CHALLENGES OF SUPPLY CHAIN MANAGEMENT ON PROVISION OF INTERNET SERVICES IN RURAL AREAS DURING COVID-19 PANDEMIC

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Abstract: There has been a wide gap between the rural and urban areas in terms of opportunities, facilities, and services. In case of telecommunication, rural areas are not considered viable for the telecom business. The recent growth in the tele-density, mobile connectivity and internet provision in urban areas has widened the digital gap between rural and urban areas, therefore, in order to uplift the rural areas digitally, they need to be provided with mobile telephony and wireless broadband access, by connecting remote areas to the broadband core networks and by choosing efficient, cost-effective and fast-deployment technologies, wired or wireless networks. This will help in the improvement of internet accessibility. Due to the ongoing pandemic (Covid-19) the world is facing major changes in every sphere of life. Specifically, in case of India, the socio-economic conditions are getting worse day by day. Many of the economic sectors which are dependent on database, continue to try to keep them afloat through Work from Home, which has led to increased dependence on the 'internet'. Internet has become a very crucial part of everybody's life currently but there are people who lack these digital facilities and are finding it increasingly difficult to cope with the need of the circumstances.

Currently, people living in rural areas are the ones who are facing major difficulties due to lack of internet. An initiative had been taken by the government and various private firms, for providing internet to the rural areas in order to uplift the rural societies of our country but due to the pandemic the work in progress slowed down as the country experienced phases of lockdown.

The research is influenced by a firm, called M2M CYBERNECTICS PRIVATE LIMITED where I interned under the supply chain management and finance department. The company is an IT based start-up which provides solution for Power, Telecom, and ICT sector. One of the major roles of the company is to provide internet connection and solar systems to the rural areas.

This study will be examining the major trends and changes in the supply chain management of the firms which deal with the telecom sector, and will be comparing them to the pre-pandemic situation. The research will be based on the data provided by different companies, and will majorly determine the pre and post Covid-19 trends of internet accessibility provided by ICT firms in rural areas.

Index Terms - **Rural** *Areas, Telecommunication, Internet, Covid-19, Supply Chain Management, ICT sector*

I. INTRODUCTION

There has been a wide gap between the rural and urban areas in terms of opportunities, facilities, and services. Due to the major developmental changes made in the urban areas, i.e. a will to educate oneself, infrastructural changes, provision of better services and facilities, the opportunities are naturally a step ahead when we compare to those in rural areas. It has been noticed that businesses and the Multinational Companies set up themselves mostly in the urban areas as they can predict a future for their business which eventually leads them to profits. Meanwhile, the Rural areas, although consisting of major population of the country, are not generally considered as viable for most of the businesses. Since the population being scattered and opportunities being very low, the rural areas always tend to stay behind the urban areas, leading to widening of the socio- economic gap in relation to the urban areas.

Nowadays being developed also means being connected to the surroundings as well as the world. In case of telecommunication, rural areas are not considered viable for the telecom business. The recent growth in the tele-density, mobile connectivity and internet provision in urban areas has widened the digital gap between rural and urban areas, therefore, in order to uplift the rural areas digitally, they need to be provided with mobile telephony and wireless broadband access, by connecting remote areas to the broadband core networks and by choosing efficient, cost-effective and fast-deployment technologies, wired or wireless networks. This will help in the improvement of internet accessibility.

Provision of internet to rural areas is a challenge taken up by various companies and firms, which are mostly affiliated by government, and in order to fulfil the challenge, Supply Chain Management (SCM) comes into play. Supply Chain Management refers handling the flow of goods and services from the producer to the final consumer and involves all the processes that transform raw material into final products. SCM represents an effort by suppliers to develop and implement supply chains that are as efficient and economical as possible.

Currently the world is facing a major challenge, i.e. a virus outbreak called CORONAVIRUS. It has created tensions all around the world and has brought some big changes in the socio-economic life. In the times of ongoing pandemic, the companies and businesses are facing

immense amount of difficulties, from producing to shipping the final product all around the world. In the case of India, the situation continues to get worse and has affected the citizens, economy, health etc. on a large scale.

There has been a downfall in the Indian economy at a very rapid rate. Workers and employees have lost their jobs, while company owners are facing huge loses. Many of the economic sectors which are dependent on database, continue to try to keep them afloat through Work from Home, which has led to increased dependence on the *'internet'*. Internet has become a very crucial part of everybody's life currently but there are people who lack these digital facilities and are finding it increasingly difficult to cope with the need of the circumstances.

Such underserved/ unserved people are huge in numbers and are mostly in the rural areas and small towns. The rural areas comprise of about 70% of the Indian population and contributes a major chunk to the Indian GDP. Nowadays, provision of internet in rural areas needs to be seen as one of the major infrastructure requirements to boost the national economy and provide a better quality of live to its inhabitants. M2M CYBERNETICS PRIVATE LIMITED is one such start-up incorporated on 5th January 2016 formed by group of professionals in order to provide solutions for the Power and Telecom and ICT sector. The strength of the company are its people who have experience to setup various government owned and private telecom networks in India. It is a non-govt company and is registered at registrar of companies. One of the major roles of the company is providing internet connection to rural areas through access points and solar systems for power backups.

In this study I will be examining the trends and changes that has taken place in provision of internet to rural areas during the pandemic and will be comparing the similar to pre-pandemic trends.

1.1 OBJECTIVES OF THE STUDY:

a. To find out the challenges for internet accessibility in rural areas
b. To determine the situation of companies that provide telecom services during covid-19.
c. To find out challenges of SCM during Covid-19.

II. RESEARCH METHODOLOGY

Apart from the information gathered from the company which encouraged the researcher to intern under the same, the data in the study is collected from various internet sources. Based on the literature review, the data has also been collected by various research papers. The data present in the paper is secondary while the result has been observed and concluded from the researcher's point of view.

2.1 LITERATURE REVIEW:

Sangamitra Ramachander (2007) in her paper "Rural Connectivity in India- The n-Louge example" has explained the rise of telecom sector in India and has put emphasis on how technologies have been helpful in bringing the villages close to each other and its availability in those areas. The paper also throws light on the challenges faced by technologies in rural areas. She has explained in her paper how modern technologies like telephony and internet has helped in the advancement of urban and developed areas and how it brings the world closer engendering many possibilities. It has improved the ways of communication to a great extent. While internet being the latest advancements lags far behind in rural and underdeveloped areas as compared to urban areas. Only about 2% of the rural population has access to the internet despite the fact that it consists of about 70% of the India's population. The researcher has justified the aim of the study by taking up an example of a company called n-Louge which developed a business model in order to provide rural areas with efficient wireless internet connections to enhance to quality of life in the villages throughout India. The Challenges explained in the paper are no less since rural areas lag behind urban areas in many spheres of life. The lower income of households requires the connectivity to be inexpensive, another challenge is that the systems need to be robust enough to withstand bad weather conditions and harsher physical environment and should also be able to function without any basic infrastructural support, like regular power supply. However, with efforts put in by n-Louge and many other organisations to provide with ICT infrastructure in the villages, the availability of the technological connections in rural areas is possible today (Ramachander, 2007).

A research paper "ICT for Rural Development: Opportunities and Challenges" by Ankita Gupta a research scholar (M.G.C.G.V., Chitrakoot, Satna, M.P., India) and Dr. SS Gautam an Associate Professor {(Dept of Phy Science), M.G.C.G.V., Chitrakoot, Satna, M.P., India} explains the role of ICT and importance E-governance. The paper describes how the rural ICT application at the village level helps in providing services to the citizens, while the role of E-governance is to provide solutions to the parties i.e. the citizens, business and governments. The emergence of ICT has made the communication faster and better, it has helped in efficient storage, and data processing and exchanging has become easier for its users. These technologies have helped the government is being more transparent to its parties, has helped in empowering the citizens and has created a better interaction platform for industries and businesses. Even though India has gained success but the fact that it is a partial success cannot be changed. The rural areas still face the problem of smooth service delivery. In conclusion The study explains the importance of ICT and its various impacts for E-governance and the citizens in making the government work effectively and efficiently, provide solutions for delivery of services to all the parties and save costs. The justification of the study is given in terms of data provided by the Skoch Consultancy, New Delhi, that due to the implication of ICT and E-governance, 81% of the citizens have reported reduction in corruption, 95% find it cost effective, and 78% have agreed to the efficient delivery of the services. (Ankita Gupta, 2017)

Noraini Ahmad (Othman Yoep Abdullah Graduate School of Business University Utara Malaysia) and Adam Mohd Saifudin (School of Technology Management and Logistics College of Business University Utara Malaysia) in their paper "Supply Chain Management in Telecommunication Industry: The Mediating Role of Logistics Integration" explained how the growth in telecom industries have raised the competition amongst them due to the increase in the demand for inexpensive and better quality products. Therefore, the telecom companies are required to work in an effective manner for the supply chain management in order to give the best results. Supply chain management practice has been looked upon as a factor to gain advantage in the competitive business environment. The paper deals with the comparison

of supply chain management performance and supply chain management practice and how the logistics integration in the Telecommunication industry is a medium of this relationship. The data collected in the research paper is from the telecom industries and the tool used in the research is Statistical Package for Social Sciences (SPSS) 21th version for testing the measurement model. (Noraini Ahmad, 2014)

III. DATA ANALYSIS
The data analysis is based on the various research and findings.
A. **The challenges of internet accessibility in rural areas are as follows:**
1. UNEMPLOYMENT IN RURAL AREAS
Due to lack in various socio-economic aspects of life in rural areas when compared to urban areas the rate of illiteracy has always been higher

MONTHS (2019)	UNEMPLOYMENT RATE (%)	MONTHS (2020)	UNEMPLOYMENT RATE (%)
JUNE	7.9	JANUARY	7.2
JULY	7.3	FEBRUARY	7.8
AUGUST	8.2	MARCH	8.7
SEPTEMBER	7.2	APRIL	23.5
OCTOBER	8.1	MAY	23.5
NOVEMBER	7.2		
DECEMBER	7.6		

TABLE 1 UNEMPLOYMENT RATE
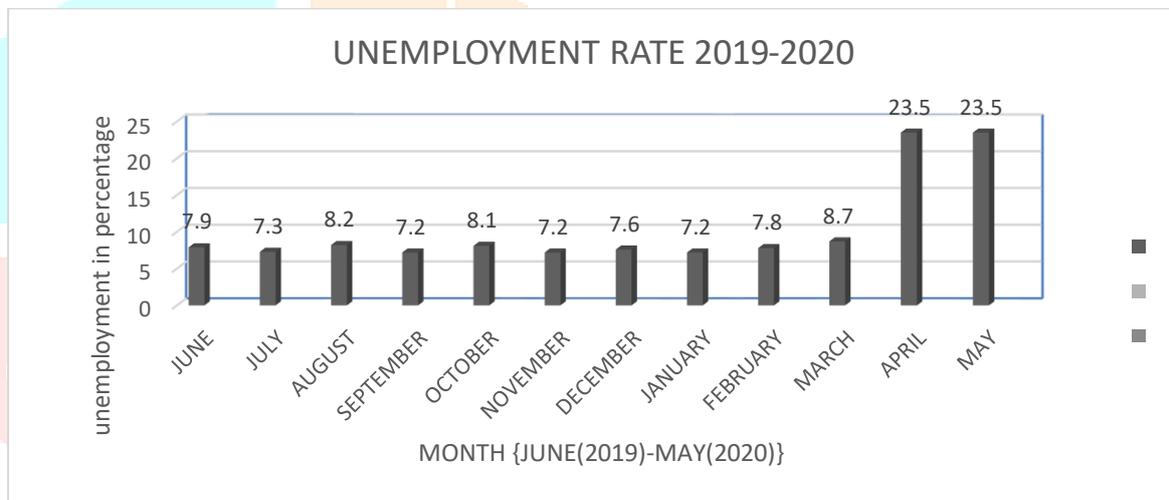
FIGURE 1 UNEMPLOYMENT TREND [source: trading economics (economy, n.d.)]

The above figure represents the unemployment rate from June 2019 to May 2020. And this trend shows a major difference in the employment rate of people during a span of 1year. In June 2019 the unemployment % was 7.9% and later in May 2020 it increased up to 23.5%.

This major increase in the unemployment rate is due to the ongoing pandemic and hence has led to decline in the per capita income of the people. As discussed above one of the major challenges of internet accessibility is unemployment as it leads to low income which decreases the affordability of ICT services. In the prevailing situation there has been increase in unemployment of about 16% which makes it worse for people living in rural areas to access these services.

2. EDUCATION
The Literacy rate in rural and urban areas is 68.90% and 85.0% respectively. The current pandemic has forced the shutdown of all the education institutions even before the lockdown started. As an alternate the education system has resorted to the online mode of teaching. Due to non-availability of high-speed internet in the rural areas as well as its unaffordability due to low income levels the rural students are getting left behind, which has potential of widening the literacy levels further when compared with the urban areas. The non-availability of internet services in the rural areas can be highlighted by a recent study conducted by state education department of Maharashtra
The following table shows the percentage of students in different district of Maharashtra with no mode of connectivity:

STATES	% OF STUDENTS
PALGARH	37.48%
GADCHIROLI	36.23%
NANDURBAR	29.87%
THANE	16.29%
PUNE	10.88%

Table 2 case study of Maharashtra

[Source: (Bhatkhande, 2020)]

A total of 15.88% of students from the state of Maharashtra have no access to any mode of connectivity.

B. TELECOM SECTOR AND THE SUPPLY CHAIN MANAGEMENT

In the current times, the telecom industries have been working efficiently more than ever before, as in the "new normal" majority of the society is dependent on this industry as they are providing with all the basic necessities and helping people maintain social distance at the same time. It has also been looking after education and is playing a major role at this moment. According to various studies the industry has been helping different fields effectively.

1. They have been supporting and helping the national healthcare by providing smooth flow of connectivity and helping with the researchers by providing tools to work effectively, while connecting citizens and making them aware about their surroundings
2. The network capacity has been extended by 30-50% in order to increase the efficiency of businesses and teachers teaching online.
3. The have made sure the services provided to the residential areas and small businesses are working smoothly while providing Wi-Fi connection to those who need it the most.

All this ensures that the supply chain of the telecom industry hasn't been affected on a large scale as the it is the most useful as well as important industry in the current scenario. The smooth functioning of the industry is the result of the uninterrupted supply chain management. But such a case mostly applies for the urban sector of the economy as the socio-economic areas are more developed in the urban areas as compared to rural areas. Therefore, investing in the urban areas is more profitable for the industry and even for the economy as a whole.

C. CHALLENGES FACED BY SUPPLY CHAIN MANAGEMENT DURING COVID-19

According to various studies and observations, due to the virus outbreak the manufacturing industries and the supply chain has suffered a lot. The international trade, i.e. the imports-exports stopped leading to the shut down of the industries on a large scale. China being one of the most efficient countries in terms of manufacturing is affected. Hence, other countries dependent on china for materials are facing losses due to the unavailability of the on-time delivery of products and materials. There has been a delay in around 40% departure of goods from ports of china due to covid-19. Few areas among many are heavily affected due to the pandemic and these are as follows:

a) Workforce: To limit the impact of covid-19, many governments all around the world have put a lockdown in their respective countries. Many Industries are interdependent on each other but due to the disruption in supply chain management the production of many non-essential goods have been slowed down. In Developing nations like India, most of the workers are migrants and as suggested by the government, the shutting down of the industries have made the workers head back to their homes due to which there has been a reduction in workforce and customer demands are not met.

b) Products: Due to the unavailability of on-time workforce and good quality materials there has been an increase in the perfect competition of the industries as people are preferring good quality products and moving on to other options if their requirements aren't fulfilled as per their needs.

c) Cost: Less production of goods has led to increase in costs. Other reason for the increase in costs is the increase shipping charges for the need of industries to meet their financial expenses. Currently industries are facing many challenges like taking care of their workers as well as protect their operational viability.

IV. FINDINGS OF THE STUDY

1. Many non-essential goods were at halt and loaded trucks were in middle of the trips as the borders were sealed. M2M's shipment of Wi-Fi & Solar products was also at halt in Madhya Pradesh on the way from Haryana to Maharashtra. This delay was there for the entire industry as the GST department extended the validity of E-way bills vide Notification No. 35/2020 – Central Tax dated 03rd April 2020 which states that where, any time limit for completion or compliance of any action, by any authority or by any person, has been specified in, or prescribed or notified under the said Act, which falls during the period from the 20th day of March, 2020 to the 29th day of June, 2020, and where completion or compliance of such action has not been made within such time, then, the time limit for completion or compliance of such action, shall be extended upto the 30th day of June, 2020.

2. According to many supply chain experts the supply chain management has been influenced by many barriers due to covid-19. Barriers found out through the study are as follows:

S.NO.	BARRIER	BARRIER'S NAME
1	B1	Lack of Labour
2	B2	Lack of raw material for production
3	B3	Unavailability of Imported goods
4	B4	Shortage of livestock feed and their availability
5	B5	Bottleneck in last mile delivery
6	B6	Lack of transportation
7	B7	Slow movement of goods
8	B8	Lack of availability in local transport
9	B9	Ban on overseas transportation
10	B10	Decline in consumption of high value commodities
11	B11	Lack of awareness in People regarding Covid-19 (affect the chicken and egg demands)
12	B12	Lack of buyers
13	B13	Perception of scarcity among masses
14	B14	Increased shortage for perishables
15	B15	Slow credit flow from banks and non-banking financial companies
16	B16	Lack of cash flow
17	B17	B17 Pressure from local laws enforcement
18	B18	E-Pass issues

TABLE 3 BARRIERS OF SCM DURING COVID-19

[SOURCE: (SHRUTI AGRAWAL, 2020)]

4.1 GOVERNMENT POLICIES:

The below mentioned initiatives with respect to manufacturing, telecommunication and transportation are steps taken by the ministry of home affairs/ Govt. of India during Covid-19.

1. Ministries of Home Affairs (MHA) have exempted telecommunication and IT sectors from lockdowns and have allowed the sectors to work as they are the most efficient and essential services during the pandemic. The dependence on telecommunication has increased and has been acknowledged by the government in the guidelines dated 24th march 2020 issued by MHA,

2. Under MHA guidelines issued on May 1st 2020, manufacturing IT hardware has been allowed even in the red zones but not in areas which come under containment zones. This took place due to the impact on supply chains of network equipment and handsets manufacturing globally which increased costs and lack of availability.

3. Due to increase in costs of production the Indian Cellular and Electronics Association (ICEA), an industry body has predicted a loss of Rs 15000 crores incurred by manufacturing sectors. Hence, market analysts have suggested relaxing costs on financial aid while easing taxes to ease the burden on manufacturing industries which in return will ease the burden on telecom sector as a domino effect.

4. According to MHA and Govt of India, exception to commercial and private establishments that is the telecommunication, internet services, broadcasting, IT and IT enables services are allowed to remain open and function (advised to work from home) as well as industrial establishment like manufacturing and production units which require continuous process after obtaining permission from State government is allowed.

5. Supply chain management for the same is allowed to function

[Source: (affairs, 2020)*]*

V. CONCLUSION

Currently the world is facing a major challenge, i.e. a virus outbreak called CORONAVIRUS. It has created tensions all around the world and has brought some big changes in the socio-economic life. In the times of ongoing pandemic, the companies and businesses are facing immense amount of difficulties, from producing to shipping the final product all around the world. In the case of India, the situation continues to get worse and has affected the citizens, economy, health etc. on a large scale. It has been noticed that businesses and the Multinational Companies set up themselves mostly in the urban areas as they can predict a future for their business which eventually leads them to profits. Meanwhile, the Rural areas, although consisting of major population of the country, are not generally considered as viable for most of the businesses. Since the population being scattered and opportunities being very low, the rural areas always tend to stay behind the urban areas, leading to widening of the socio- economic gap in relation to the urban areas. In conclusion the data analyzed gives an idea about how the ICT services in rural areas are lagging behind and during the pandemic the situation has not become any better, the unemployment rate has increased rapidly and has led to extreme unaffordability. Due to this unaffordability there has been many difficulties faced by rural areas in the country. Education being one of the most important factors has been affected immensely as students living in villages are unable to afford any kind of mode of connectivity. While on the other hand the telecom industry has been trying to work efficiently in order to make the situation hassle free and ensuring safety of the people by providing solutions for the healthcare systems as well. But in case of rural areas as there had been a wide digital gap even before covid-19 and the initiative to provide the rural areas with internet and ICT services has come to a halt. Just like earlier time the main focus is still the urban areas as it is more developed in terms of socio-economic aspect. This study has examined the current changes and trends in terms of the challenges of internet affordability and how telecom sector has been a crucial part at the time of the pandemic

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