Comparative Study on the Impact of Mobile Communication System on Social Life

Md. Atiqur Rahman

Dept. of Mass Communication & Journalism, University of Rajshahi, Rajshahi, Bangladesh

Md. Ashraful Islam

Dept. of Information and Communication Engineering, University of Rajshahi, Rajshahi, Bangladesh

Abstract

Mobile technology has a tremendous capacity to connect people. It also brought a revolutionary change in day-to-day activities and in various sectors such as entertainment, health, agriculture, employment, revenue earning and social change. It has also some negative impacts like cellphone addiction, wasting time, distraction and radiation-related health issues. This paper focuses on the impacts of mobile technology in Bangladesh perspective. Both secondary and primary data have been used to conduct this survey. The result shows that mobile phone technology and their providers make a significant contribution to GDP and directly and indirectly generated 0.80 million jobs in Bangladesh. The most important finding is young people prefer internet or social sites to television, and the duration of spending leisure in mobile phone is increased significantly whether spending time with family, reading newspaper-books decreased remarkably. Result also shows that the internet has more negative impacts on younger people than on older ones. The effect of radiation from mobile device and mobile tower, and ways to reduce its risk have been discussed in this paper.

Keywords: mobile communication system, radiation, social networks, effects, addictions.

Introduction

Technology is undergoing revolution though human beings are also changing. The recent years have seen a groundbreaking advancement of mobile technology. Hardware, software and network communications are involved in the development of mobile technology. Mobile technology leaders such as mobile device manufacturers and mobile services/apps developers are therefore competing to attract the increasing number of mobile users with their advance feature.

The first mobile phone company to begin its trip to Bangladesh is Grameen Phone, founded in 1997. Later four more GSM operators (Banglalink, Robi, Airtel and Teletalk) started their operation in Bangladesh. In the recent year, the increasing number of mobile phone operator with advance features make remarkable changes in Bangladesh as compared to previous years. Recently, 165.572 million people use cell phone in Bangladesh [btrc, 2019]. And total number of internet user in Bangladesh according to BTRC (Bangladesh Telecommunication Regulatory Commission) till December, 2019 was 99.428 million where 93.681 million use internets over phone, 0.005 million use internets through WiMAX [Islam et al, 2009, 2012, 2016, 2016, Awon et at, 2012, Halim et al, 2012, Tai et at , 2016], 5.742 million use internets through ISP+PSTN [btrc, 2019]. According to Bangladesh Demographics Profile 2019, 59.21% of total population are between 15 to 54 years of age. This is a large portion of people who are the possible heavy internet user. While cell phone technology has grown greatly in all sectors in Bangladesh, we cannot overlook the negative impacts of cell phones [Bangladesh demographics profile].

Most studies on internet user have shown that participation on social media activities improves one`s social development, others have shown to the contrary. It is also found that social media like whatsapp distracted students from completing their

studies, damaged their language skills such as spelling and grammar and disturber their concentration when in class. In [Yeboah et at, 2014] the authors indicated that students' academic performance was adversely affected for social media. Students faced challenges arising from their frequent use of social media, which included the need to messages immediately, the exposure to false or unregulated information or social contents, mobile connectivity and addictive-like behaviors which disturbed their studies [Ahad & Lim]. Internet use among college students undermined self-regulation and was associated with depression. Another study on the effect of mobile technology on human relationships shows that face-to- face communication with their family members and friends had reduced because of the attraction of mobile technology. People are neglecting to engage personally, uninhibited by phones and devices and even when actually in the presence of others. They are becoming more reliant on communicating with friend and family through technology [Elsobeihi & Naser, 2017]. There's also a distinction, psychologists say, between strong ties and weak ties. Strong ties are associated with frequent contacts, and are closely focused. Online ties tend to be fragile [Constant et al, 1996].

A comparative study on social media addiction between public and private high school students in India shows that private school students have more addiction on mobile phone for using social media. A multitude of physical, psychological and behavioral problems were observed among social media users [Ramesh et al, 2017]. In this paper we surveyed various impacts of cell phone as well as the solution to overcome from this situation have been discussed.

This research paper is focused on secondary data collected from online sources, various research papers, and survey studies conducted by renowned daily newspaper institution along with primary data. We used some data collection tools like On Site Observations, Interviews, and Questionnaires to gather information about the general use of the internet. We interviewed 800 individuals with the help of questionnaire. These individuals are from Rajshahi, Dhaka, Rangpur and Kishoreganj districts in Bangladesh. The 800 sample are random collected that includes male-female, university teachers, officers, students, businessmen, worker of various professions, housewives and others. We categorized internet user according to their daily using duration. People who use internet for less than one hour were regarded as low users; those who used the internet for 1 to 2 hours were classified as moderate users, and who were on the internet for more than two hours a day were considered as high users [Panahi & Soheila, 2015]. These sampling was carefully chosen within 15 to 54 years of aged persons.text text (Note 1)

2. Evolution of Mobile Communication System

The evolution of wireless mobile communication system is defined by changing the fundamental nature of provided service, non-backward compatible transmission technology, and new frequency bands. The evolution of the mobile communication system has been categorized into 'generations' as:

2.1 First-generation (1G)

This generation was launched by Nippon Telephone and Telegraph Company (NTT) in Tokyo and become in operation in the world during 1979 [rfpage.com] since the mobile radio telephone appeared around 1950s [Del peral-rosado et al, 2018]. The system of this generation used an analog communication system for speech service with operation frequency of 800 MHz and 900 MHz, and bandwidth of 10 MHz [rfpage.com].

2.2 Second-generation (2G)

2G was introduced at the end of the 1980s with digital multiple access technologies, such as TDMA (time division multiple access) and CDMA (code division multiple access). This generation offered enhanced security, SMS services, higher spectrum efficiency, first internet at a lower data rate with better data services, and more advanced roaming [Mousa, 2012]. 2G communication is generally associated with a global system for mobile (GSM) services [Shukla & Panday, 2012].

2.3 Third-generation (3G)

In 1991, the standards for 3G were defined by the International Telecommunication Union (ITU) to finalize the specification of the International Mobile Telecommunications 2000 (IMT-2000) framework [IMT, 1999]. UMTS, at data rate of 384kbps and cdma2000, at a chip rate of 1.2288 Mcps were the two leading technologies in 3G mobile communication systems [Holma & Toskala, 2000]. The key features include higher data rate, video calling, TV streaming, multimedia message support, enhanced security, number of users and coverage.

2.4 Fourth-generation (4G)

The first successful field trial for 4G was conducted by NTT Do Co Mo in Tokyo, Japan, on June 23rd, 2005, and achieved 1Gbps real-time packet transmission in the downlink at a moving speed of about 20km/h that was developed by IEEE. This generation offers a higher data rate and capable of handling more advanced multimedia services. The wireless technologies used in 4G mobile communication systems are LTE [Islam et al, 2014] and LTE advanced. 4G infrastructure introduced terminal mobility to provide wireless services at anytime and anywhere [umtsworld.com].

2.5 Fifth-generation (5G)

With Fifth-generation (5G) mobile communication systems, people can access and share information in a wide range of scenarios with extremely low latency and very high data rate [Boccardi et al, 2014]. It should achieve 1000 times the system capacity, 100 times the data rate, 3–5 times the spectral efficiency, and 10–100 times the energy efficiency concerning the current fourth-generation (4G) systems [wang, 2014; Popovski, 2013]. Millimeter-wave (mmWave) communication will be one of the most promising technologies in 5G systems [Roh et al, 2014] that can provide several gigabits per second data rate with enormous bandwidth.

3. Impacts of Mobile Communication Systems in Our Community and Our Lives

3.1 Positive impact

Recently, mobile phone becomes an important part of our daily lives, it is impossible to carry out our everyday chores without our phones. From communication to entertainment, everything can do with this gadget. If we were to enlist the positive effects of mobile phones, they would be as follows:

3.1.1 Communication

The fundamental root of human colonization is communication. Nowadays, mobile phones have the ability to connect people from all over the world, wherever they may be. Not only that, they're easy to carry and access, contact was never been easier. Social media apps also play an immense role in connectivity allowing us to communicate clearly with our loved ones every day.

3.1.2 Entertainment

From the latest blockbusters in Hollywood to our country's news highlights, our mobile holds all of these. We don't have to wait for our favorite TV show or news highlights anymore, with one click on the mobile screen, and get access to anything we want to see, so saving time.

3.1.3 Daily Utilities

We have more information in our hands than we did in history. Our gadgets can even anticipate what information we need and when it is most useful present it to us. Mobile phones now have apps that help us perform the same day-to-day activities without having facing difficulty. From paying bills, shopping online, booking cabs and hotels, electronic navigation charts, creating and editing documents, capturing memorable moments through built-in cameras. In Japan, mobile phone companies provide their customers with free and immediate notification of earthquakes and other natural disasters. In an

emergency situation, disaster response teams may find people trapped or wounded using the signals from their or the small flare detonator in each mobile phone's battery.

3.1.4 Social Change/Movement

The widespread adoption of the mobile phone as a contact and entertainment device has revolutionized society, redefining patterns of social contact and relationships among individuals [Nurullah, 2009]. Mobile technology has given a voice at cataclysmic events to those otherwise cut off from the world. When a local disaster happens, the voice will reach out for help and these people are not alone for the first time. Using text, voice, photos and most importantly videos, they can express their plight and bring about real change. Where the increased availability and use of telecommunications technology has increased social involvement, especially for people with disabilities, such as supporting visually impaired individuals via video conferencing facilities.

3.1.5 Health

The introduction of mobile communication system has lowered the health care costs, improved access to health services, enabled continuing education for medical practitioners and ultimately, led to health outcomes. The government and mobile service provider in Bangladesh provide treatment facility to the citizen through the mobile phone.

3.1.6 Agriculture

The increased use of mobile communication system has improved efficiency, competitiveness, food security and job opportunities by allowing information to be shared on market prices, farming processes and weather conditions, access to e-commerce facilities and the use of satellite systems to track land use, crop yields, pests and weeds, soil moisture and nutrient levels [telenor.com].

3.1.7 Revenue

Bangladesh is the third largest video gaming market in South Asia and the 61st in a 100-country ranking worldwide to rapid growth of Internet users and the penetration of smartphones. According to Newzoo, a leading provider of global gaming, e-sports and mobile market intelligence, the country's video gaming market is worth around $62.22 million or roughly BDT 500 crore per year. As shown in Figure 1 that blue color for internet user and the orange for market size for games. In Bangladesh, where the number of Internet user is 26.46 million; India, Pakistan and Sri Lanka have 383.17, 38.96 and 6.89 million users respectively. On the other hand, the market for Games is 62.22 million in Bangladesh, whereas the market size of India, Pakistan and Sri Lanka is also 521.11 million, 109.05 and 34.52 million respectively. The size of global online gaming industry is almost $160 billion. Bangladesh government wants to reach the goal of $5 billion ICT export by 2021 [thedailystar.net].
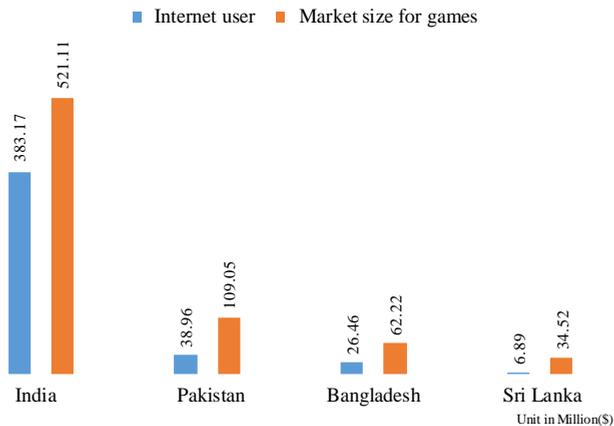
Figure 1. Top South Asian Countries (In terms of market size for games)

3.2 Negative impact

No matter how useful the mobile phone may be, we cannot ignore the negative underlying effects they carry with them. Some of them do the following:

3.2.1 Addiction

Most of the time addiction to technology is under-acknowledged. The condition gets worse when we start feeling a vibration of our cell phones even if it is not vibrating. Nomophobia is a proposed name for the phobia of being out of cell phone contact. 50% of teens admit to being addicted to their phones [electronicslover.com, 2018]. Giving children a simple mobile phone is a way to keep them occupied. A lot of parents use this tactic to stop continuously nagging them. The government of Bangladesh has passed law in 2015, the buyer's age must be at least eighteen when purchasing a mobile SIM card.

3.2.2 Time Consuming Technology

The average person checks his phone once every 12 minutes, leading to 80 times a day. Most of the time people just check their phones for no good reason. According to a study conducted by the digital analytical firm Flurry, the average American adult spends about 150 hours a month over 5 hours a day on mobile phones, totaling almost one day of each week. Where as in Bangladesh, adults spend about 240 hours a month over 8 hours a day on mobile phones that is not a good sign for Bangladesh.

3.2.3 Health Issues

Mobile phones, as discussed earlier, can lead to depression, particularly among teens. In fact, reducing the experiences in daily life leads to depression and anxiety. There are some serious health issues caused by radiation from the handset or from mobile tower that is placed at the roof of our building. Several researchers linked to reduced sperm count, motility, and concentration because of this radiation. It can diminish brain cells and also alter human brain activity (neurotoxic effects). Facebook also admitted the passive use of its social network can leave people in negative moods [cnbc.com, 2018]. Mobile phones have an effect not only on human health but also on plants and animals. Because of EMR plants leaves are hurt. The United States' American National Toxicity Program (NTP) has conducted research on the effect of radio frequency radiation (RFR) on rats for ten years and said that radio frequency radiation (RFR) can lead to animal diseases, such as cancer [daily-sun.com, 2019].

3.2.4 Distraction

The French Government passed a law banning cell phones in schools in July 2018. The law passed 62 votes to one according to CNN. The policy came into effect during the start of the 2018-2019 school year and has an impact on kindergarten students through 9th grade. Several schools across the U.S. are adopting similar policies to reduce disruptions for students. One study published in the Journal of Communication Education found that students with no mobile phones were performing better in various areas. They wrote down 62 percent more information in their notes, could remember more detailed information from the class and scored a complete letter grade and a half higher on a multiple choice test than those who regularly used their mobile phones [Kuznekoff & Titsworth, 2013]. Another research published by the University of Chicago found that even if cell phones are turned off, turned face down or put away, their mere presence reduces people`s cognitive capacity [Adrian et al, 2017]. Using mobile phones while driving is illegal, most people cannot resist the urge to respond, mostly teenagers find it harder not to respond to every text message while driving. This was largely attributable to teen-vehicle crashes [addictiontips.com].

3.3 Effect of Radio Wave on Human Body

The impact of harmful radiation emitted from mobile tower and mobile device is still being studied. All the animals were exposed to the same amount of radiation that humans receive using the cellphone during the day [nyu.edu]. In Bangladesh, five operators reflect their radiation. Moreover, this radiation harms the human body, especially on the human head. Even most mobile users in Bangladesh are not fully aware of the adverse effects of this excessive amount of microwave radiation. It can cause damage to human cells and more even it increases the possibility of brain cancer [Reza et al, 2015] because human usually places the cell phone near their head during the conversation. The increase in the use of mobile communication systems and wireless devices has created awareness of the possible effects of electromagnetic fields in different environments, including hospitals, in which this topic is of importance because of the possible effects of these fields on patient's lives. Some of this equipment is used to monitor critical physiological parameters or even to give life support to the patients, and therefore, the proper function of this equipment at all times and without interferences from external devices is essential [Migue el at, 2012]. This interference problem can be overcome by the essential design of a standard electromagnetic environment both inside and outside the hospital.

4. Impact of Mobile Technology in Bangladesh

According to GSMA Intelligence, in 2015 mobile technologies and services created 6.2% of the country's GDP, a contribution worth about 13 billion US dollars of economic value in Bangladesh. In the same year, more than 760,000 natives throughout Bangladesh were appointed by the mobile operators and the industry, and in 2015, it made a significant contribution of over $2 billion to public funding. One third of the employments is produced directly in the environment, and the remainder are generated through the knock-on impact on the industries that provide inputs for mobile goods and services. It involves the direct impact of the mobile environment as well as increased productivity that mobile technology has brought about [gsms.com]. Bangladesh is performing near regional averages across metrics of mobile market growth despite lower revenue than India and southern Asia. Notably, in broadband density, Bangladesh is above the regional level, while in mobile internet and the proportions of 3G and 4G networks are just slightly below as shown in Figure 2. Number of mobile subscriber in Bangladesh is 53%, whether India, Southern Asia and the average world subscriber are respectively 48%, 50% and 65% (blue color in Figure 2). 3G and 4G subscriber in Bangladesh are respectively 33% and 20%; whether in India is 35% and 18%, Southern Asia 34% and 21%, world proportion is 48% and 32% as shown in orange (3G) and grey color (4G).
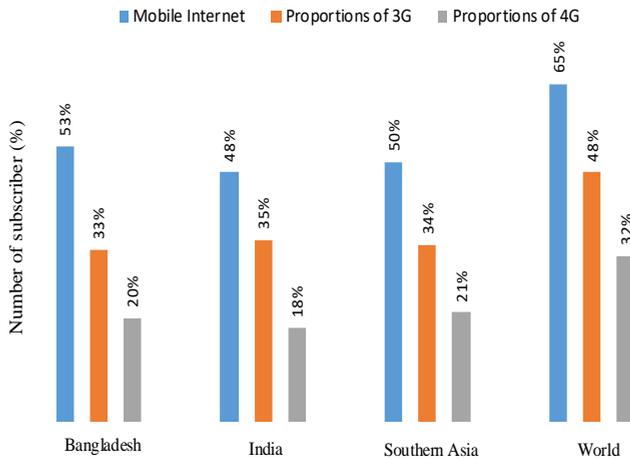
Figure 2. Mobile internet in Bangladesh: Key metrics

A recent study [gsma.com, 2017] on rural Bangladesh found that 80% of households had at least one mobile phone and 31% of respondents used mobile phones for health-care purposes [Ahmed el at, 2014]. Mobile phone ownership among males was also reported to be comparatively higher compared with females. Another study in [McIntyre & Myer, 2011] found that, globally, women are 21% less likely to own a mobile phone than men, and this gap is higher in South East Asia. A recent review of the growth of mHealth services in Bangladesh reported 19 initiatives involving mHealth services call centers which send messages from health authorities to subscribers. Nevertheless, all of these measures focused primarily on the urban population [Ahmed el at, 2014].

Figure 3. Most Used Social Media

Opinion speech, personal relationship, news, entertainment, shopping, paying, booking nearly all of our everyday necessity, the youth rely on the internet or social sites. ORG-Quest (a professional research firm) conducted a survey in 2019 to learn

about the spending leisure for young people. That same survey was conducted in 2019 by the same organization. We compare our almost similar survey conducted in January-February 2020 with the previous survey of ORG-Quest and found that the most popular social network in Bangladesh is facebook. Nine out of every ten people use this popular, unchallenged site in Bangladesh. They spend each day on an average of 46 minutes. This popularity is more in villages, especially in young women, than in cities. Figure 3 shows the trend of people using social sites in Bangladesh. Blue color shows 2017 and orange refers for 2020. Youtube is now the second-most-popular app in Bangladesh. Within three years, the use of this video sharing app increased by 20.20%. In terms of popularity, Messaging App Imo is in third place. Its popularity is less in the city than in the countryside. Imo has lost almost 12.60 percent of its popularity in the last three years. Although ranked fourth in terms of popularity, WhatsApp users are currently a little over 16 percent. However, the number of these messaging app users in the city area is relatively high. This app is preferred by many because of its secure way or use of end-to-end encryption. A very small number of young people took to Instagram, Twitter and Google Plus.

In this survey, the very significant result is that low internet users have stronger relationships with their family and friends as well as they are more outgoing person compared with heavy internet users. As a result, they have less social skills to solve the social problems. Young people have lots of online friends and don't know each other enough. when individuals express their feelings vocally through face to face with integration and take accountability for their interactions and the effects of their dealings, but it is not happening through mobile communication technologies. That's why online relationships are shallow and inconsistent. This is a key reason for the loneliness of the young internet user that is getting into the research finding.

Survey also shows that the young people now prefer the internet or social site for entertainment as compared to television. It is observed from the Fig. 4 that in 2017, 80.6% of young people watched television to spend leisure and now this number is 76.50% after three years. On the other side young people spend an average of 47 minutes on a daily basis now, whereas this duration was 80 minutes in 2017. This tendency is comparatively high among urban and highly educated people. Drama, entertainment, movies and songs are their favorite television program. News is now the most influential of youngest generation. Although the news channels' influence has declined and listening music has increased. In 2017, 43 percent of respondents reported their second choice of leisure spending by chatting with their kin. Now that number has fallen to 38.40%. This means that people have a decreased tendency to spend time with their families. Respondents spent time for reading newspaper 34 minutes on an average everyday in 2017, this duration decreased to 29 minutes.
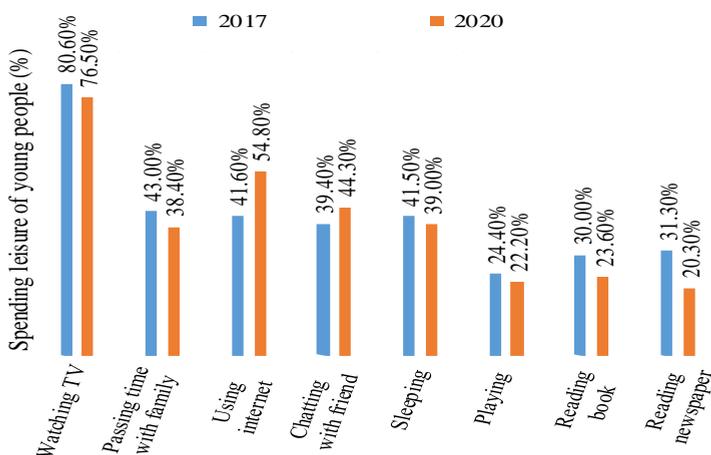

Fig. 4. Spending leisure of the people of Bangladesh

The reason behind internet's popularity among urban young people, internet is the best medium for instantly knowing any information and news; communicating with family and friends living abroad is the easiest, most available, and cheapest means. The Internet has provided the opportunity to listen music and watch TV in cell phone device. Three years ago 41.6 percent of young people spent their leisure time on the internet or on the social site. Now it is 54.20 percent. Now they are spending more than 100 minutes of free time on the internet on average. Most research shows that the internet has more negative impacts on younger people than on older ones. Leisure consumption by reading newspapers and books has decreased. People use the online news site to know information and this number of internet users has risen remarkably from just 9 percent to 28.6 percent in three years.

Most young people agreed that they spend too much time on internet surfing and on social sites, which has negative effects. They blamed western culture, depression, increasing cyber-crime, fraud, rape, drug addiction and the tendency to propagate fake news for this condition. These social communication sites also act as a barrier to the construction of their careers.
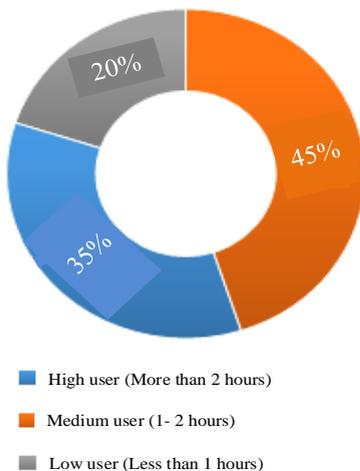
Figure 5. Ratio of internet users to different levels

Forty-five percent of internet users in Bangladesh are high-end users as shown in Figure 5. They browse the internet for more than two hours every day. And twenty percent of the net users are moderate user and fifteen percepts are low user who use internet for less than one hour a day. Blue color showing percentage of moderate user and grey for low internet user.

The Shahbag movement in Bangladesh in 2013 used internet-provided platforms to coordinate and share out its messages. In recent times, the road-safety movement has relied heavily on social media to organize and disseminate information not only because of the ease of rapid dissemination of information, but also because of a lack of trust in traditional news outlets. Yet the increased use by state apparatus of digital technologies for controlling cyberspace has not gone unnoticed. Under China's leadership over the past decade, several countries around the world, including Bangladesh, have used Internet surveillance techniques, especially in attempts to restrain anti-government protests and to enforce legal restrictions on cyberspace regulation. These digital authoritarianisms are made through the creation of laws, policies, and regulations

such as the Bangladesh Digital Security Act. Criticism is also being delegitimized by government adopting more covert policies.

5. Way to Overcome from The Effects of Mobile Phone Technology

To those worried about the potential risks from the radiation of mobile phone devices, safety instructions are advised here:

- People can wear an air tube headset, because the typical wired headset was clearly found to concentrate radiation more deeply into the ear canal.
- Do not carry your mobile phones in your pockets or bras. Use a belt holster designed to protect the body from radiation. Turn the phone off when you don't need it.
- Consider using a mobile phone at a certain distance from a cell tower in a moving car, bus, train or in rural areas. Distance from a cell tower can increase radiation emission from the cell phone.
- Do not allow children to sleep with a cellphone beneath their pillow or keep it as the bedside. Discourage children using mobile phone under 18, except in emergencies.

The following recommendations for mobile device and mobile tower manufacturer companies and government of Bangladesh should be taken seriously to try to minimize the health risks:

- When designing mobile phones and ear phones, the filter must be set such that the radiation is at its lowest level.
- Mobile phone towers should be installed away from hospitals and localities.
- Government of Bangladesh has no policy on reducing radiation of BTS towers, therefore, policy is urgent.
- Counseling regarding healthy use of technology is the need of the hour.

6. Conclusion

These days the main tool and resource of peoples getting information, entertainment and for several daily utilities is a smartphone with internet connection. In Bangladesh, mobile operators and the industry have created a large number of employment and an excellent contribution to GDP. Studies confirm that majority user have mild addiction and spending excess time in online, that's why their communication with family and friends have been reduced both in quantity and quality. They are becoming more dependent on communicating with people through mobile phone. Loneliness and depression is a major issue today and a noteworthy case of these are associated with shallow and inconsistent online relationships.

Now we have to see that the face-to-face communication in the society has been reduced due to mobile technology, has the communication or interaction been changed? If there is a change, what kind of change and impact it has on society and what to do if it has changed.

References

[1] Adrian, F., Ward, Kristen, D., Gneezy., & Maarten, W. B. (2017). Brain Drain: The Mere Presence of One's Own Smartphone Reduces Available Cognitive Capacity. *JACR*, 2(2).

[2] https://www.addictiontips.net/phone-addiction/negative-effects-of-mobile-phones-on-society/

[3] Ahmed,T., Bloom, G., Iqbal, M., Lucas, H., Rasheed, S., Waldman, L., Khan, A. S., Islam, R., & Bhuiya, A. (2014). E-health and M-Health in Bangladesh: Opportunities and Challenges. 9(11), doi: 10.1371/journal.pone.0111413

[4] Ahad, A. D., & Lim. Convenience or Nuisence? The `WhatsApp` dilemma. *Procedia-Social and Behavioral Sciences*, 155, 189-196.

[5] Aown, N. T., Islam, M. A., Rahman, M. M., & Islam A.Z.M. T., (2012). Effect of AWGN & Fading (Rayleigh & Rician) channels on BER performance of a WiMAX communication System. *International Journal of Computer Science and Information Security (IJCSIS)*, 10(8), USA.

[6] http://www.btrc.gov.bd/content/mobile-phone-subscribers-bangladesh-december-2019.

[7] http://www.btrc.gov.bd/content/internet-subscribers-bangladesh-december-2019

[8] Boccardi, F., Heath, R. W., Lozano, A., Marzetta, T. L., & Popovski, P. (2014). Five disruptive technology directions for 5G. *IEEE Communication Magazine*, 52(2), 74–80.

[9] https://www.cnbc.com/2018/01/03/how-to-curb-you-smartphone-addiction-in-2018.html

[10] Constant, D., Sproull, L., & Kiesler, S. (1996). The kindness of strangers: The usefulness of   electronic weak ties for technical advice. *Organization science*, 7(2), 119-135.

[11] https://www.daily-sun.com/arcprint/details/385697/Harmful-Effects-of-Mobile-Phone/2019-04-17

[12] del Peral-Rosado, José A., Rauflefs, Ronald, José A,. López-Salcedo,. and Gonzalo Seco-Granados. (2018). Survey of Cellular Mobile Radio Localization Methods: From 1G to 5G. *IEEE Communications Surveys & Tutorials*, 20(2), 1124-1148.

[13] Elsobeihi, M. M., & Naser, S. S. A. (2017). Effects of Mobile Technology on Human Relationship. *International Journal of Engineering and Communication Systems (IJEAIS)*, 1(5), 110-125.

[14] https://www.electronicslovers.com/2018/04/the-impact-of-mobile-devices-on-our-lives-society-and-environment.html

[15] https://www.gsma.com/spectrum/resources/gsma-reveals-economic-impact-mobile-bangladesh.

[16] https://www.gsma.com/spectrum/wp-content/uploads/2017/01/Economic-Impact-Bangladesh-Mobile-Industry.pdf

[17] Halim, M. A., Islam, M. A., Islam, T., Homyara, H., & Zaman, M. (2012). Performance Analysis of Cyclic Redundancy Check (CRC) encoded Fixed WiMAX Wireless Communication System under Implementation of M-ary Quadrature Amplitude Modulation (QAM) Technique. *International Journal of Engineering Research and Applications (IJERA)*, 2(5), 1056-1062.

[18] Holma, H., & Toskala, A. WCDMA for UMTS: Radio Access for Third Generation Mobile Communications. *Chichester*, U.K. Wiley, 2000.

[19] IMT-2000 radio interface specifications approved in ITU meeting in Helsinki, ITU, Geneva, Switzerland, ITU/99-22, Nov. 1999.

[20] Islam, M. A., Mondol, R. U., & Hasan, M. Z. (2009). Performance Evaluation of WiMAX Physical Layer under Adaptive Modulation Techniques and Communication Channels. *International Journal of Computer Science and Information Security (IJCSIS)*, 5(1), 111-114, USA.

[21] Islam, M. A. & Islam, A.Z.M. T., (2012). Performance of WiMAX Physical Layer with Variations in Channel Coding and Digital Modulation Under Realistic Channel Conditions. *International Journal of Information Sciences and Techniques (IJIST)*, 2(4), 39-47.

[22] https://www.indexmundi.com/bangladesh/demographics_profile.html

[23] Islam, M. A., & Islam, A. Z. M. T. (2014). Secure Wireless Text Message Transmission with the Implementation of RSA Cryptographic Algorithm. *International Journal of Computer Networks and Communications Security*, 2(5), 146–151, UAE. online at: www.ijcncs.org.

[24] Islam, M. A., Das, D., Homyara, H., &Islam, A. Z. M. T. (2014). BER Performance of CRC Coded LTE System for Various Modulation Schemes and Channel Conditions. *Scientific Research Journal (SRJ)*, II(V), 6-10.

[25] Islam, M. A., Rahman, M. M., Enam, F., & Homyara, H. (2016). Analysis the Effect of Spectral Efficiency on Digitally Modulated OFDM Communication System over Realistic Channel Condition. *International Journal of Scientific & Engineering Research*, 7(1), 1019-1024, France.

[26] Kuznekoff, J. H & Titsworth, S. (2013), The Impact of Mobile Phone Usage on Student Learning, Communication Education, 62(3), 233-252. DOI: 10.1080/03634523.2013.767917

[27] Miguel, S. de, Martín, M. A., Pozo, J. del, Febles, V.,García, J., Suárez,D. S., Fernández de Aldecoa, J. C. & Ramos, V. (2012). Electromagnetic compatility in hospitals for electrometrical equipment and personal communication systems. *Advanced Electromagnetics Symposium (AES)*, France.

[28] McIntyre, J., & Myer, L. (2011). Men and antiretroviral therapy in Africa: our blind spot. *Tropical Medicine and International Health*, 16(7), 828–829, doi:10.1111/j.1365-3156.2011. 02767.x

[29] Mousa, A. M. (2012). Prospective of Fifth Generation Mobile communications. *International Journal of Next-Generation Networks (IJNGN)*, 4(3),1-30.

[30] Nurullah, A. S. (2009). The Cell Phone as an Agent of Social Change. *Rocky Mountain Communication Review*, 6(1), 19-25.

[31] http://www.nyu.edu/classes/keefer/waoe/miakotkol.pdf

[32] Panahi & Soheila. (2015). Impact of Modernization on Development of Adolescents. *The Media, Culture, Technology, Unique Journal of Pharmaceutical and Biological Sciences*, 03(2), 15-22.

[33] Popovski, P. (2013). Scenarios, Requirements and KPIs for 5G Mobile and Wireless System. *document ICT-317669/D1.1, METIS*, USA.

[34] Ramesh., Masthi, N. R., Pruthvi, S., & Phanendra, M. (2017). "A Comparative Study on Social Media Addiction Between Public and Private High School Students of Urban Bengaluru, India. *ASEAN Journal of Psychiatry*, 18(2), 206-215.

[35] Reza, A. A., Faruq, M. O., & Rahman, M. M. (2015). Impact of cell Phone in Bangladesh: possible Solutions. *International Journal of Science and Research(IJSR)*, 5(12), 615-620. DOI: 10.21275/ART20163404

[36] https://www.rfpage.com/evolution-of-wireless-technologies-1g-to-5g-in-mobile-communication

[37] Roh, W., Seol, Ji-Yun, Park, J., Lee, B., Lee, J., Kim, Y., Cho,J, Cheun, K., & Aryanfar. (2014). Millimeter-wave beamforming as an enabling technology for 5G cellular communications: Theoretical feasibility and prototype results. *IEEE Communication Magazine*, 52(2), 106–113.

[38] Shukla, S,. & Pandey, M. C. (2012). Mobile Technology in 4G. *International Conference on Recent Trends in Engineering & Technology (ICRTET)*, 107-110.

[39] Tai, M. P., Islam, M. A., Enam, F., & Rahman, M. A. (2016). Secure Color Image Transmission Over WIMAX Communication System. *Journal of Multidisciplinary Engineering Science and Technology (JMEST)*, 3(6), 5040-5047, Germany.

[40] https://www.telenor.com/wp-content/uploads/2019/03/The-Mobile-Effect-How-Connectivity-Enables-Growth-vF.pdf

[41] https://www.thedailystar.net/business/local-video-game-market-worth-tk-500cr-study-1385905

[42] https://www.thedailystar.net/business/local-video-game-market-worth-tk-500cr-study-1385905

[43] http://www.umtsworld.com/umts/history.html

[44] Wang, C. X. (2014). Cellular architecture and key technologies for 5G wireless communication networks. *IEEE Communication Magazine,* 52(2), 122–130.

[45] Yeboah, J., & Ewur, G. D. (2014). The impact of WhatsApp messenger usage on students` performance in Tertiary Institutions in Ghana. *Journal of education and practice*, 5(6), 157-164,196.