

Cost And Power Consumption Analysis Of Smartphone Users In India

Mangal Nath Tiwari¹, Dr. Arvind Kumar Tripathi², Sandeep Kumar Sharma³

¹Dept of Computer Science

²Professor, Dept of Physics

³Dept of Physics

^{1,3}MPU, MP, India

²Govt. SGS Auto. PG College, Sidhi, MP, India

Abstract- *In this age of technology, smartphones have affected every aspect of everyone's life. Today smartphones have mainly affected the major aspects of human life like health, education, culture, business etc. Mobile phones have changed the cultural aspects of human life, along with personal life; the effects of human life are also clearly visible from the psychological point of view. Today, the impact of smart phones in human life is having both positive and negative impact. Where it is becoming responsible for many dangerous situations occurring in human life, on the other hand it is also proving to be a boon. Today, a large population of India is spending most of its time and money in smartphones and internet for useless, unnecessary tasks. It is not only losing its money and time, the precious energy power of India is also being lost unknowingly, which is not fair to any man or country.*

Keywords- Smartphone Users, Energy consumption, Cost analysis, Indian Smartphone Market, Uses of Smartphones.

I. INTRODUCTION

Smartphone (Mobile) is a very useful digital wireless gadget in today's era. Smartphones allows user to access and sharing of data across different media with the help of powerful operating system. Today mobile users are available for their services with the touch screen interface and third party software. Smartphones have changed the lifestyle of the customers. High-end smartphones are getting advanced operating systems, touch screen interfaces, internet access, download and use of essential third party applications. Today smartphones with Apple and Android operating systems are being used more. In fact, smartphones are available in the market for use since 1993. The only difference between today's smartphones and two decades ago is that, earlier smartphones were used by prominent and selected corporate users for their use and they were used with some special upgrades [1].

Across the world, there is neither such a person nor any such institution whose needs a smartphone cannot fulfill. It is being used today to create high quality photos and videos, run video games, video and movies, animations, presentations, play back recording, email service, social websites, social media applications. This is the reason that today smartphones are being used in abundance even among common users.

II. USAGE PATTERN OF SMARTPHONES BY INDIAN USERS

Due to the changing nature of internet and IT technology, today smartphone has become an integral part of everyone's life; people can now keep it in their pocket and use it anywhere anytime. They can be connected to the internet while on the go. One of the biggest reasons to use the smartphone is the social media access facility along with 24 hours internet access [2]

Some general purpose uses of Smartphones are listed here.

- Text messaging (SMS).
- Reading and writing e-mail.
- Searching for specific information.
- Voice/Video calls on the phone
- Viewing and writing content on social networks.
- Weather forecasts.
- Navigation systems and services.
- Communicating with friends on social networks.
- News and reading books.
- Chatting, Live Meeting and Video games.
- Listening to music/Watching video
- Taking photos, videos
- Maps/GPS.

III. STATUS OF SMARTPHONE USERS IN INDIA

In India, as the population is growing, smartphone users are also growing day by day. The number of smartphone

users in India was estimated to reach over 748 million in 2020, with the number of smartphone users worldwide forecasted to exceed to 1.5 billion users in 2040. Number of smartphone users in India in 2010 to 2020, with estimates until 2040(in millions) [3]

There are lots of reports states the ratio of smartphone users for their needs. Based on a panel of Smartphone users, Nielsen Informat reports that 87% use it for running online searches followed by 80% for social networking. While 72% Smartphone users are chatting and using webmail, 59% stream video and use their devices for maps and navigation. Accessing mobile television on a Smartphone is also an increasing trend in urban India - 25 percent use their phones for this purpose [3].

Nielsen report (Feb-13) says that

- 48% users are between age group 18-25 years.
- 58% uses for Games.
- 45% uses for Streaming/Music and.
- 62% users use Android OS in their smartphone.
- 53% uses for Chat/Messaging.

In 2021, India is on 2nd rank (with 492.78 Millions) among the top rank for smartphone users.

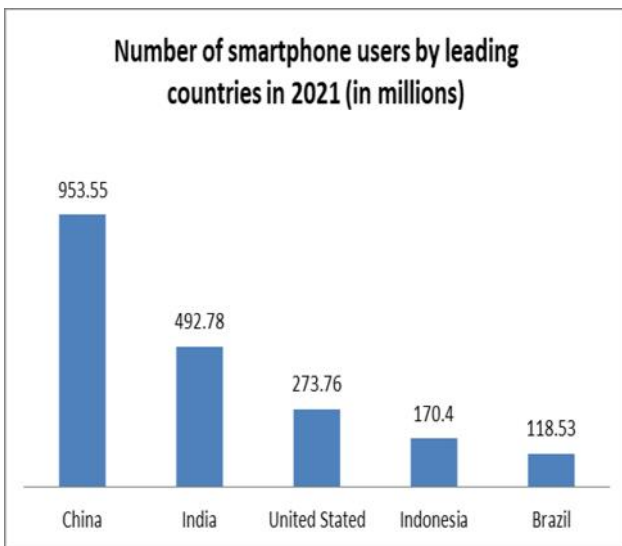


Chart-1: Number of smartphone users by leading countries in 2021 (in millions)

Source: <https://datareportal.com/reports/digital-2022-india>

3.1 Internet Users in India in 2022

Kepios analysis indicates that internet users in India increased by 34 million (+5.4 percent) between 2021 and 2022. Today 60% of Total 658.0 internet users are active in

social media platforms, which is 394+ Million. There were 658.0 million internet users in India in January 2022.

IV. COST AND ENERGY CONSUMPTION ANALYSIS

Most smart phones are popular with android OS are popular and best choice of users. And Android smartphone comes with powerful battery capacity. Normally battery capacity is measured in mAh (Miliamps Hour). Commonly android smartphone have different capacity of battery as 1500, 2000, 2300, 2500, 3000, 3500, 4000, 5300 mAh.

mAh: A miliampere hour (mAh) is 1000 of an ampere hour (Ah). mAh is the capacity rating of battery. mAh is the technical term for measuring how much electrical charge a particular battery will hold. Smaller batteries as in mobile phones and cameras are often rated in mAh.

Let us assume a smartphone with 2000 mAh battery capacity is used by most of the users. $2000/1000 \text{ mAh} = 2 \text{ Ah}$ (2 Ampere for an hour). Normally 2000 mAh rating battery can consume 3.7 or 3.8 V electric by mobile phone charger.

The Power (P) in Watts(w) is equal to the current (I) in Amp(A) times the voltage V in volt.

$$P(\text{Watt}) = I(\text{Amp}) * V(\text{Volt}). \quad (\text{for DC current})$$

$$P(\text{Watt}) = PF * I(\text{Amp}) * V(\text{Volt}). \quad (\text{for AC current})$$

Herer PF (Powe Factor) is a constant, for resistive load without inductors or capacitors the powe factor (PF) is =1, and for inductive load (like induction motor) the power factor can be approximately=0.8

4.1 Miliampere – hour (mAh) to watt – hour (Wh) calculation-

The energy E(wh) is qual to the electric charge Q(mAh) in milliampere – hour times the voltage V(v) in divided by 1000.

$$E(\text{wh}) = Q(\text{mAh}) * V(\text{v}) / 1000 \text{ Or } \text{Wh} = \text{mAh} * V / 1000.$$

So, $2000 \text{ mAh} = 2 \text{ Ah}$, $\text{Amp} = 2$, $\text{Volt} = 3.7$

$$\text{Wh} = 2000 \text{ mAh} * 3.7 \text{ V} / 1000 = 7.4.$$

4.2 Energy and Cost Calculation-

1 unit of electricity is equal to 1000 watt. Here watt (W) is unit of power and is calculated as –

$$\text{Energy} = \text{Power} * \text{Time}.$$

$$1 \text{ Unit} = 1000 \text{ W} * 1 \text{ Hour} = 1 \text{ KWh}.$$

For example 10 bulbs of 100 watt each continuously supply power/light for 1 hour, then consumed electricity energy will be calculated as $100 * 10 = 1000 \text{ W} = 1 \text{ Unit}$.

Electricity rate in India for domestic usage in 2022-23 is as follows=

1. Upto 50 Units – Rs 3.00 /Unit.
2. 51 – 200 Units – Rs 4.80/Unit.
3. 201 – 400 Units – Rs 5.80/Unit.
4. 401 – Above – Rs 6.20/Unit.

If a user continuously uses his smartphone having 2000 mAh rated battery specification for 8 hours in a day then total consumed energy by his smartphone can be calculated as –

$$\begin{aligned}
 E &= \text{Power} * \text{Time} = 7.4 * 8 \text{ Hours} = 59.2 \text{ Wh.} \\
 &59.2 \text{ Watt for 8 Hour in a day.} \\
 &= 0.06 \text{ Unit/day.} \quad (60.0 / 1000 \text{ watt}) \\
 &= 0.06 * 30 \text{ days} = 1.8 \text{ Unit/Month.} \\
 &= 1.8 * 3.00 = 5.40 \text{ Rs/8h/month.} \quad (@ 3.00 \text{ Rs/Unit upto 50} \\
 &\text{units slot})
 \end{aligned}$$

India has 658+ million (65+ crores) smartphone users. Who uses their smartphone for several purpose most of them have uses for Social Networking sites, Youtube videos, chatting, music. We can simply calculate their total energy (E_{Tot}) consumption and total cost (C_{Tot}) in Indian currency.

$$\begin{aligned}
 E_{Tot} &= 650,000,000 * 59.2 \text{ Wh.} \\
 &= 38,480,000,000 \text{ Wh.} \\
 C_{Tot} &= 38,480,000 \text{ Unit.} \quad (\text{Since } 1000 \\
 &\text{Wh} = 1 \text{ Unit}) \\
 &= 38,480,000 * 6.20. \quad (\text{Since } @ 6.20 \\
 &\text{Rs/Unit} > 400 \text{ units}) \\
 &= 238,576,000.00 \text{ INR.} \quad (\text{For only } 8 \\
 &\text{hours/day}) \\
 &\text{Approx } 25 \text{ Crore INR}
 \end{aligned}$$

V. CONCLUSION

Due to being a gadget of luxury and elegance, today the smartphone market has become very wide. Today, for most users, smartphones and tablets have become an integral part of their daily lives. It is true that the use of smartphones is affecting the lives of society and individuals in many ways, both positive and negative. Clearly the overuse of these digital gadgets by the users shows the extent of their impact. The use of smartphones is making its place as an ideal and praise of the society today. It is clear from the above facts that smartphone use has its own advantages and disadvantages or negative effects

Many users are spending a lot of their precious time for useless and useless activities in the smartphone. And such people are wasting more money and energy power of India.

Therefore it is necessary that attention should be paid to the expenditure and use of energy and time by the user for the needs of the work

As we have analyzed in this paper, the smartphones in excessive use can be more expensive. Because we found here in conclusion that people are spending Crores of rupees of energy and more valuable time of life in useless activities. We all have to be aware of this, we all have a responsibility to save energy, and we should be more aware and think about green IT.

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