

The Impact of 5G Security on Human Wellbeing

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Abstract.

Technology is all over us and we are so used to it. Technology can be good and it can also be bad but it depends on the person using it that he uses it in a good way or a bad way. This paper will tell you about a new technology which is going to be launched in few months and it is 5G. 5G can be operated on every device you see not now but in near future as all new devices are equipped with 5G. The devices you regularly use are going to be equipped with 5G and will assist you in many ways but using them negatively will turn the tables around. There are many problems associated with 5G and the very first is cyberbullying. This is a very serious issue and many people are working on it as with the launch of 5G this issue will raise.

The paper will also add information about the security of 5G and its impact in the wellbeing of humans. It is very important to know how the 5G will impact the humans as it provides you with more speed. Will it be more secure than the previous ones or it will increase the security threats? It is very important for us to know the specifications of 5G and what it is equipped with as just by knowing that we will be able to tell what exactly 5G. The paper will also include the threats of 5G and what is going on in the world for 5G and on what level the research is carried out. Later on, the findings of different people are shared in the document and they are compiled to see how much research is carried out and what we can get from that research.

Keywords:

5G Security, Human Wellbeing, Impact

1. Introduction.

Our lives are becoming more involved in technology. Many or I would say most of our contacts and communication is online now, a lot of entertainment is provided to us by internet. A lot of us find that the cell phones are the biggest medium of communication and they are really very important in our daily lives. We are addicted to the technology and we cannot even think of our lives without technology. As there are many benefits provided by the technology like 5G as it will make communication easier and faster. We can talk to our loved ones which are sitting miles away from us and just with a single click. In recent years another great advancement made in the technology in recent years is video calling which is a game changer. And in the times of this global pandemic covid-19 video calling has proven its worth and importance. Almost all

the people around us are contacting each other via video calling as they are asked to maintain social distancing. During the pandemic other applications are also launched into the market and they have grown at a very fast rate like zoom as many of us hadn't heard of zoom in the last year but after the pandemic many of us do. The improved network like 5G will also help it to make efficient communication.

Digital technology is all the devices, electronic tools and all other things which make human lives easier. This also involve machines and gadgets which we use for our works to make them easier. Like we use our smart phones for every purpose but in the pandemic, they have been used for online shopping and people loved it to shop. It hasn't stopped physical shopping either but it has made the lives much easier and the faster internet like 5G can help you to use these technologies more efficiently. If we see at the past in-fact just 10 years ago when the technology was not at its peak, we can see that the access to any information was very difficult and a lot of work was needed to search for one thing along with a lot of time. But in the recent days you can search for anything and it is just a click away from you and just image using more faster internet which will be provided by 5G. The technology has made the availability of information very easy and fast that you don't need to move or wait.

The technology can be good and it can also be bad for the humans so instead of labelling the technology as good and bad at the first place is not good. It is very important to see first that the technology is produced and who is using it and for which purpose it is used. Like if I talk about online communication it is very good for the existing friendships, it will allow the students to contact their teachers and friends to get help in their studies, it will keep you near to your loved ones for miles apart, it will help you in your business to interact with people without traveling 1000 miles. In the recent years as technology has grown so does the cyberbullying and it has affected many people in a negative way. The children are being bullied and no one is giving attention to the subject as the victims are afraid to tell anyone and the culprits are roaming around freely. As there are no complains so there is no stopping to the subject and it is growing on daily bases. And with the releasing of 5G all the attention is given to it and the issue of cyber bullying remains still. Although an act is passed to stop cyber bullying which is republic act 10627 but still it needs a lot of attention.

In [1], it is mentioned about how the swiss citizens have bought this topic to attention that it will have negative aspects with it and we need to focus on that. The people who know about the harms which 5G are also talking of how it will disturb the lives in shorter and longer time period. However, we all know that technology is the need and it must come but must do something to minimize its harms so that we can save our future generations from the long-term harms of technology.

With the use of technology people are stick to their homes and are not involved in the outdoor activities. This can cause harm to your eye sight, mental health and your physical health. We all know that we live in an era where technology is growing at a very fast rate so does the addiction of technology but it depends on the user that how long he is spending on the device. It also depends on the user that he is using the device in a right way and right amount of time or not. This also put a responsibility on the parents to look after their children.

In [2], the threats of 5G are shared like how it will be a threat to cybersecurity. Data is gathered through different environments for machine learning. By implementing the machine language into 5G can lead to serious problems of security for example, denial of service, unethically use of resources and as well as hacking of data. So basically, what it tells us is that the faster connection will also help the hackers to do their job with more perfection and in more speed.

Human wellbeing is all about living regardless of gender, culture, age, or geographical location. But at the same time, it can cause some serious damage to children like cyberbullying is very popular now a days along with internet related abuses. As these things should also be considered as they are very important to discuss and to tell people about them.

In [3], security provided by 5G is mentioned and the benefits of it. Like it will help to increase the physical security by enhancing the biometrics identification to increase the integrity of data. Another benefit it will provide is about monitoring the patients from outside the walls of the hospital as there is no delay in 5G and the current information will be passed to the desired user within no time. It is also said that it will be very beneficial for the patients of chronic diseases.

Now that the technology is improving and the launching of 5G is expected soon people are so happy that they will be able to use faster internet. Yes, it is good we will be able to enjoy a faster internet and we will be able to do work in shorter time period. The 5G is way faster than the 4G as it transmits data at a faster rate. It is also more secure than 3G or 4G and it will secure the user from the threats. We will be able to control the cyber bullying at a faster and efficient way.

2. Literature review

The G in 5G indicates its generation which makes it different from the other previous networks. In [4], it is said that the previous networks are slower than 5G and a lot of advancement is done in the 5th generation network. Like 2G was equipped with 2.4GHz of frequency whereas the latest 5G which

is expected soon is equipped with 5GHz. Even though the range covered by 2.4GHz is more than that of 5G but the data transmission of 5G is way more than that of 2G. Another thing which is mentioned here is about the penetration of these 2 frequencies in case of 5G the frequencies will find it difficult to penetrate through the solid walls but the frequencies of 2G will do it more easily [4]. So, there are advantages of 2G over 5G but still the need of people is speed and they can give up other things for speed.

The 5G network is faster than the previous networks and almost everyone knows that. There are certain advance features of 5g which are discussed in the paper [5]. Many are unknown to the people or they know very little of that. It is said that 5G is equipped with up-to 10GB speed of internet. Another benefit of 5G is that it has less than one millisecond of delay and it provides 1000X bandwidth within unit area. It has a very great capability to connect 10 to 100 devices at a time and it provides you with 99.99% availability and 100% coverage area [5]. It also has an advantage for the devices to be used that it will reduce the energy usage of the devices. In order to achieve these advantages offered by 5G there are certain technologies applied to the 5G like (HetNet) heterogenous networks.

It means that 5G is the need and that is why companies are working to launch it as soon as possible. Especially there is a war going on between America and China about who launches it first because there are multiple reasons which are unknown to other world about 5G and only these countries know and that is why they are in a race to launch it first.

As many reports suggest that 5G carries radio waves which is a part of electromagnetic spectrum however we are already trapped by electromagnetic radiations from every corner for example television, radio, mobile phones and even from natural sources like sun light. Many people made assumptions about the heating of things from 5G's microwaves. Like the microwaves heat everything from which they pass through. But in a report of BBC news [6] it is mentioned that the maximum passing of 5G radio waves from a human does not harm that person and no change in the temperature was measured. Along with it one more thing is mentioned in the report which says that people think that 5G is going to break the DNA of humans and will cause damage to the cells as 5G has more penetrating power [5]. But according to David Robert Grimes who made a research and said that radio waves used by mobile phones or networks does not have sufficient energy to do that and we are safe from this threat.

5G has many benefits but the most important for all the humans is its assistance in health segment. In [7], it is said that it will help to improve the health system all around. The doctors will be able to transfer the large patients' files in seconds. Another major advantage is remote surgery where the doctors cannot go physically, they can use 5G to do remote surgery. More benefits in health segment includes patients monitoring through IOT devices which will the work of doctors easier and faster. The people will be connected to each other from a long distance and with more efficiency. Like the doctors will be able to monitor their patients in less time and do tasks like MRI and PET scans within no time.

5G is a trending topic now a days and it is discussed in [8], that if you ask anyone about 5G they will know that it has something to do with mobile phones. If someone knows a little about 5G even then they will know that it is faster than previous networks. People are looking forward to experience the speed of 5G and improve their desired works. As it is a new radio technology so the lag time is very low and the availability is very good. The people want availability of internet and it shall be given to them by 5G. It is predicted that the applications of 5G will revolutionize all types of industries. There are different types of 5G which will be available to the users in near future through different carriers. Each has its own uses and advantages through which one can decide which is best for them. The researchers say that even a slice of 5G has great capacity to perform massive tasks. The 5G is expected to be available even at remote areas with high speed without the need of Wi-fi. It will also be a competition between the ISPs as the internet will be fast and will be readily available.

So, one can say that 5G is going to be a game changer and that is why countries like America and China were and are fighting to launch it before the other. They both know that it will give them great advantage to overcome many problems and can assist them in many ways like spying will be very easy with the help of 5G.

3. Research Methodology

Saunders research onion mainly refers to the stages of the research from which a researcher must pass in order to develop an efficient methodology. There is concept of research tree from which you can have a clear idea of how to carry out the research in steps and how to take every aspect of research along and the extension of this tree is known as the research onion as it defines the parameters of research to make your work easier.

From the research onion I have chosen the survey technique as it was more efficient and easier to do. There were other techniques but this was effective and possible. The experiment was not possible as there is no proper equipment of 5G available in Pakistan and it isn't launched yet. Another method present was ethnography which was effective but unfortunately due to the lockdown and COVID-19 situations this also was not possible. So, I chose survey as it was possible and it was effective to do research and sufficient data was gathered after a lot of hard work.

The response of the survey can lead you to many new directions and the same thing happened to me after the survey. I got to know the interest of people about 5G and it was a surprise to me that many people are just interested in using the new invention and they know nothing about it.

The research method I have chosen is quantitative research. This research method was used for a couple of reasons among them one was the lockdown in which it was impossible to go out and gather data and other was that this research method is more effective and it gives you more accurate data. Survey was conducted and authentic data was gathered which was later used to generate the results which were quite accurate.

4. Contributions in research/ findings.

Survey was conducted to provide the general public to get their opinion on the subject of 5G. In the process this survey gave many people the idea of what the 5G is and what people think of it. By giving the people the knowledge and getting knowledge in return. This survey gave a precise idea of what people think of 5G. The questionnaire also gave people the incentive of how much of their response matters.

While conducting the survey it took a lot of time and required a lot of effort. It was provided to about 500 people from which only about 200 or more people responded which came as a surprise because the set target was 100 this questionnaire was delivered through the means electronic communication mediums such as 'WhatsApp' and was made using the 'google survey' tool provided by google. It was quite a hard task to get the response of the people because in between some results that were received in the survey were not making sense due to some people showing lack of maturity and responsibility in filling it out but due to high number of people answering the questionnaire the trend of it was predictable.

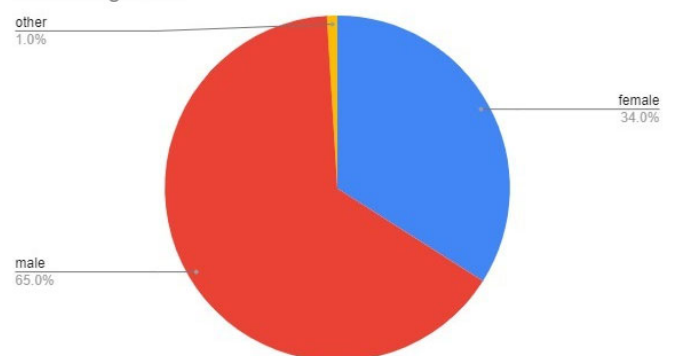
The survey that was conducted was rather lightweight and yet quite accurate. The questions were structured questions. There are some important aspects to the questions that were delivered. There are 3 crucial aspects that are being covered in the survey, one of them being that, are people aware of what 5G is. The second and third aspect being its pros and cons in terms of health & safety, human wellbeing and issues related to cyber security.

5. Survey Result.

The analysis of the response is listed below:

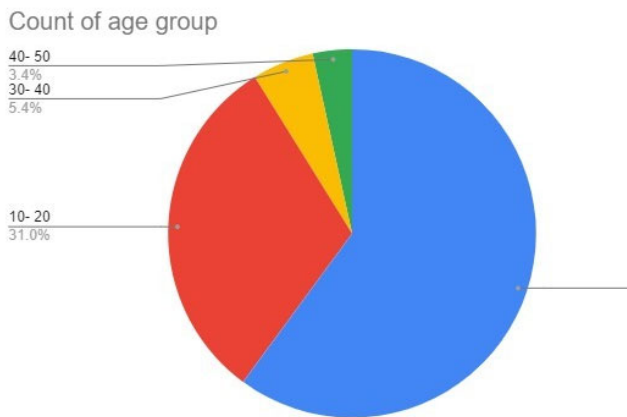
Gender.

Count of gender:



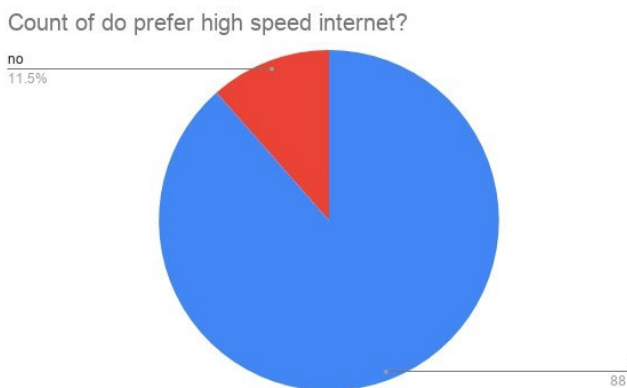
The first question asked was about gender it was kept in mind get perspective of gender specific response to get a better idea of the general public whether male female or others. According to the chart above it states that there are about 65% male and 34% female and 1% others which took part in the questionnaire.

Age group.



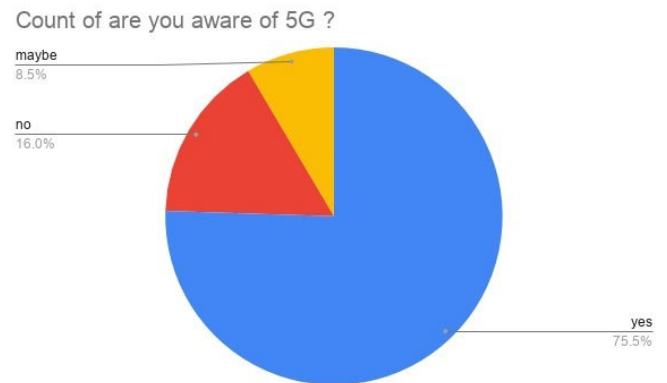
According to the survey majority of the people who took part in the survey were people of age from 20-30 and then 10-20. This can be justified due to the youth being more engaged in keeping a know-how of the new trends of technology and innovation. The chart above states that there are 31% from age 10-20, 60.1% from age 20-30, 5.4% from 30-40 and 3.4% who were 40-50. The older generation giving less response due to their lack of interest on the matter.

Preference of high-speed internet.



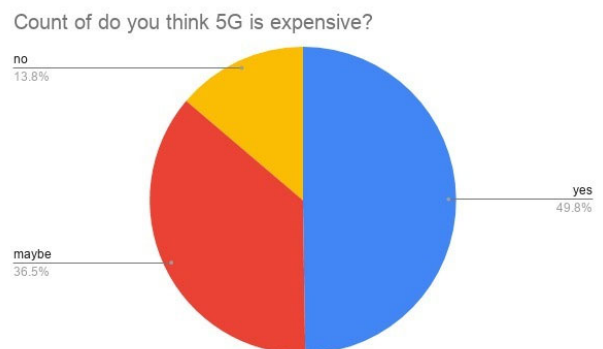
The third question asked was if the general public preferred high-speed internet, as we know that internet has become a part of our daily life and many people prefer high speed internet weather it is in their profession such as requiring a tool which requires that high speed internet or a person at home who is in to gamming and things they like to do on internet as a hobby. To which the majority of the people responded as 88.5% people requiring high speed internet and the rest 11.5% responding the opposite.

Awareness of topic.



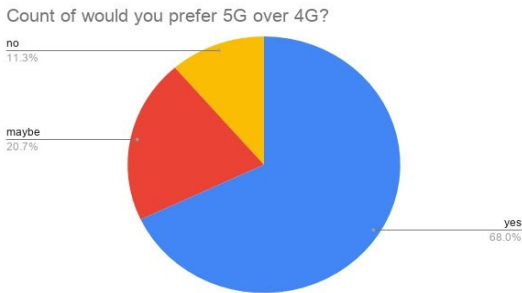
The chart above states how many people are aware of what 5G is. Due to that quick pace of technological growth many people are still falling behind in keeping up with the new trends but its only about time the 5th Generation of the internet speed is going to be used in every household and offices all over the globe. It is shown in the chart that 75.5% people are aware of what 5G is 16% don't know what 5G is and 8.5% know somewhat of what 5G is.

Awareness of cost.



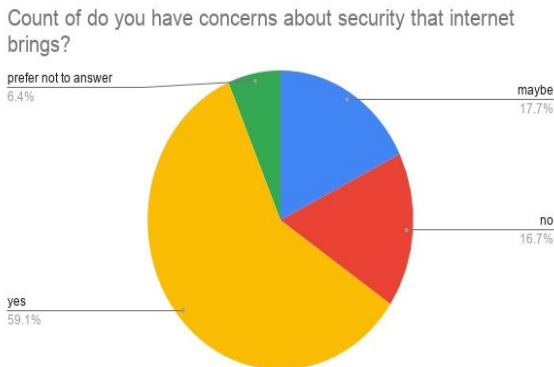
Like any other product or thing that is introduced int the market which is highly anticipated has high rates in can be due to the high cost of production or just the value that thing provides. In the chart above people were asked if they think 5G is expensive 49.8% responded to yes where as 13.8% said no and the rest 36.5% said maybe.

Preference over previous network.



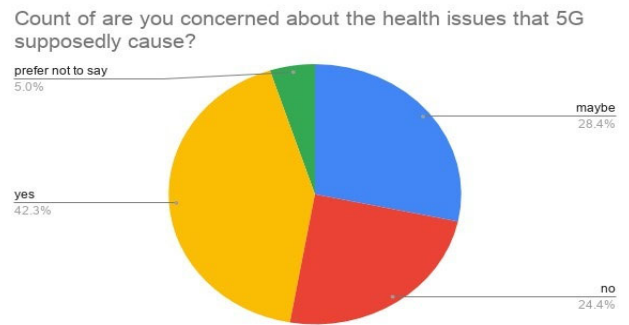
Anything that has an influence in life or is new to people or human beings as a species tend to resist to that change but later on it becomes the norm. This question was directed more towards the people who prefer using high-speed internet. The question states that will people consider using 5G over 4G which is the current generation of high-speed that the internet had achieved. To which the 68% respondents said yes, 11.3% said no and 20.7% said maybe.

Concerns regarding security.



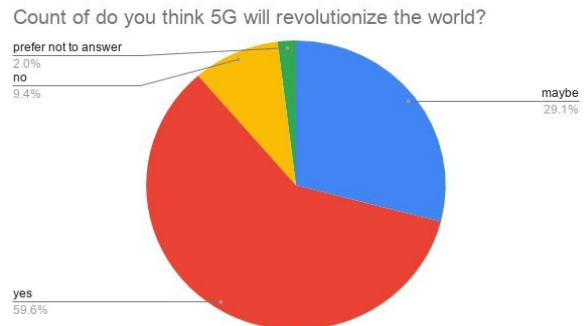
Many people are aware of what security issues that internet can bring. These security issues can be in the form of espionage or theft of profile where the sensitive information can be compromised. The question above was asked to know how many people are concerned about the security that internet brings to this 59.1% said yes, 16.7% said no, 17.7% said maybe and the rest 6.4% preferred not to answer.

Concerns about the health issues.



There are plenty of theories floating around the internet forums and the news that there are major risks to the health that can be caused by 5G. The question above asks the people if they are concerned about the health issues that 5G may cause and to this 42.3% people said yes, 24.4% said no, 28.4% said maybe and the rest preferred not to mention.

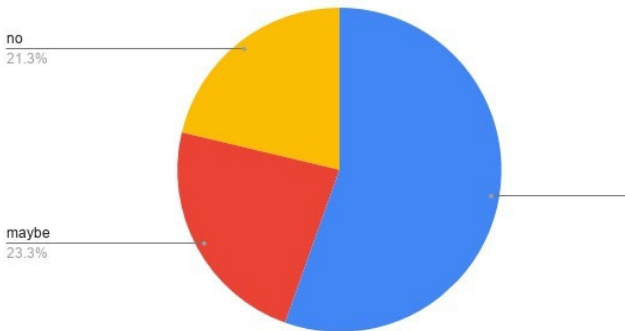
Future of topic.



There are many technological advancements that have changed the course of history and revolutionized the world similarly this 5G internet could do the same. According to the question above when people were asked if they think that 5G will revolutionize the world 59.6% people agreed, 9.4% said no, 29.1% said maybe and the rest 2% preferred not to mention.

Concerns about cyber security.

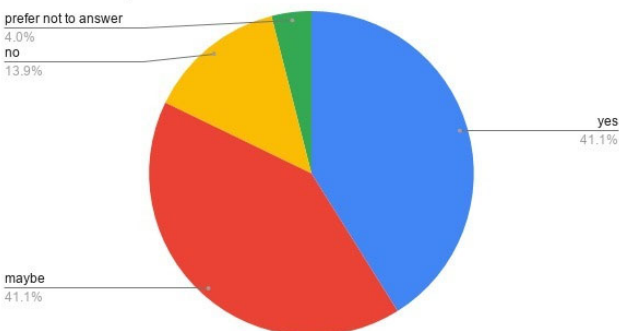
Count of are you concerned about the risks of 5G cyber security?



There are plenty of problems that befall due to the internet and its uses. There are many cyber security issues that the internet faces but the police governing the internet tries its best to fix them. 5G can help avoid undesirable risks and such and put them to an end. In the question above the people were asked if they are concerned about the risks of cyber security. To which 55.4% said yes, 21.3% said no and the rest 23.3% concluded with maybe.

Security of 5G.

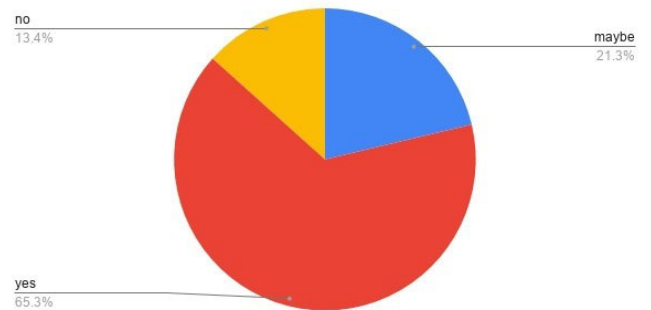
Count of do you think that 5G will be more secure ?



As we all know that the thing about the new things is that “newer is better” but similarly it’s the said about the old things that “old is gold”. Will the 5G be more secure? It is something that the time will tell, but for now and in accordance to the survey 41.1% people agreed,13.9% didn’t, 41.1% said maybe and 4% preferred not to answer.

Uses of 5G.

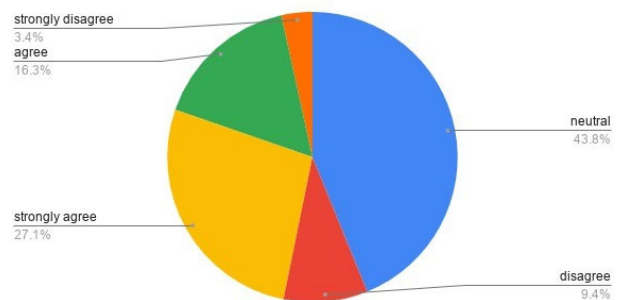
Count of do you think that 5G will make human work much easier?



Many jobs are already being executed through the internet and making life just more-easier. But yet there are some setbacks of the current capability of 4G internet. So, when asked in the survey about will 5G make the human work easier 65.3% said yes, 13.4% said no and 21.3 said maybe.

Forecasting threats.

Count of do you think that 5G can foresee the disasters and threats?



There are plenty of studies being conducted on the matter of how 5G can benefit in seeing any unpredictable threats before it may cause catastrophe. Due to the fast speed of information delivery 5G will become a soothsayer and may even help avoid disasters and threats. When it was asked in the survey that “Can 5G foresee the disasters and threats?”. The results were quite mixed 27.1% strongly agreed, 16.3% just agreed, 3.4% strongly disagreed, 9.4% just agreed and the rest 43.8% had no opinion on the matter.

6. Evaluation of the research conducted

According to the survey and questionnaire that I had conducted which came to me as a surprise that there were many new discoveries made from the results as well as some expected results. On the matter 5G the research questions are a few in

number but the answer from them gave a much more meaning and structure to the research project. Ill begin with the first question, it really had to be asked about the gender, because there is a majority of men who are more into the trends of technology and innovation stated in various researches and findings not because of the male gender is superior it is just the statistics and in accordance to my research survey the same was found. The age group of younger people gave more response than the older ones due to them being more into the technology.

Who doesn't want high speed internet? "Am I right." According to the survey there are more people who would like high speed internet. Every one being connect to the internet It was about time that people got to know about what 5G is and the survey says the same a lot of people know what 5G is. What I think about the 5G if it is going to be expensive or not it is really about the time and truly the time will tell if it will be expensive or cheap. The survey gave a 50/50 answer to this. If the 5G comes and it I better than 4G the way it is said to be then obviously without a doubt it is what ill choose and majority of the people too according to the survey. I am really concerned about the cyber security issues that internet brings and so do the majority of the people who took part in the survey.

Many people over the internet are saying that there can be a lot of harmful rays that can be emitted through the antenna of 5G towers and ironically it was the same said when 4G first came. I think 5G will raise the bar even higher than its predecessor and many visionary people like me think the same and it is quite properly justified in the survey. 5G to me will be more secure and half of people in the survey think the same but the other half says maybe. In my opinion it is because they don't have enough knowledge on the matter of 5G and what things it will do better than 4G. 5G will make the life of the people easier with due to high-speed communication etc basically the possibilities are endless.

The idea of seeing the future to me is quite compelling but seems impossible the theorists say that there is a possibility of seeing the future in real time by harnessing the power of 5G which can send and receive data at a phenomenal rate which can help get the message of any disaster or threats before it can arrive. The answers in the survey are mediator and people also think it's a 50% chance that 5G can attain that.

Another information which was generated from the survey is that people do prefer 5G over the previous networks. Well, it is obvious who does not want change and when it offers you a lot more than the previous one is but the problem is lacking of 5G devices. All the smart phones till now are not capable of running the 5G but the new phones coming into the market are but it will take time to spread the 5G utilized devices all over the globe. One cannot give authentic response without using the 5G and same happened with the survey that people make assumptions about some questions asked in the survey as they have never used the 5G.

7. Future research directions.

The findings of this paper made me think about what the future researchers must be directed to as I have done my part in the research by getting information from the previous researchers. The future direction will be about the exact impacts of 5G that how are people affected by it. If it is in positive way than it is good but if they are affected negatively then why and how this problem can be solved and measures should people take to avoid the problems. Moreover, is the 5G available all over the globe or not as it was told that the availability of 5G is 100% and if it is not available then why it was said that it has 100% availability. It is very important to search for these things as they say that 5G is the future and we don't want to ruin our future. The launch of 5G can bring a major change in the world and it must be a good change not a bad change and it is us who are going to change the future in a positive way and make this planet a better living place for our future generations.

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