Digital Inclusion and Usage Behaviour: A Study to Understand the Rural-Urban Differences under the Digital India Initiative

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Abstract
The study aims to identify the effect of digital inclusion initiative by governments on individual digital consumption usage with a focus on identifying the differences between rural and urban population. Based on a sample of 390 respondents randomly selected from two districts of Gujarat state in India, the present study aims to identify the relationship between population demographics and digital usage. The study also explores the differences that exist between rural and urban population using chi square tests.Major findings indicate uniformity across different demographics in digital usage in urban areas, while there are stark differences among certain demographics in the rural areas. Differences were also found between the rural and urban population in terms of the digital usage.The present study has policy implications for the implementation of digital inclusion initiatives. Moreover, these insights can be used to understand the effectiveness of these initiatives by focusing the specific needs of rural populations and reducing differences in digital access and usage.This study adds to the limited empirical research on the effects of digital inclusion initiatives, particularly in the context of rural-urban comparisons. It highlights valuable insights into how demographic factors impact digital consumption and the ongoing challenges of achieving digital equity across varied regions.

Keywords: Digital India, Empowerment, Digital Consumption,Digital Inclusion; Exploratory study; Rural-urban divide; India; Chi-square tests

1. Introduction

In the past few decades, the internet has transformed how humans interact and go with their business in day to day lives. It has empowered people more than ever before by allowing them to access information at their fingertips. No other information in human history has shown this much impact on people's lives as the internet. This has ultimately led to the advancement of communication and computer technology and has enabled many sectors to function that aid

advancement in people's lives. For example, today it is possible to do banking transactions at a remote location at a physical store using technology that enables digital payments (Boss, 2000) or to consult with health experts online. But this rapid digital transformation has also become a challenge for many countries. The globalization of technology may aspire to shape societies to be digital societies, but it has also resulted in a new facet called the digital divide owing to the global socioeconomic divide. There is a need to address this divide, however tackling the digital divide is a major concern owing to the crucial role that technology and techno-consumption play in global economic growth. Bridging this divide is essential and beneficial for all the sections of the society to be empowered and bringing these empowered consumers' online presence is beneficial for the market overall (Riggins& Dewan, 2005).

The analysis to bridge this 'digital divide' has been done at three levels -- the individual, the organizational, and the global -- for managerial and policy implications (Riggins& Dewan, 2005). At the base is the individual level where the digital divide manifests as the absence of access to information technology due to socio-economic and technological or geographical drawbacks. This gap exists among the people who can access the technology and who do not (Riggins& Dewan, 2005). To bridge this persisting divide, Indian government launched the 'Digital India' initiative in 2015. The initiative is considered as a stepping-stone towards reaching a digital economy. The drive aims towards transforming India into a knowledge economy digitally empowered through ensuring seamless accessibility of public services in a digital landscape. In order to achieve the above objective three thrust areas were identified as the preconditions i.e. digital empowerment of the citizens, infrastructure development and efficient governance. The objective is to build an ecosystem that powers the advantages of digitalization and has positive ramifications on multiple sectors and induces economic growth (Lenka & Sharma, 2017). This endeavour of augmented digital interference has boosted various sectors to embrace the digital advancements ranging from algorithms to blockchain technology to artificial intelligence. Core principles of these innovations have subsequently led to a broader and affordable range of goods and services in various areas that are accessible, economical, sustainable and usable by the masses easily.

However, according to scholars, the real potential of information technology and digital inclusion endeavours as an enabler of development is yet to be harnessed (Bhatnagar, 2014). In particular, the effect of digital inclusion initiatives in the rural areas is still a sparsely explored topic (Wagg & Simeonova, 2022). Thus, there is a scope for exploration on the differential effect of digital inclusion initiatives by the government between the urban and rural areas. In addition, it is also imperative to explore whether these differential effects are nuanced by population demographics and specific demographic factors such as gender, age and occupation. Thus, the

present study explores the differences in digital inclusion initiative usage and the differences of usage differ between rural and urban areas based on the population demographics. The next section provides a brief literature review leading to the study hypothesis. This is followed by sections on the methodology and the findings. The last section discusses the implications of the study before concluding the paper.

2. Literature review

2.1. Digital Inclusion and Rural Population

Digitalization has infiltrated all segments and have restructured society across the globe, making them digital economies (Tapscott, 1996) that function on internet and digital knowhow (Mesenbourg, 2001). This digital transformation is recognized to be a critical engine that may foster inclusiveness (Bansal, 2014) and accelerate economic growth and development across the globe (Avgerou, 2008; Beck, Georgiadis,& Straub, 2014). These advancements have made it a dominant platform for exploring new markets and provisioning of improved service quality and delivery in key domains. For example, the financial sector has modified to digitalization and attempted to advance the financial inclusion status through technological interventions (Singh, 2017; Kumar& Joseph, 2014).

Literature on the rural urban divide with respect to information technology have observed a bias tilted towards the urban population (Townsend et al., 2013; Skerratt, Farrington,& Ashmore, 2012). Urban areas tend to become digital hotspots because of the presence of high-speed internet and uninterrupted connections. On the other hand, rural areas are seen to suffer from poor internet speed, unreliable connections and low-tech access (Skerratt,Farrington,& Ashmore, 2012; Skerratt, 2010). This is because of the lack of inadequate backbone infrastructure (European Commission, 2013). This in turn puts pressure on socio economic development, innovation potential and certain forms of consumption, thereby leading to exclusion of some communities in the rural areas to fully participate in an information enabled society (Roberts & Townsend, 2015; Kilpeläinen & Seppänen, 2014; Velaga et al., 2012). Researchers (LaRose et al., 2011, LaRose et al., 2007) note a paradox here: the problems of physical remoteness and improper service provision which otherwise would have been solved through digital inclusion, do not get solved precisely because of the same lack of digital technology. Scholars in this domain also conclude that poorly educated and digitally inexperienced rural people may be more vulnerable to digital exclusion which leads to a vicious cycle of further exclusion and marginalization (Salemink,Strijker,& Bosworth, 2017).

2.2. Digital Inclusion in India

The Digital India campaign is trying to bridge the digital divide in the country which has resulted from the pre-existing socioeconomic divides like the rural-urban

discrepancy, inequalities of capability, caste stratification and class disparity. Rural areas of India are characterized as highly under-resourced and are poorly managed relative to the urban areas that in contrast have more resources, are technologically advanced and are more developed (Laskar, 2023). Further, India also exhibits diverse patterns of standard of living based on capability. There is also a wide class and social gap which is also concerning. At the same time, there is a clear partition between the poorer and the affluent sections of the society in urban and rural areas. The two major interventions that the 'Digital India' campaign focuses on are, first, uplifting the economic situations of groups and individuals by upskilling them to use digital tools and, second by educating people (India Skills Reports, 2021). The policy intends to increase the reach of digital networks to include more population and more geographies. Thus, the current study focuses on the demographics of internet users impacted by the Digital India campaign. Though demographic variables are explored to study the willingness of the residents to adopt e-government services in developed nations framework, studies in the developing ones are rarely conducted (Al-Somani, Gholami,& Clegg, 2009; Hernandez, Jiménez, & José Martín, 2011; Tarhini,Hone,& Liu, 2014). Furthermore, there is a significant gap in studying the direct impact of demographics on the adoption of digital inclusion initiatives by the government (Chan & Chong, 2013).

2.3. Hypotheses

Considering the above context, the current study choses to focus on demographics variables such as age, gender, occupation, education, usage rate in the context of rural and urban population post the launch of 'Digital India' initiative.

Gender

The relation between user gender and internet usage was investigated by Teo (2001) where it was observed that women use internet more than the men in context of downloading and purchasing online. However, in another case, no significant difference was observed between women and men when the usage of mobile technology was tested (Chan & Chong, 2013). Thus, we propose:

H_1:*There is a significant difference in usage rates between males and females in rural and urban populations.*

Age

Age in past research has shown as significantly impacting the adoption of internet and computer technologies (Chan& Chong, 2013; Cutler, Hendricks,& Guyer, 2003; Teo, 2001). Furthermore, research has found age variations in owning and using of mobiles and computers. High internet usage has been recorded among the younger users as contrast to older users (Teo, 2001). Similarly, Chan and Chong (2013) found younger

people tend to engage more with mobile technologies than elderly people. Thus, we propose:

H_2:*There is a significant difference in the usage rates between age groups in rural and urban populations.*

Education

The association between education and use of technology has been limited in literature (Teo, 2001). For example, in a study it was observed that people with higher educational qualifications are more prone to use the internet. However, it was also observed that such people are less likely to use it for web browsing and messaging services (Teo, 2001). Similarly, another study observed that highly educated individuals use digital technologies more liberally than less educated individuals and thus varying their usage rate and purpose (Brown &Venkatesh, 2005). Thus, we propose:

H_3:*There is a significant difference in usage rates between education levels in rural and urban populations.*

Occupation

In India, employment patterns across the rural and urban areas are significantly different, with most of the population employed in informal jobs across areas. These informal jobs comprised private enterprises, domestic helpers, daily wage labourers and manual labourers in urban areas, while agriculture is the major occupation in rural areas. Hence, the usage rate varies among the users for their purposes (Martínez-Domínguez & Mora-Rivera, 2020). Thus, we propose:

H_4:*There is a significant difference in usage rates between occupations in rural and urban populations.*

3. Research methodology

The study utilized a sample survey method as the study objective was majorly exploratory. The data was collected using a survey method that majorly had two sections. The first part comprised of the respondent demographics. The second part was related to the average usage rate of mobile phones related to various digital inclusion activities measured on a four-point scale (Less than 1 hour; Between 1-3 hours; Between 3-6 hours; More than 6 hours) like e-commerce, study platforms, social media, content creation. The data was collected from Gujarat, India, as it is one of India's highest-ranking states in digitization (SIDE Report, 2024). The data was collected using a random sampling technique (sample demographics given in Table 1). The data analysis was done using SPSS version 25. For testing the hypotheses, a Chi-square test was conducted to find out the difference in the means among the demographics to the usage rate in the context of rural and urban populations. Chi-square tests have been recommended for identifying latent relationships between

categorial variables by scholars (e.g. Momeni, Pincus,& Libien, 2017; Talib & Suleiman, 2022). However, instead of a traditional chi-square test using two-way arrays, we employed a three-way array (demographic variable X settlement status X usage rate) that allowed for more nuanced findings.

Table 1: Demographics of the respondents

Demographic variable	Frequency (N=390)
Gender	
Male	209
Female	181
Settlement Type	
Urban	236
Rural	154
Age	
18-26 years	239
27-35 years	151
Education	
Post-Graduate	141
Graduate	72
Secondary	49
Primary	49
Illiterate	29
Occupation	
Student	123
Self Employed	117
Government Service	14
Private Services	98
Homemaker Student	38
Usage Rate	
Less than 1 hour	29
Between 1-3 hours	2.15
Between 3-6 hours	126
More than 6 hours	20

Source: Authors

4. Results and analysis

The results of the chi-square tests were conducted to find the effect of the usage rate on the respondents' demographics in the rural and urban contexts. First, for gender, the chi-square test results showed that in urban areas, there is no significant

association between gender and usage rate (χ^2 = 6.888, p = .076), but in rural areas, the association between gender and usage rate is significant (χ^2 = 6.896, p = .075). However, for the overall population (Table 2), the gender effects on usage rate were insignificant (χ^2 = 6.896, p = .075). Second, for age, the chi-square test results indicated that there is no significant association between age and usage rate in urban areas (χ^2 = 9.519, p = .391), but in rural areas, a significant association is observed between age and usage rate (χ^2 = 26.105, p = .002). However, the overall population's age effects (Table 3) on usage rate were insignificant (χ^2 = 9.123, p = .426). Third, for education, the chi-square results displayed that there is no significant association between education level and usage rate in urban areas (χ^2 = 13.857, p = .310), but for rural areas, the association of education and usage rate was significant (χ^2 = 31.451, p = .002) (Table 4). Interestingly, a noteworthy association exists between education level and usage rate (χ^2 = 23.731, p = .022), indicating that education level influences usage rate. Lastly, as table 5 demonstrates for occupation, the chi-square results indicated that there is no significant association between occupation and usage rate in urban areas (χ^2 = 12.435, p = .411), but in rural areas, there is a significant association between occupation and usage rate (χ^2 = 26.361, p = .010). However, no significant association was found for the overall population (χ^2 = 17.440, p = .134).

Table 2: Difference in gender and usage rate

Settlement Type		Value	df	Asymptotic Significance (2-sided)
Urban	Pearson Chi-Square	6.888[b]	3	.076
	Likelihood Ratio	6.931	3	.074
	Linear-by-Linear Association	.530	1	.466
	N of Valid Cases	236		
Rural	Pearson Chi-Square	13.175[c]	3	.004
	Likelihood Ratio	15.045	3	.002
	Linear-by-Linear Association	12.774	1	.000
	N of Valid Cases	154		
Total	Pearson Chi-Square	6.896[a]	3	.075
	Likelihood Ratio	6.980	3	.073
	Linear-by-Linear Association	1.581	1	.209

	N of Valid Cases	390		
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.28.				
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.66.				
c. 3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.77.				

Source: Authors

Table3: Difference in age and usage rate

Settlement Type		Value	df	Asymptotic Significance (2-sided)
Urban	Pearson Chi-Square	9.519[b]	9	.391
	Likelihood Ratio	11.746	9	.228
	Linear-by-Linear Association	4.684	1	.030
	N of Valid Cases	236		
Rural	Pearson Chi-Square	26.105[c]	9	.002
	Likelihood Ratio	23.781	9	.005
	Linear-by-Linear Association	16.705	1	.000
	N of Valid Cases	154		
Total	Pearson Chi-Square	9.123[a]	9	.426
	Likelihood Ratio	11.257	9	.259
	Linear-by-Linear Association	.675	1	.411
	N of Valid Cases	390		
a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is .82.				
b. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .20.				
c. 9 cells (56.3%) have expected count less than 5. The minimum expected count is .34.				

Source: Authors

Table 4: Difference in education and usage rate

Settlement Type		Value	df	Asymptotic Significance (2-sided)
Urban	Pearson Chi-Square	13.857[b]	12	.310
	Likelihood Ratio	15.026	12	.240
	Linear-by-Linear Association	.820	1	.365
	N of Valid Cases	236		
Rural	Pearson Chi-Square	31.451[c]	12	.002
	Likelihood Ratio	28.222	12	.005
	Linear-by-Linear Association	3.435	1	.064
	N of Valid Cases	154		
Total	Pearson Chi-Square	23.731[a]	12	.022
	Likelihood Ratio	26.426	12	.009
	Linear-by-Linear Association	4.968	1	.026
	N of Valid Cases	390		
a. 5 cells (25.0%) have expected count less than 5. The minimum expected count is 1.49.				
b. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .61.				
c. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .31.				

Source: Authors

Table 5: Difference in occupation and usage rate

Settlement Type		Value	df	Asymptotic Significance (2-sided)
Urban	Pearson Chi-Square	12.435[b]	12	.411
	Likelihood Ratio	13.165	12	.357
	Linear-by-Linear Association	2.491	1	.115
	N of Valid Cases	236		
Rural	Pearson Chi-Square	26.361[c]	12	.010
	Likelihood Ratio	29.075	12	.004
	Linear-by-Linear Association	5.072	1	.024
	N of Valid Cases	154		

Total	Pearson Chi-Square	17.440[a]	12	.134
	Likelihood Ratio	17.908	12	.119
	Linear-by-Linear Association	.258	1	.612
	N of Valid Cases	390		
a. 5 cells (25.0%) have expected count less than 5. The minimum expected count is .72.				
b. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .47.				
c. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .18.				

Source: Authors

5. Discussion

The current study focused on the demographic variables affecting the usage rate in urban and rural contexts. Thereby the present study answers the call for research exploring digital initiatives in the rural population (Salemink, Strijker,& Bosworth, 2017). However, in addition, the present study also explores whether digital initiatives bring relatively different changes in the usage behaviour among the rural and urban populations. This is where the novelty of the study lies. The major findings bring out some counter intuitive insights into the usage behaviour in rural population.

First, gender significantly affects usage rates in rural areas but not in urban or overall. This suggests that in rural populations, gender plays a role in how much time is spent online, possibly due to varying access or cultural norms. In contrast, in urban settings, gender difference is less pronounced. Second, age significantly correlates with usage rates in rural areas but not in urban areas or the overall population. This indicates age-based online behaviour differs more in rural areas, where older populations might face more internet access barriers than younger ones. This supports existing thoughts of digital usage by rural population (Townsend et al., 2013; Skerratt, Farrington, & Ashmore, 2012). Third, education level was also found to be a key factor affecting usage rate, particularly in rural areas or even in the overall sample. This highlights the importance of education in determining internet usage, especially in rural areas, where access and digital literacy might be lower among those with less formal education. Education has been observed to be a key factor affecting digital adoption in rural areas (Salemink, Strijker, & Bosworth, 2017). Lastly, occupation affects usage rate significantly in rural areas but not in urban areas or the overall population, pointing to the different occupational structures in rural areas, where certain jobs may limit or encourage usage (LaRose et al., 2007; LaRose et al., 2011). Overall, the results suggest that rural populations experience more pronounced demographic-based differences in usage rate

than their urban counterparts, underscoring the need for target digital inclusion strategies.

6. Conclusion and implications

The present study has multiple policy implications. First, the findings from the present study support the notion that government initiatives in digital inclusion may actually bear fruit by bringing marginalised societies such as rural population under the purview of digital usage. In addition, the descriptive finding on the digital usage by rural population underlines the fact that digital usage can be high in rural areas to as contrary to traditional notions. However, some of the findings underscore pain points or challenges for digital inclusion. For example, the usage rate was found to be significantly lower for elderly rural people. This may be a natural fallout as elderly audience may not have the technology readiness to operate digital devices. However, this implies that the government needs to facilitate digital education to bring the elderly audience under the purview of digital inclusion. This will not be possible merely with provisions of digital inclusion but would require digital literacy and handholding so that the elderly are enabled to use digital media. Another policy implication arises from the finding that shows a difference in usage rate based on occupation. While this may also be a natural outcome because certain traditional occupations do not allow enough exposure to digital media. However, exposure to the digital media in those cases may actually help the audience to perform better in the same occupations. This calls for a focused approach where not just digital education but facilitating understanding and demonstrating the value of digital literacy in traditional professions may help. On the similar lines to the previous implication, this study suggests that a mere provision of digital inclusion initiatives may not be sufficient, if the value of the same is not communicated through frequent demonstrations. To summarise, the present study supports the role of digital inclusion in increasing digital usage rate but also notes the possibilities for the usage in an effective way.

The present study is of descriptive nature and thus allows a lot of scope for future research. First, the study was conducted in a single country with specific socio demographic characteristics. The very nature of rural audience may differ depending on the country. Thus, similar studies can be carried out in other developing nations which can help to validate the findings from the present study. Second, the present study was of descriptive nature and did not explore the cause of usage behaviour. Neither did it explore the effect of the usage behaviour on various parameters of individual development such as empowerment. Future studies can explore the effect of digital inclusion on individual level variables such as empowerment and perceived competence. That may also allow testing of digital inclusion in a numerological network of antecedents and consequences. Finally, the present study hard a cross-sectional approach. Digital inclusion will have a temporal effect on the user and the

manifestations may take some time to develop. Thus, a time series study may help in understanding the temporal effect of digital inclusion. Nevertheless, the present study explored and illuminated a hitherto under investigated area and generated relevant implications for theory.

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