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A Study on ICT Penetration in Global Perspective

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ABSTRACT

ICT stands for "Information and Communication Technology". ICT penetration is the extent to which the population of a particular place use ICT enabled devices. The objective of this paper is to assess the ICT penetration in global perspective on the basis of two parameters termed as tele-density and internet density. Higher subscriptions of 'active mobile-broadband subscriptions', lower gap between male and female internet users, greater CAGR in female internet users are indicator of greater ICT penetration, empowerment of women and better gender parity across the world.

Keywords: *ICT penetration, Tele-density, Internet density, Gender parity, Global perspective.*

1. INTRODUCTION

ICT stands for "Information and Communication Technology". ICT penetration is the extent to which the population of a particular place use ICT enabled devices. "Understanding the ICT penetration level is important as it has positive impacts on economic growth and development" (David & Grobler, 2020). The benefits of ICTs are not symmetric among the countries across the world or/and among the sectors of the economy and sections of the society within countries (Kaur and Singh, 2016). According to ITU[1], Covid-19 pandemic has led to a massive surge in the internet users worldwide from around 4.1 billion (approximately 54% of World's total population) in 2019 to almost 4.9 billion in 2021 that constitute 63% of World's total population. Highest growth rate of 10.2% is observed in internet users corresponding to 13.3% growth in internet usage in developing country. In 2021, the growth rate has returned to a normalised rate of 5.8% like pre-crisis period. Apart from these, Global gender parity score (female users divided by Male users) is also achieved (0.89 in 2018 to 0.92 in 2020), while young people (15-24 years) are

[1]The ITU is the Agency of the United Nations, headquartered in Geneva

1.24 times more connected than rest of the population. On the other hand, subject to availability of data of countries, 90% of population own a mobile phone in half of those countries that helps in empowering women and attaining greater gender equality in this regard. In 2018-2020, half of the 60 countries (of which data is available) gender parity is achieved and in 10 more countries, women mobile phone users exceed their men counterpart. The study focuses light on ICT penetration status in the world, developed countries (e.g., USA, The UK, Germany, etc.), developing countries (e.g., India, Sri Lanka, Mexico, etc.), Least Developed Countries (e.g., Afghanistan, Bangladesh, etc.), Land Locked Developing Countries (e.g., Botswana, Zimbabwe, etc.), and Small Island Developing States (e.g., Bahrain, Bahamas, etc.). The paper has mentioned objectives, data sources and methodology in section 2, followed by discussions on ICT penetration in section 3 and finally conclusion of the study.

2. OBJECTIVE, DATA SOURCE AND METHODOLOGY

The present study seeks to assess the ICT penetration in global perspective by considering different regions of the world. Regarding data source, secondary data have been collected from the reports and web-sources that have been presented and discussed through tables and graphs. Two important parameters have been used viz. Tele-density and Internet density to assess the ICT penetration globally. Penetration rate is expressed in terms of percentage. Time period is 2015 to 2021.

3. DISCUSSIONS

To achieve the objective of this paper, we use two parameters viz. Tele-density and Internet density. Tele-density refers to the number of telephone connectivity per 100 people living within an area. By the term internet density, we mean to say the number of internet connectivity per 100 people living within an area. The world is represented through five regions as per their development status. They are (1) Developed, (2) Developing, (3) "Least Developed Countries", (4) "Land Locked Developing Countries" and (5) "Small Island Developing States".

Tele-density: To assess the tele-density position, this paper considers three major indicators. They are **(i)** "Fixed-telephone subscriptions per 100 inhabitants", **(ii)** "Mobile-cellular telephone subscriptions per 100 inhabitants" and **(iii)** "Percentage of population covered by a mobile-cellular network" (Urban-Rural wise). They are presented as below.

TABLE 1: FIXED TELEPHONE SUBSCRIPTIONS PER 100 INHABITANTS

	2015	2016	2017	2018	2019	2020	2021
World	14.0	13.4	12.9	12.6	12.1	11.6	11.2
Developed	39.0	38.0	37.0	35.9	34.5	33.4	32.2
Developing	8.9	8.3	8.0	7.9	7.6	7.4	7.2
Least Developed Countries (LDCs)	0.9	0.9	0.8	0.9	0.8	0.8	0.8
Land Locked Developing Countries (LLDCs)	3.8	3.9	3.7	3.5	3.4	3.3	3.1
Small Island Developing States (SIDS)	12.1	12.1	11.9	11.8	11.6	11.6	11.5

Source: *ITU (2021)*

FIGURE 1: FIXED TELEPHONE SUBSCRIPTIONS PENETRATION RATE

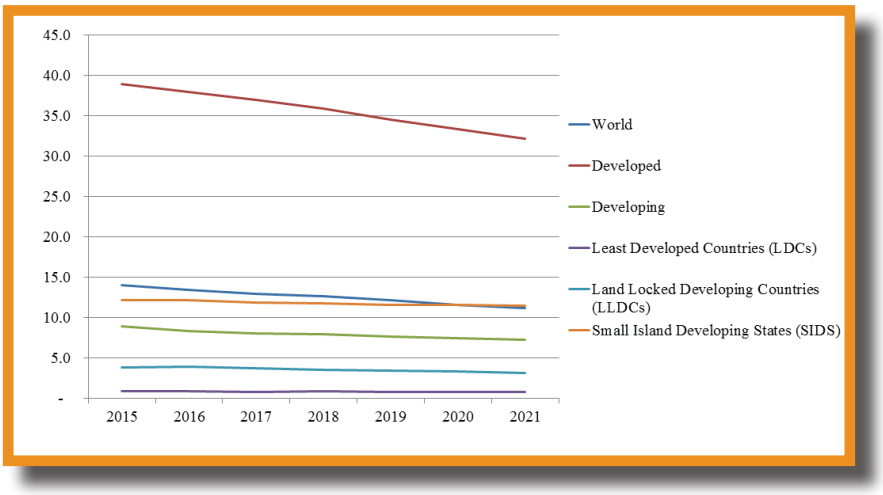

TABLE 2: MOBILE-CELLULAR TELEPHONE SUBSCRIPTIONS PER 100 INHABITANTS

	2015	2016	2017	2018	2019	2020	2021
World	97.3	100.6	102.7	104.9	107.6	107.0	109.9
Developed	124.5	125.9	126.3	128.4	131.4	133.0	134.8
Developing	91.6	95.4	97.9	100.1	102.9	101.9	105.1
Least Developed Countries (LDCs)	67.5	67.6	68.4	71.2	74.5	74.7	75.6
Land Locked Developing Countries (LLDCs)	70.4	72.7	73.5	72.8	75.7	76.7	77.0
Small Island Developing States (SIDS)	80.4	81.9	81.6	82.7	84.7	84.8	87.1

Source: *ITU (2021)*

FIGURE 2: MOBILE-CELLULAR TELEPHONE SUBSCRIPTIONS PENETRATION RATE

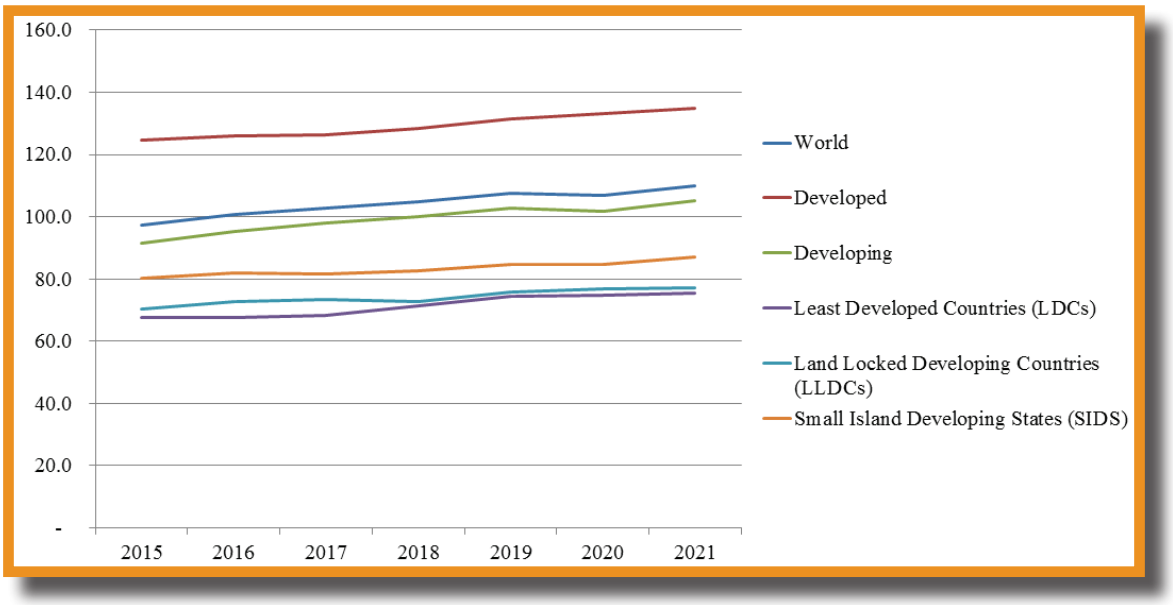

TABLE 3: URBAN POPULATION COVERED BY A MOBILE-CELLULAR NETWORK (%)

	2015	2016	2017	2018	2019	2020	2021
World	99.9	100.0	100.0	100.0	100.0	100.0	100.0
Developed	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Developing	99.8	99.9	100.0	100.0	100.0	100.0	100.0
Least Developed Countries (LDCs)	99.1	100.0	100.0	100.0	100.0	100.0	100.0
Land Locked Developing Countries (LLDCs)	98.6	100.0	100.0	100.0	100.0	100.0	100.0
Small Island Developing States (SIDS)	99.8	99.9	99.9	99.9	99.9	99.9	99.9

Source: *ITU (2021)*

FIGURE 3: MOBILE-CELLULAR NETWORK PENETRATION RATE (URBAN)

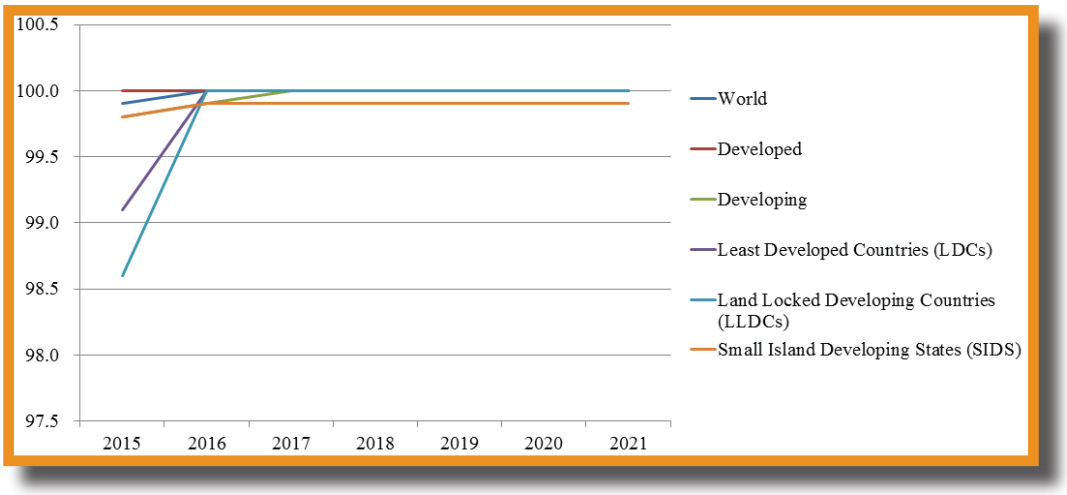

TABLE 4: RURAL POPULATION COVERED BY A MOBILE-CELLULAR NETWORK (%)

	2015	2016	2017	2018	2019	2020	2021
World	88.9	89.8	91.3	91.8	92.7	92.5	93.0
Developed	93.0	93.5	94.0	94.0	98.3	98.3	98.6
Developing	88.5	89.4	91.1	91.6	92.2	92.1	92.5
Least Developed Countries (LDCs)	80.0	81.0	80.8	81.8	82.4	82.7	84.8
Land Locked Developing Countries (LLDCs)	83.7	87.0	87.2	89.0	89.9	87.5	91.2
Small Island Developing States (SIDS)	74.2	68.7	71.2	71.7	72.1	72.3	76.9

Source: *ITU (2021)*

FIGURE 4: MOBILE-CELLULAR NETWORK PENETRATION RATE (RURAL)

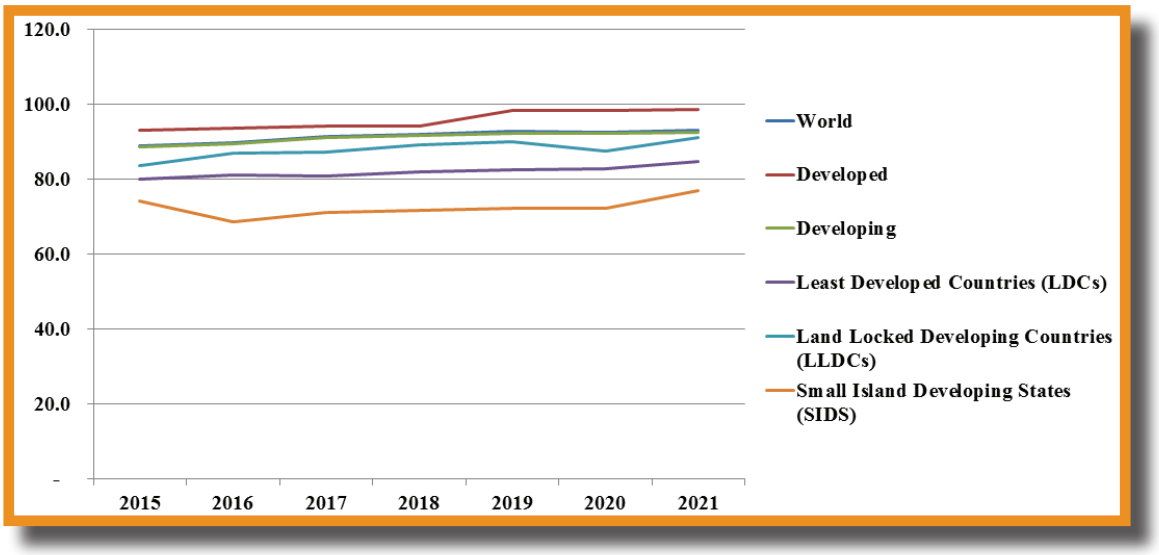

TABLE 5: CAGR (%) OF TELE-DENSITY

	Fixed-telephone subscriptions	Mobile-cellular telephone subscriptions	Urban population covered by a mobile-cellular network	Rural population covered by a mobile-cellular network
World	-3.14	1.75	0.01	0.65
Developed	-2.70	1.14	0.00	0.84
Developing	-2.98	1.98	0.03	0.63
Least Developed Countries (LDCs)	-1.67	1.63	0.13	0.84
Land Locked Developing Countries (LLDCs)	-2.87	1.29	0.20	1.23
Small Island Developing States (SIDS)	-0.72	1.15	0.01	0.51

Source: *Authors' Calculation*

Due to advent of mobile technology, the use of fixed telephone has been decreasing all over the world. Small Island Developing States witnessed a little progress in this context. On the other hand, the mobile-cellular telephone subscriptions penetration rate has been progressing at a significant way. Developing countries got the highest CAGR. In urban areas, most of the inhabitants are covered by a mobile-cellular network for our study period. Mobile-cellular network coverage is more in urban than rural population. Developed countries have more ICT penetration in terms of tele-density compared to other regions.

Internet density: Internet connectivity is the spine of ICT development. Higher the internet density, better the ICT penetration. We take three indicators to gauge internet density. They are **(i) "**Fixed-broadband subscriptions per 100 inhabitants", **(ii) "**Active mobile-broadband subscriptions per 100 inhabitants" and **(iii)** "Percentage of individuals using the internet".

TABLE 6: FIXED-BROADBAND SUBSCRIPTIONS PER 100 INHABITANTS

	2015	2016	2017	2018	2019	2020	2021
World	11.4	12.2	13.6	14.1	14.9	15.8	16.7
Developed	29.5	30.4	31.5	32.5	33.4	34.6	35.7
Developing	7.6	8.5	9.9	10.4	11.2	12.1	13.0
Least Developed Countries (LDCs)	0.8	0.9	1.0	1.1	1.2	1.4	1.4
Land Locked Developing Countries (LLDCs)	1.9	2.1	2.3	2.5	2.7	2.9	3.0
Small Island Developing States (SIDS)	6.7	7.0	7.0	7.1	7.5	8.0	8.4

Source: *ITU (2021)*

FIGURE 5: FIXED-BROADBAND SUBSCRIPTIONS PENETRATION RATE

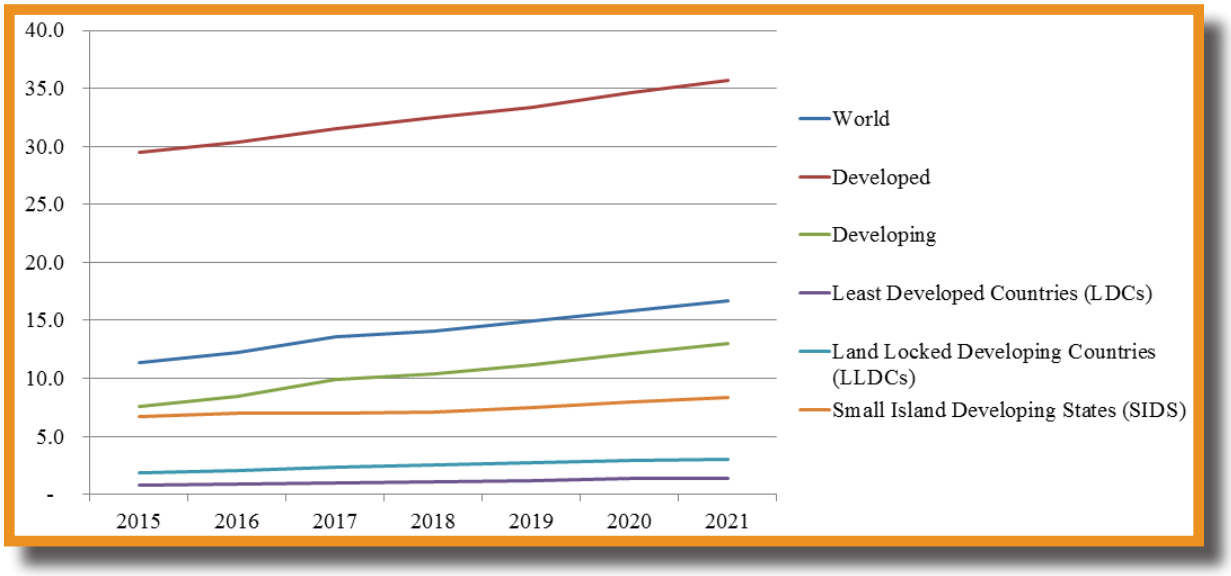

TABLE 7: ACTIVE MOBILE-BROADBAND SUBSCRIPTIONS PER 100 INHABITANTS

	2015	2016	2017	2018	2019	2020	2021
World	44.6	51.9	62.8	69.7	74.5	77.3	83.2
Developed	89.2	97.0	108.7	116.7	124.1	127.1	131.0
Developing	35.4	42.7	53.5	60.2	64.7	67.5	73.9
Least Developed Countries (LDCs)	14.9	19.9	26.2	29.0	33.2	36.3	38.8
Land Locked Developing Countries (LLDCs)	19.7	24.3	31.4	33.3	36.7	40.0	43.2
Small Island Developing States (SIDS)	31.8	38.5	44.8	49.3	52.2	54.4	57.1

Source: *ITU (2021)*

FIGURE 6: ACTIVE MOBILE-BROADBAND SUBSCRIPTIONS PENETRATION RATE

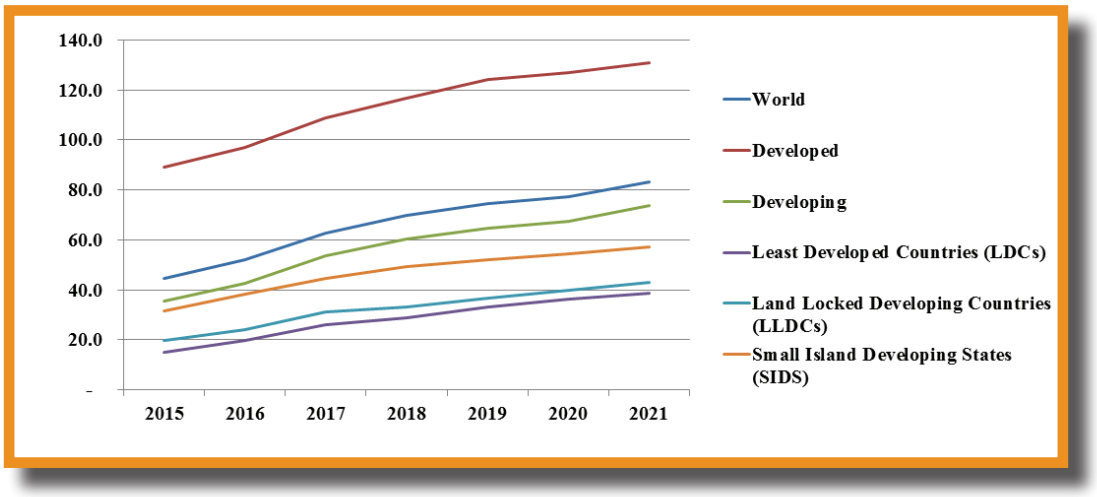

TABLE 8: PERCENTAGE OF INDIVIDUALS USING THE INTERNET*

	Male			Female		
	2018	2019	2020	2018	2019	2020
World	52.0	56.4	61.7	46.2	50.9	56.5
Developed	85.7	87.4	89.0	83.7	85.7	87.7
Developing	45.5	50.5	56.5	38.3	43.7	50.1
Least Developed Countries" (LDCs)	25.6	28.3	30.5	14.6	16.9	18.8
Land Locked Developing Countries (LLDCs)	31.6	34.7	37.8	21.2	24.1	26.8
Small Island Developing States (SIDS)	55.4	57.8	61.2	53.3	56.4	59.4
* Only three years data are available						

Source: *ITU (2021)*

FIGURE 7: PERCENTAGE OF INDIVIDUAL (GENDER-WISE) USING THE INTERNET

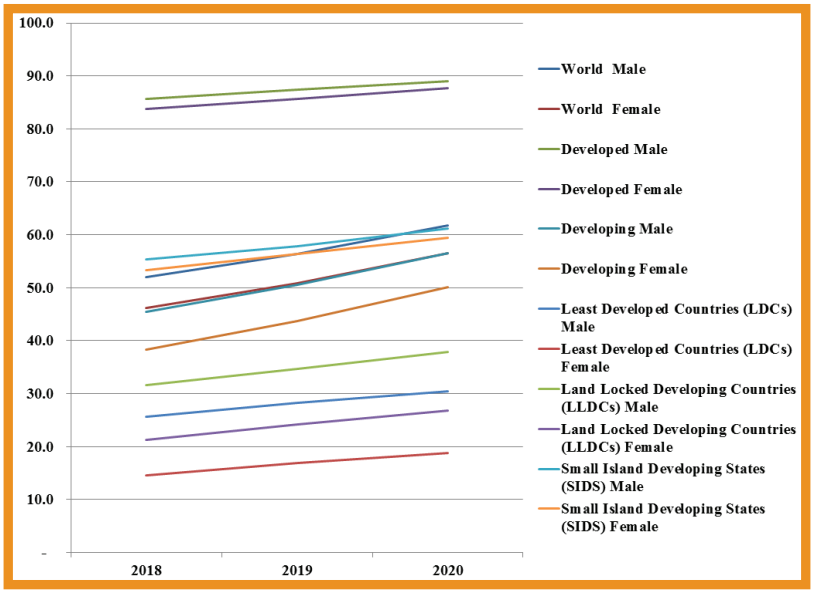

TABLE 9: CAGR (%) OF INTERNET DENSITY

	Fixed-broadband subscriptions	Active mobile-broadband subscriptions	Males using the internet	Females using the internet
World	5.61	9.32	5.87	6.94
Developed	2.76	5.64	1.27	1.57
Developing	7.97	11.09	7.48	9.37
Least Developed Countries (LDCs)	8.32	14.65	6.01	8.79
Land Locked Developing Countries (LLDCs)	6.74	11.87	6.15	8.31
Small Island Developing States (SIDS)	3.28	8.72	3.37	3.68

Source: *Authors' calculation*

In context of internet density, the global penetration of 'active mobile-broadband subscriptions', on an average is 4.7 times higher than 'fixed-broadband subscriptions. Inhabitants of Developed Countries have more than one active mobile-broadband subscriptions since 2017. CAGR of Least Developed Countries (LDCs) for active mobile-broadband subscriptions got the highest rate of 14.65% than other regions of the world due to the fact that Developed Countries or Developing Countries already have a higher penetration rate in terms of active mobile-broadband subscriptions. Interestingly, during the time period 2018-2020, CAGR of females using internet is more than the males in all regions of the globe, although the percentage of females using the internet is lower than males in all five regions. "The gap between the "percentage of females and males" using the internet is lower in Developed Countries and "Small Island Developing States" (SIDS), moderate in "Developing Countries" and higher in "Least Developed Countries" (LDCs) and "Land Locked Developing Countries" (LLDCs). Globally, the internet density is upward rising during our study period.

CONCLUSION

The study, so far, has made an attempt to capture an overview of ICT penetration across the globe. Due to sound infrastructure, almost entire urban population across the world possess mobile phone while rural users are not so far away. Higher subscriptions of 'active mobile-broadband subscriptions' is an indicator of greater ICT penetration across the world. Lower gap between male and female users along with greater CAGR in female internet users indicate the empowerment of women and better gender parity. The growth rate in both the indicators in "Least Developed Countries" (LDCs) and "Land Locked Developing Countries" (LLDCs) have shown greater ICT penetration in the respective countries. More infrastructural development along with improvements in education, internet usage, phone usage, income level and so on is recommended for achieving greater ICT penetration. The study could have been further improved analysing the role of other variables determining ICT penetration.

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