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THE RAPID EXPANSION OF 5G: TRANSFORMING CONNECTIVITY

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ABSTRACT

Fifth generation mobile network is the 5G, it has faster data, low latency and increased capacity. In India adoption of 5G had come with actions of spectrums in July 2022 with various bands of frequencies to operate. For the expansion of 5G we need new infrastructure like fiber connection, antennas. It has high frequency signals which do not able to travel in distances. For the data collection researcher used the google form questionnaire which has parts like General information, Awareness and Knowledge, Perception and impact, Future expectations of 5G by respondents and Open-ended feedback of 5G from respondents. Random sampling method is used for the study. 50 samples were collected in that 25 are male and 25 are female respondents from northern Karnataka. Both primary and secondary data are used primary data collected through structured questionnaire and secondary data collected from journals, ChatGPT, some other publications.

Almost all are positively responded for 5G expansion, benefit associated with 5G 86% respondents are responded for faster internet speed it is the most recognised benefit. In all the respondents 88% are aware about 5G technology and remaining 12% are not aware about 5G technology. Throgh social media people first heard about 5G technology it is 36% secondly friends and family. Here the most commen rating is 4 it is followed very closed to 5 it shows vey high level of understanding of 5G. 70% of people believe that 5G positively impacts their daily life. 24 % respondents are not sure, so it is suggested to educate people and conduct awareness campaigns. Only 6% said "No" it indicates lower resistance. Availability of 5G in the country expects 46% responded for already available.

Lastly users concern about security and privacy which has remained critical. Users want their data will be protected and networks are safe. Totally users appreciate positive merits of 5G, they promote continues improvement and hope the advantages will destroy disadvantages.

KEYWORDS: *5G, AI, Augmented Reality, Virtual Reality, Environment, Social Responsibility*

INTRODUCTION

5-G is a fifth-generation wireless network in telecommunication technology and it is successor of 4G Long Term Evaluation. It proposed to faster, extra reliable and more efficient. Its speed reaches up to 10 GBPs (10-100x faster than 4G network). Its latency is lower as 1 millisecond (latency- slowdown between sending and receiving data). It can connect several devises and supports the explosion of Internet of Things devises like smart phone, sensors, towns etc. it is next level reliable and efficient which benefits all the users and network providers.

It makes use of higher frequency (millimeter waves) radio waves to incorporating to lower bands of 4G. the high frequencies allow faster data in shorter range therefore these networks need further mini/ small cell towers which are placed closer each other. Most probably 5G network is using by Smartphones, Healthcare, Autonomous vehicles, Manufacturing industry, Augmented Reality (AR)- it connects to real world like graphics, videos, text and so on, Virtual Reality (VR)- it replaces the real world by creating computer-based environment and it is fully digitalised.

In India adoption of 5G had come with actions of spectrums in July 2022 with various bands of frequencies to operate. For the expansion of 5G we need new infrastructure like fiber connection, antennas. It has high frequency signals which do not able to travel in distances. In rural and low developed areas, the cost of rollout is very high. In India this network is supported by 4.69 lakh 5G Base Transceiver Stations and adopted by 25 crore subscribers of mobile and by 2025 the 5G services aims to cover 99.6% districts.

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5G features and performances

5G Features	5G performance
Data Rate	Up to 10 Gbps
Latency	One ms (ideal) – 10 ms (real world)
Bandwidth	Up to 100 MHz, 800 MHz
Frequency bands	Sub-6 GHz
Destiny connection	One million /km2
Efficiency of energy	90 % reduction of traffic per unit vs 4G

Source: chatgpt.com

5G spectrum and its types

Spectrum	Frequency	Coverage	Speed
Low band	<1 GHz	High	Low speed
Mid band	1-6 GHz	Moderate	Balanced
High band	>24 GHz	low	Remarkably high speed and low latency

Source: chatgpt.com

Objectives

1. To study about 5G networks and its working.
2. Expansion of 5G networks in Northern Karnataka.

Research methodology

The article is relating to the expansion of 5G networking and the knowledge about 5G in people of Karnataka. Collect data, google form questionnaires are framed that includes parts like general information, awareness and knowledge, usage and adoption, perception and impact, challenges and concerns and future outlooks. Fifty samples were collected from Belagavi, Dharwad, Haveri, Uttara Kannada, Vijayapura districts which are part of Northern Karnataka in that 25 respondents are male, and 25 respondents are female. For sample collection random sampling method is used and data analysis done through MS-excel. The paper includes both primary and secondary data, the secondary data were collected from several websites related to government, journals and ChatGPT AI tool.

DATA PRESENTATION AND INTERPRETATION

General information

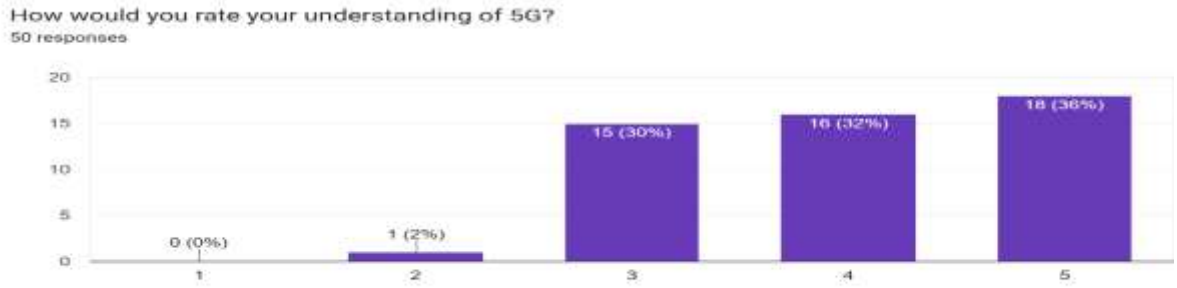
For the study 50 samples were collected in that 25 respondents are male and 25 are female respondents. Age of respondents in in between 18 to 60. in all the respondents 46% are private workers, 12 are government employees, 8% are formers, 22% are students and remaining 12% are from other sources like business, housewife, some are research scholars, tailors and some working in health care centres. 50% respondents are from Dharwad district and 40% from Belagavi and remaining 10% are from Haveri, Uttara Kannada, Vijayapura districts.

Awareness and Knowledge

In all the respondents 88% are aware about 5G technology and remaining 12% are not aware about 5G technology. Throgh social media people first heard about 5G technology it is 36% secondly friends and family, it is the role of suggestion throgh word of mouth and it plays very important role with 24% news/media and telecome providers also plays very crucial role but they slightly less then others that is 20 % and 8% respectivly.

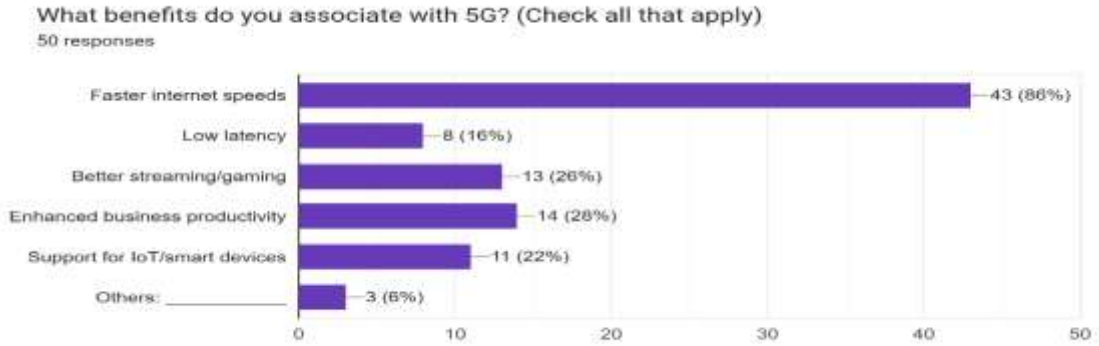
The ratings for understanding of 5G network responces are on a 1 to 5 scale where 1 for very poor 5 is for excellent. Here the most commen rating is 4 it is followed very closed to 5 it shows vey high level of understanding of 5G. only 1 person rated it 2 and no one rated a 1, it indicates very few people unfamiliar with 5G.

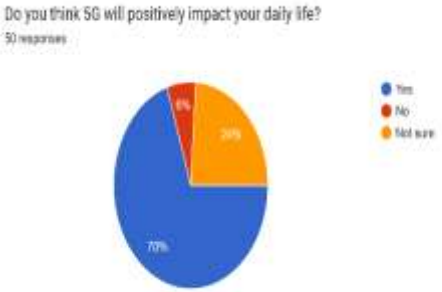
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Perception and impact

For the question related to benefit associated with 5G 86% respondents are responded for faster internet speed it is the most recognised benefit. Better streaming and enhanced business productivity are appearing in 26 and 28 percent, respectively. Support for IoT/ smart devices and low latency are having more moderated response with 22 and 16 percent. 6% respondents are recognised for others but did not specify further.





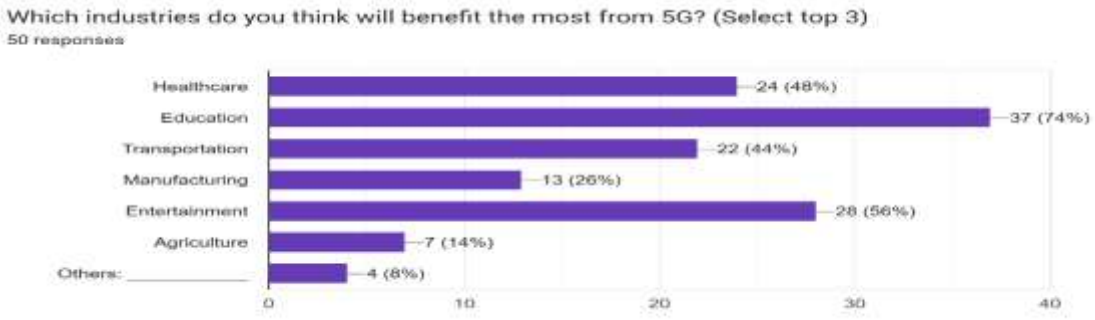
For daily life of a layman 5G helping to easier their work and it will help then in saving their valuable time and money.

70% of people believe that 5G positively impacts their daily life. 24 % respondents are not sure, so it is suggested to educate people and conduct awareness campaigns. Only 6% said “No” it indicates lower resistance.

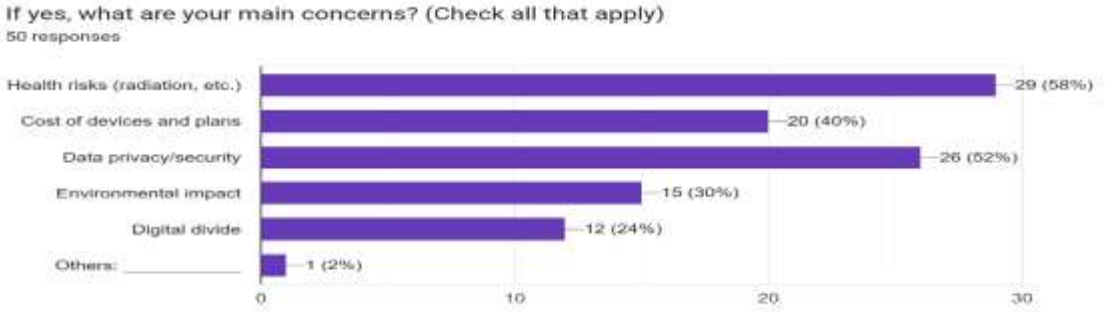
5G networks not only contributing to an ordinary person it also benefiting numbers of industries in the earth. In that top 6 industries are selected by researcher viz., Education, Healthcare, Entertainment, Transportation, Manufacturing, Agriculture and others.

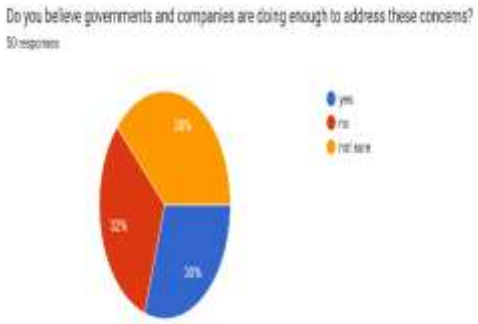
Education is the highly mentioned industry indicating in the digital transformation with 5G. it easier the education by speed and uninterested usage of internet with 74%. Secondly Healthcare and Entertainment are closely followed with 48 and 58 percent, respectively. It is highlighting the expectations in immersive media and telemedicine. Transportation also scarce high with 44% it is associates with smart mobility and autonomous vehicles. Manufacturing and Agriculture are less responded, but it is also most benefiting to these two industries, and they are practicing. It shows the gaps in awareness about their 5G usages and applications.

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Where there are benefits we also found challenges therefore researcher found some concerns viz., health risk from radiation, data privacy/ security, cost of devices and plans, environmental impact, digital divide and others. At top health risk(58%) is responded, it shows the very strong public concern regarding radiation effects. Second concern recorded for data privacy(52) it is almost equaly concerns trust issues with data handling. 5G enabled smart phones are very costly so it is also one of the most recorded concern by 40% respondents. Environmental impact and digital divide are less mentioned that is 30and 24 percent respectively but they also still significant.





For believe regarding any action taken by the government and companies to address the above concerns 38% are responded for “Not sure” it shows high uncertainty about government or corporate actions. 32% sain “No” it says that to address issues like privacy, costs, health and etc government must act. Only 30% said “Yes” it says that public has limited confidence in government efforts.

the question regarding time for availability of 5G in the country expects 46% responded for already available. 24% think it takes 1 to 3 years, 22 % people think it takes 1 year, and small number of people believe it will take more than 3 years. This is good awareness, and it has much access in urban areas, but it concerns about rural region.

In future respondents need the following features or services and the summary of respondents also discussed.

Future expectations of 5G by respondents

Respondents have numbers of positive and negative outlooks. At top Seed and Performance placed with demand for speed internet, low latency, non-disturbed connections and the ability to connect multiple devices. Accessibility also equally important for the users in remote areas. People want 5G services all over India, to support for Education with an affordable rate. Affordability is reputedly asking theme, people asking for reasonable cost plans with regular feedback to assist providers in getting information for improvements. Concern

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regarding Environment also an important matter raised, with expectation to withdraw social and environmental responsibility by the service providers in relation to protect wildlife especially birds. In demand for advanced features, users always look forward to innovations like voice translation, applications of smart city, 6G internet, desire for environment protection and security features. Lastly users concern about security and privacy which has remained critical. Users want their data will be protected and networks are safe. Totally users appreciate positive merits of 5G, they promote continues improvement and hope the advantages will destroy disadvantages.

Open ended feedback of 5G from respondents

Respondents shares their views on 5G expansion, which highlighted both zeal and lethargy. Several respondents warried about environment and health damages they asked for reduce radiation effects which is very dangerous for birds and raising health risk for human. Some respondents suggested service providers to take responsibility to decrease adverse impact on environment and health of human also livings in the world.

Secondly major themes are accessibility and coverage, lots are suggesting for wide availability, in remote and rural areas, they worried about 'network issues in our area' and demanding the service 'should reach all-over India.'

With regards to speed, features and execution, low latency and rapid speed connections are most frequently asked. They also demanded for advanced features like sudden voice translation, application in enterprises and unlimited data with high speed.

Affordability also reputedly demanding concern, users demanding affordable pricings with suitable plans, it means the unused data claim and for better service regular feedback loops.

For companies and service providers it is asked to take social responsibility to protect the environment and ensure ethical technology and security.

Some respondents are optimistic regarding 5G to transform industries and day to day life, some are skeptical as it diminishing concerns about cultural and ethical.

CONCLUSION

In this article researcher studied about the 5G expansion which is rapidly growing transmission connectivity. The article revels the General information, Awareness and Knowledge, Perception and impact, Future expectations of 5G by respondents and Open-ended feedback of 5G from respondents. Respondents are appreciated the expansion of 5G and, they concern about the challenges like harm for environment and radiation effects with demand for better internet and connectivity in remote and rural areas. Almost all are positively responded for 5G expansion, benefit associated with 5G 86% respondents are responded for faster internet speed it is the most recognised benefit. In all the respondents 88% are aware about 5G technology and remaining 12% are not aware about 5G technology. Throgh social media people first heard about 5G technology it is 36% secondly friends and family. Here the most commen rating is 4 it is followed very closed to 5 it shows vey high level of understanding of 5G. 70% of people believe that 5G positively impacts their daily life. 24 % respondents are not sure, so it is suggested to educate people and conduct awareness campaigns. Only 6% said "No" it indicates lower resistance. Availability of 5G in the country expects 46% responded for already available.

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