following is the List of some of the useful devices that are used during covid-19.

- ❖ **Finger Tip pulse Oxymeter:** Pulse oxymeter is a non-invasive and painless test that measures the oxygen saturation level in blood. It can rapidly detect small changes in how efficiently oxygen is being carried to heart and other part of the body. Pulse oxymeter is a small clamp like device which is placed o finger, earlobe or toe. Small

beams of light pass through the blood in the finger measuring the amount of oxygen. It consistently provides result of 2%. If a reading is 82% than the oxygen saturation level may be near to 80-84%. It comes with non risks and is p o t a b l e .

- ❖ **Infrared Thermometer:** Infrared thermometer are temperature sensing devices that uses electromagnetic Radiation to make non-contact surface temperature reading. This allows for fast. Touch-less measurements from safe distance. Infrared Thermometer uses a lens to focus light from one object onto detector called thermopile. The detector in turn converts that energy into a Electrical signal which after compensating for the ambient temperature is delayed in units of temperature. It Consists of wavelength from 0.7 to 1000nm. It can be used to check hot spot in fire fighting situation.
- ❖ **CoronaOven:** A Bengaluru based start-up has developed a device which disinfects daily objects and kills covid-19 virus using UV Light Radiation. It is a portable UV disinfection chamber which helps in disinfecting items from Covid-19 bacteria and other pathogens. CoronaOven uses chemical free multi-focal UV light exposure covering 100% surface of items placed inside the oven from 360 degree and wavelength of 253.7nm. A treatment duration of 19 min be sufficient enough to sanitize and disinfect surface properly.
- ❖ **Sanitize Spray Gun:** The sanitizer Spray gun is a fast and flawless way to sanitize home or office. It I made with related voltage of 220-240 Volts with power of 130 Watt. It is an indispensable air-brush **Sanitizing** kit that allows you to tackle any job with a professional and accurate finish. It allows you to **spray** swiftly and accurately.

2) Finding Drugs

During covid-19 situation it is very important to find a specific drugs or vaccine to cure the pandemic situation. In this area Artificial Intelligence is being used as suggesting components of a vaccine by understanding viral protein structures, and helping medical researchers at an unprecedented pace. Allen Institute for AI, Google DeepMind have created AI tools, shared data sets and research results.

3) Increasing trace ability and transparency by sharing data

During a pandemic it is very important that people are aware about what is happening and are given proper suggestion hence messaging plays a vital role to make sure people are informed and reminded to use appropriate precautions. Several groups are using the trending technologies like mobile, AI, ML and more, to provide visibility on the outbreak. Microsoft Bing launched an interactive COVID-19 map to provide widespread disease news. Sixfold has published a free live map of border crossing times for trucks to enable all of Europe's supply chains to understand expected delays in receiving shipments. Social platform like TikTok has partnered with WHO on COVID-19 to help keep their users knowledgeable with correct, timely facts, along with a live stream from the WHO where users will be able to ask questions and seek answers. Taiwan CDC central epidemic command centre (CECC) is combining health data with the travel data, to build a monitoring system and provide real-time alerts. For example, sending automatic alerts during clinical visits if they have travelled to the infected vicinity. In India, Telecom operators like Jio, BSNL, Airtel, and more, are using the caller tunes to spread awareness about the pandemic.

4) Tracking people with facial recognition and big data

In case of pandemic management, big data analytics can help in quickly identifying infected individuals, connect with them, track who they have come in contact with, and so on. Facial recognition technologies along with data can accurately identify people even if they are masked. Such technologies can help in monitoring movement and tracking of people who are quarantined. It can also help in keeping a tab on people and ascertaining whether or not they have been in contact with an infected person. CCTV cameras along with facial recognition technologies can help in identifying infected people who break the rules and step out despite being quarantined.

5) Contact-less movement and deliveries through autonomous vehicles, drones and robots

Self-driving cars, drones, robots can all help at a time when the need is to avoid human contact. Autonomous vehicles can be used to transport affected people to and from health care facilities with ease, without risking the lives of healthy people. Robots can be used for delivering grocery, cooking means, sterilizing hospitals and patrolling the streets. Drones can be used for food deliveries, tracking population, carrying test kits and medicines to quarantine locations, thermal imaging to identify infected people, spraying disinfectant, and more. Many new areas and use cases

are coming up where drones, robots and autonomous vehicles are being used. Different Tech giants like Alibaba.com and other sources are contributing their computing power to help hospitals perform diagnoses and possibly find a cure.

6) Technology supported temperature monitoring

The wireless thermometer guns and other similar infrared body temperature measuring devices have become the most important medical equipment that are being used at checkpoints of offices, airports, hotels, hospitals, train stations, shops, and other public places. These technologies assist in measuring the body temperature from a distance and turn out to be effective in pinpointing the individuals who might need further investigation. Automated thermal monitoring along with facial recognition is making the process faster and more effective.

7) Remote working technologies to support social distancing and maintain business continuity

As pandemics or other calamities keep threatening the business world, working from home ensures business continuity as well as facilitates social distancing. In such a scenario, technologies that enable secure access to data, enterprise applications, virtual meetings, cloud conferencing, and virtual/mixed/augmented reality are the forefront leaders to ensure deliverables are not impacted. Remote working is a blessing that comes due to technology and is one of the greatest solutions that helps us in social distancing.

8) Use of smart Technology for Covid-19

A smartphone is a newer class of cellular telephone with an integrated computer technology and other features such as an operating system, web browsing, and the ability to run software applications. They are called 'Smart' because they can provide information when you need them at the touch of your fingers and this can be used in a useful way. Currently smartphones are equipped with features such as camera, video recording, Global Positioning Service (GPS) navigation, and games, sending and receiving Electronic mail (email), web search applications for various purposes. In India a virtual app is being developed called as **Aarogya Setu** (lit. 'Health Bridge') which is a tracking mobile application developed by the National Informatics Centre that comes under the Ministry of Electronics and Information Technology, Government of India. This is a tracking app which uses smartphone's GPS and Bluetooth features to track the coronavirus infection. Aarogya Setu app is available for Android and IOS mobile operating systems. Using Bluetooth technology, the Aarogya Setu app tries to determine the risk if one has been near a Covid-19 infected person (within six feet of distance) by scanning through a database of known cases across India, and using location information it determines the location one is in belongs to the infected areas based on the data available.

IV. NEW INNOVATIONS DURING COVID-19

1. Data Tracking Platform by NASSCOM

The National Association of Software and Service Companies (**NASSCOM**) introduced a Data Tracking Platform during covid-19 in Karnataka helping the state take data driven measures to control the pandemic. The Karnataka state government launched the data analysis tool developed by NASSCOM task force including Microsoft, Intel, Wipro, Infosys MindTree, Accenture etc. The Data Tracking platform is based on plug and play concept Technology providing the benefit to users to decide which feature they want to use and integrate with their existing platform. Dashboard of data Tracking includes:-

- ❖ Covid Summary: Key facts useful for officials to get the quick glance of state and district level numbers.
- ❖ Covid Source Analysis: case in last 24 hrs their origin and spread analysis.
- ❖ Testing Summary: Covid positive rates by number of tests
- ❖ Test By category: Useful to understand the source of infection.
- ❖ Hospital Capacity: Bed occupancy and availability by districts.
- ❖ India Summary: State Level Summary



Fig: 4.1 Data Tracking Platform

2. Low Cost X-ray Machine

Getting Tested to Covid-19 virus without having to get throat test with just rs 150-250 is possible with new innovations where it takes just an X-Ray of the chest. Cov-Astra is the low cost AI[Artificial Intelligence] X-Ray device developed by AI Indra System founder Adarsh Natarajan which replaces the Conventional covid-19 testing which cost over Rs 4000.



Fig : 4.2 Low Cost X-ray Machine

3. Shield X-24

This is a Micro-wave like device which is developed by Bio Informatics start-up Ravikumar Rajendraprasad. This device Can eliminate viruses located on the objects such as Wallet, mobile phone, pen and other minute devices within 15 seconds with UV rays. This Device is helpful to be used in offices, Homes, Airports or railway Station where luggages can be screened to neutralize viruses.



Fig: 4.3 Shield X-24

4. DeConto

This is low cost product that help transport a live virus .The viral transport media are currently imported and are very expensive.The DeConto was Developed by Researcher Manjunath and Dinesh from Denovo Biolabs incubated at the institute of Bio-Informatics and Applied Technology[IBAB]



Fig: 4.4 DeConto

5. Fluorescence Probes

VNIR Co-Founder T Govindraju and Meheer Prakash has developed Fluorescence probes which are currently important to various nations like china and India. Fluorescence probes are molecules that absorb light of a specific wavelength and emit light of a different typical range and are used to study different biological samples. The use of Fluorescence probes in biological Research is the standard in many applications. The Fluorescence probes play a vital and important role during covid-19 which helps detecting the protein location and Activation. Thus Fluorescence probes are used in RT-PCR test kits and their development promises to be a boon for Indian companies working on Covid -19 Test kits.

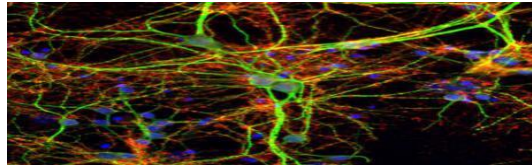


Fig: 4.5 Fluorescence Probes

6. Daksh: [Foetal Monitoring Device]

During this pandemic era it is been a difficult time to those who are pregnant. The National Family Health Survey [NFHS] data shows that overall fertility rate (TFR) in India is declined from 2.7 in 2005-06 to 2.2 in 2015-16. It is seen that there is a tremendous fall in Birth Rate of new born babies during covid-19 situation. Arun Agarwal of Janitri has developed Daksh a foetal monitoring device which helps doctor to remotely monitor the foetus. The women need to keep the device on her stomach which will let the doctor know the heartbeat of foetus. This helps in monitoring the healthy condition of baby in fraction of seconds.



Fig: 4.6 Foetal Monitoring Device

7. Internet Enabled Ventilators

The Covid-19 pandemic has highlighted a shortage of Ventilators. In order to overcome this situation ABM Respiratory Care Singapore Based Medical device company developed an Internet Enabled Ventilator which is also called as Tele Ventilator. This ABM's Tele-Ventilator leverages new Technologies which is 25 times faster and creates 50 times less data traffic than traditional web Technologies. This enables Time Valuable, Responsive, Consistent and large scale secure access to ventilators without complex Configuration which is usually needed in traditional connecting systems.



Fig: 4.7 Internet Enabled Ventilators

8. Low Cost Mechanical Ventilator

Researchers from Indian Institute of science Education and Research[IISER] in Pune have developed a prototype of a Low cost mass producible mechanical ventilator that could fulfill the needs of Covid-19 patients. The Ventilator is Compatible with wireless Technology that facilitates remote monitoring as well as Control of Machine. A number of Ventilators can be connected to a center console allowing health care workers to monitor several patients simultaneously. This Ventilator is made using equipment available locally which has electronic system and controls the flow of Air volume. It has the ability to sense the flow and to deliver the desired volume of air to patients. It also has pressure sensors as micro-controller for autonomous operation and a micro computer to interface with user with remote monitoring and Control. This Ventilator is 10 times cheaper than Commercial Ventilators.

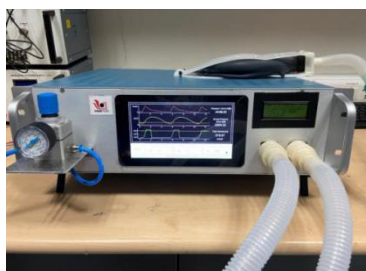


Fig:4.8 Low Cost Mechanical Ventilator

9. DNA molecule-matching technology

DNA molecule-matching technology can measure DNA in 1,000 times more detail, creating an accurate diagnostics tool that can track changes inside the body at a molecular level. On 7 April, the firm unveiled its Covid-19 test protocol, which it claims will enable one million tests for the virus to take place a day in the US. Using its QSanger spike-in technology — which is designed to bind a DNA molecule with a matching sequence — followed by data analysis to test whether the virus is present, it can automatically perform 3,840 assessments a day. Its test uses different sets of instruments and chemicals from existing Covid-19 diagnostics, enabling labs to increase their testing capacity, as well as engaging multiple sequences. Most of the molecular level testing during the pandemic is being conducted through the polymerase chain reaction (PCR) method, which is used to directly detect the presence of an antigen, rather than the presence of the body's immune response.



Fig : 4.9 DNA molecule-matching technology

10. AI-driven Covid-19 screening tools through digital stethoscopes by EkoHealth

To aid the health service's response to the pandemic, EkoHealth is using its tele-health technology and infection control tools to allow health-care professionals to deliver cardiac and pulmonary care to patients. To do this, the firm manufactures stethoscopes, provider-to-patient software, and AI-powered analysis. During Covid-19, the company is providing its AI technology and cardiac screening tools to clinicians, offering them real-time visualization and the ability to analyse and share heart and lung sound data.



Fig :4.10 AI-driven Covid-19 screening tools

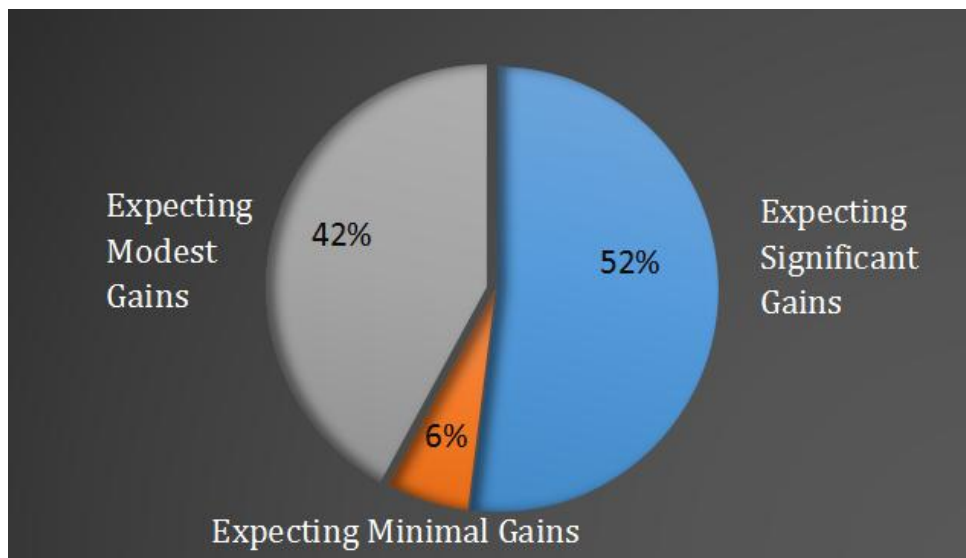
11. BlueDot’s AI-driven virus tracking technology

Digital technology firm BlueDot was founded in 2013 with one purpose — to develop an automated global infectious disease risk assessment system. BlueDot’s technology is a software-as-a-service designed to locate, track and predict infectious disease spread. Its engine gathers data on more than 150 diseases and syndromes around the world, searching every 15 minutes and includes official data from organizations such as the WHO. Most of the predictive ability is based on data it collects from outside official health-care sources, such as the worldwide annual movements of more than four billion travelers on commercial flights, alongside human, animal and insect population data. Combining this data with AI, BlueDot successfully predicted several cities where Covid-19 spread to after it surfaced in Wuhan. The company is now working with governments and public health agencies from around the world with their Covid-19 responses.



Fig: 4.11 BlueDot’s AI-driven virus tracking technology

V. STATISTICAL ANALYSIS OF DATA

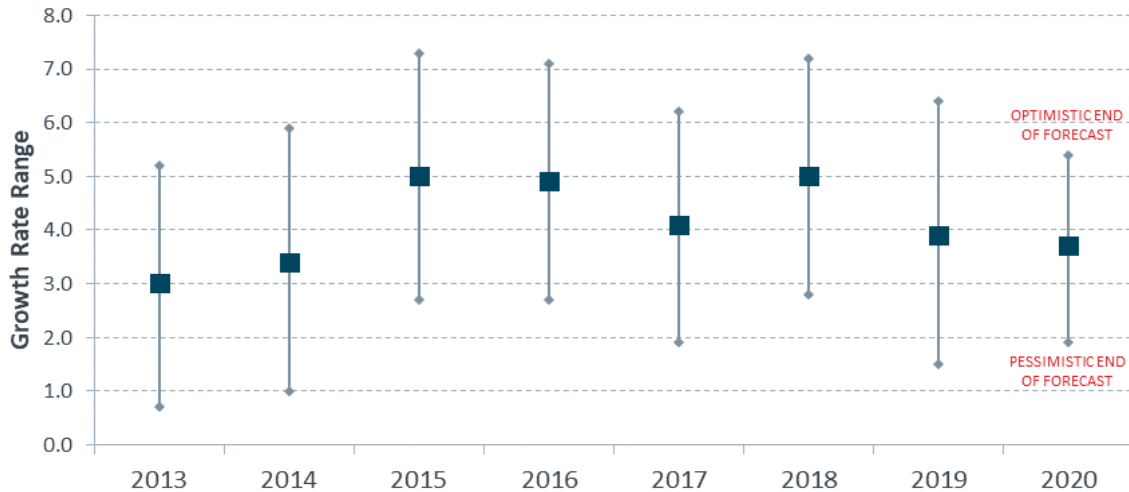


Graph: 5.1 Depicts the percentage of new innovations in Information Technology

As per the above Graph the pessimist data gives the information about expected and minimal growth in new innovation of information technologies, expected significance Gain is driven by 52%, Expected modest Gains is by 42%, where there is least drop of percentage in expected minimal Gains of 6%. Following expected percentages are



with respect to all emerging information technology, such as 5G, Artificial Intelligence, IOT, virtual reality Biometric, 3D printing, Robotics, etc.



Graph: 5.2 Depicts brief analysis in Growth of Information Technology During Covid-19

The Above Analytic study gives the brief idea about of how Information technology industry growth can hit 3.7% during Covid-19 Pandemic. As with any forecast if we see overall industry growth many factors can play role of estimation and innovation in emerging Technology. This shows that there is high demand to trending innovations of Information Technology to fight against the covid-19.

VI. CONCLUSION

There is an ethical framework to avoid the pandemic situation using modern and advanced Information Technology escapements until a specific vaccine is found. The successful use of all this new Digital based equipment s such as Oxymeter, mechanical ventilator etc can secure a public trust and helps them to check their health updates within a fraction of seconds. The researcher aimed to achieve a wide knowledge of how information Technology is raising its bars in helping a country to face the covid-19 situation. This can revoke the confidence of people around the world and help them to make aware of the situation in fraction of seconds. Our personal digital devices, combined with rigorous data science, are of crucial importance during this COVID-19 pandemic.

Though potentially revolutionary, the way that digital technology can be used during this pandemic also comes with many challenges and risks. Thus, we must be critical and think about how we can ensure that the new technology will truly benefit our society in this time of crisis. Covid-19 is a global crisis, and perhaps the greatest tragedy is that the world has not yet come together to find a global solution. But there is still hope. New ideas and new technologies know no borders, and the internet connects us even when we are apart. Leaders that put this mindset at the heart of their strategy can and will show the world that a better future remains possible.

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