Bridging the Digital Divide for Sustainable Development: A Study of Digitalization and Inclusive Growth Among the Jenu Kuruba Tribe in Mysore

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Abstract: Digitalization has become a critical enabler of sustainable development, creating opportunities for economic participation, social inclusion, and improved access to services. However, its benefits are not uniformly distributed, and marginalized groups such as tribal communities often remain excluded from digital transformation. Bridging this divide is vital for advancing inclusive growth and achieving the Sustainable Development Goals (SDGs). This study examines the extent and impact of digital access, literacy, and utilization among the Jenu Kuruba tribal community in Mysore District, Karnataka, to evaluate whether digital technologies promote empowerment or reinforce existing inequalities.

The research employed a descriptive and analytical design, relying on primary data collected from 160 respondents through a structured questionnaire. Purposive sampling was used to capture diversity across demographic variables such as age, gender, education, and occupation. Data were analyzed using SPSS software, with descriptive statistics and Chi-square tests applied to explore associations between socio-demographic factors, digital literacy, and perceived benefits.

Findings reveal that while 65 percent of respondents owned mobile phones, only 30 percent possessed smartphones and just 18 percent reported reliable internet access. Digital literacy remained low, with only 20 percent having received formal training. Education and age were significantly associated with the likelihood of training, while occupation influenced perceptions of benefits, particularly among agricultural workers. Importantly, receipt of digital training was strongly linked to perceiving social and economic benefits. Persistent barriers included poor connectivity, high costs, limited culturally relevant content, and mistrust of digital systems.

The study concludes that access alone does not ensure inclusion; digital participation requires skills, affordability, cultural relevance, and trust. Policy recommendations include localized digital literacy programs, affordable devices and connectivity, and integration of digital initiatives within tribal welfare schemes. These findings contribute to the discourse on digital inclusion and provide policy insights for advancing sustainable and equitable development in marginalized communities.

Keywords: Digital Divide; Digital Inclusion; Digital Literacy; ICT; Inclusive Growth; Jenu Kuruba Tribe; Social Equity; Sustainable Development; Tribal Communities.

Introduction

The rapid advancement of digital technologies has fundamentally transformed economies, societies, and governance structures across the globe. By enhancing access to information, facilitating communication, and enabling participation in economic and civic life, digitalization is increasingly positioned as a catalyst for inclusive and sustainable development. The United Nations' Sustainable Development Goals (SDGs), particularly Goal 9 (Industry, Innovation, and Infrastructure) and Goal 10 (Reduced Inequalities), emphasize the importance of equitable access to digital resources in bridging social and economic divides. Despite this global progress, digital transformation has not been uniformly inclusive, leaving behind marginalized communities such as indigenous populations and rural groups who continue to face barriers in digital access and utilization.

In the Indian context, the government's flagship *Digital India* initiative has made significant strides in expanding digital infrastructure and promoting e-governance. However, the benefits of these programs often remain concentrated among urban and relatively privileged groups, while tribal and rural populations continue to struggle with limited access, inadequate digital literacy, and structural inequalities. For many indigenous communities, digital exclusion compounds existing challenges related to poverty, low education levels, unemployment, and limited access to healthcare and welfare schemes. As a result, the digital divide risks reinforcing rather than reducing social and economic disparities.

One such marginalized community is the Jenu Kuruba tribe, an indigenous group traditionally dependent on forest-based livelihoods in the Mysore district of Karnataka, India. Despite being among the most vulnerable groups in the region, there is limited empirical research on how digitalization influences their access to opportunities for education, employment, welfare, and social participation. Existing studies on tribal communities in India largely focus on rural development or digital literacy in general, with few specifically examining the intersection of digital inclusion and sustainable development outcomes among forest-dependent populations.

Against this backdrop, the present study aims to empirically assess the extent and impact of digital access, literacy, and usage among the Jenu Kuruba tribe. The research seeks to determine whether digital technologies function as instruments of empowerment or whether structural and socio-economic barriers limit their transformative potential. By addressing this gap, the study contributes to academic discourse on digital inclusion while providing policy insights for advancing sustainable and equitable development in marginalized tribal communities.

Review of Literature

Digital inclusiveness is becoming widely perceived as a key driver of social change and economic development. As Hilbert (2011) states, access to digital technologies improves several capabilities of people, particularly those who come from disadvantaged communities. Access in itself is not enough, however. According to van Dijk (2006), the second-order digital divide, which surrounds digital skills, content interest, and actual use, is an important factor in determining the capacity for technology to be transformative.

Moreover, in India, for instance, the government's flagship Digital India campaign has resulted in considerable investments in digital infrastructure and e-governance. Notwithstanding these attempts, Christie (2005) noted that "the initial hype on the tribal peoples in cyberspace was much louder than the drumming of the reality on the ground" (p. 12) while for various reasons, tribal groups continue to occupy the periphery of the digital revolution (Dandekar, 2020; NITI Aayog, 2021). Digital exclusion factors, including remote connectivity, expensive equipment and services, low levels of digital literacy, and cultural or language barriers, all prevent meaningful digital participation by Aboriginal populations.

In this respect, Gurumurthy and Chami's (2019) work highlights that digital inclusion measures should take into account social, cultural, and linguistic diversity to prevent deepening the existing inequalities. Meanwhile, Heeks (2010) highlights that in digital development projects, the requirements of marginal groups are often obscured from view, and as such, while infrastructure development may be improving, digital exclusion remains.

Research on tribal societies (Patnaik et al., 2018; Sharma & Singh, 2020) specifically shows how the fusion between indigenous knowledge systems and digital technologies can serve a twofold purpose: to suppress and propel the empowerment of indigenous communities. However, barriers to success remain: there is not sufficient culturally relevant digital content, local capacity-building efforts are small, and the technology industry struggles with low representation of local entrepreneurs and content creators.

While prior research has explored the digital divide in various tribal and rural contexts across India, there is limited empirical evidence focusing specifically on the Jenu Kuruba tribe of Mysore. Furthermore, few studies have examined the direct relationship between digitalization initiatives and measurable outcomes in inclusive growth among such marginalized groups. This study seeks to fill this gap by providing primary data and analysis on the digital experiences and development outcomes within the Jenu Kuruba community.

Objectives of the Study

1. To assess the level of access to digital technologies among the Jenu Kuruba tribal community.
2. To evaluate digital literacy and usage patterns within the community.
3. To examine the perceived impact of digital access on social and economic inclusion.
4. To identify challenges and barriers to digital inclusion.
5. To suggest policy recommendations for inclusive and sustainable digital development.

Research Methodology

The study follows a descriptive and analytical research design to investigate the extent of digital inclusion and its implications for the Jenu Kuruba tribal community in Mysore District, Karnataka. This approach was considered appropriate as it allowed the researcher to describe existing conditions of digital access, literacy, and usage, while also analyzing their associations with demographic and socio-economic characteristics. A purposive sampling method was adopted to select respondents in order to capture diversity in age, gender, education, and occupation. In total, 160 members of the community were surveyed, and this sample size was considered adequate for conducting statistical tests relevant to the study objectives.

Primary data were collected using a structured questionnaire that was pre-tested for clarity and reliability before administration. The instrument covered four dimensions: socio-demographic details, digital access and ownership of devices, digital literacy and usage patterns, and perceptions of digital benefits and barriers. The questions were primarily close-ended to facilitate quantitative analysis, although respondents were also given limited scope to provide additional remarks. Data were collected in the local context with the assistance of community volunteers to ensure cultural appropriateness and accuracy of responses.

The data collected were coded and analyzed using SPSS software. Descriptive statistics such as percentages and frequencies were used to summarize the demographic profile and levels of digital access and literacy. Cross-tabulations were employed to explore the relationship between demographic characteristics and digital inclusion indicators. To examine the hypotheses framed for the study, Chi-square tests were conducted at a significance level of $p < 0.05$, thereby enabling the identification of statistically significant associations between education, age, occupation, digital training, and perceived digital benefits.

Ethical considerations were observed throughout the research process. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality was maintained to ensure that the data were used solely for academic purposes. The study acknowledges certain limitations, including reliance on self-reported information and the use of purposive sampling, which may limit the generalizability of results beyond the studied community. Nevertheless, the methodology provides robust empirical evidence to address the research objectives and contributes to understanding the dynamics of digital inclusion in marginalized tribal populations.

Data Analysis and Results

Demographic Profile

The ratio was 58% to 42% between males and females, while 60% were aged 21-40 years. With respect to education, 25% of the participants were non-literate, 40% were literate at primary levels, 25% were at secondary level, and 10% were educated above secondary level. Regarding occupation, 35% were farmers, 30% were daily wage laborers, and 15% were unemployed.

Digital Access

58% of respondents possessed a mobile phone, but only 22% had a smartphone. Half of the respondents (50%) had internet access, with only 18% having reliable access. Low access to computers or tablets was particularly low; only 12% reported such availability.

Digital Literacy and Usage

Digital literacy was low, as only 20% had taken formal digital training. Simple use of mobile for calls, SMSs, or WhatsApp was reported by 60% of the respondents. More sophisticated online behaviors, such as accessing government web portals (15%) and making use of financial applications (18%), were less common. Only 10% reported educational use of online platforms in learning or skill development.

Perceived Benefits of Digitalization

Thirty-five percent of respondents perceived increased access to welfare schemes through digital coverage, and 22 percent reported improved access to market information. Forty percent reported improved communication, and 28% were more aware of their rights. Despite those gains, more than half (55%) said they felt excluded by digital technology, often because of a lack of know-how and poor connections.

Barriers to Digital Inclusion

The most common barriers identified were lack of digital skills (70%), poor internet access (55%), cost of devices and data (50%), language and content issues (40%), and mistrust of digital systems (25%).

Hypothesis Testing and Results Interpretation

To investigate in empirical terms the interrelations between demographic variables, digital training, and perceptions of digital benefits, we tested various hypotheses on the base of Chi-square analyses.

H1: Education level is significantly associated with receipt of digital training.

The analysis indicated a significant relationship between education level and having received digital training ($\chi^2 = 18.45, 3, p < 0.001$). This means that individuals with a higher education level were more likely to have received training in digital literacy, highlighting the importance of education in accessing digital skills development.

H2: Age group is significantly associated with receipt of digital training.

There was also a significant association between age and receiving digital training ($\chi^2 = 10.24, 2, p = 0.02$) with respondents being younger than older community members. This represents a generational gap in the acceptance of digital technology and its view.

H3: Gender is significantly associated with internet access.

There was no significant relationship observed between gender and internet access ($\chi^2 = 1.23, 1, p = 0.27$); therefore, males and females in the Jenu Kuruba community appeared to have relatively equal digital access.

H4: Occupation is significantly related to perceived digital benefits.

Occupation was significantly associated with the perception of digital benefit ($\chi^2 = 15.36, 3, p = 0.001$). We also found that agricultural workers reported more advantages, likely due to their use of digital tools to access market information and communicate, which underscores the importance of livelihood context on digital inclusion outcomes.

H5: Receipt of digital training is significantly associated with perceiving digital benefits.

Receiving digital training was strongly associated with benefiting from digitalization ($\chi^2 = 22.47, 1, p < 0.001$). This important result further emphasizes digital education as the key to translating access into significant economic and social benefits.

Interpretation

These results provide a collective confirmation that basic digital access is essential but that education, age, occupation, and, in particular, digital skills training have considerable impacts on the effective use and benefits of digital technology. Therefore, digital inclusion programs should emphasize skill formation based on the demographic and occupational profile of the tribal community to ensure fair and sustainable development.

Discussion

The findings of this study reveal that while digital accessibility among the Jenu Kuruba community has shown signs of improvement, meaningful digital inclusion remains limited. Mobile phone ownership is relatively widespread, but access to smartphones, reliable internet, and advanced digital tools is considerably lower. This outcome reflects what van Dijk (2006) referred to as the "second-level digital divide," in which basic access exists but disparities in skills, literacy, and utilization restrict the full benefits of digitalization. In the present study, only a small proportion of respondents had received formal digital training, which significantly influenced their ability to translate access into tangible socio-economic advantages. This aligns with Hilbert's (2011) assertion that access alone is insufficient without the necessary skills and capabilities to use technology effectively.

Education and age emerged as important determinants of digital literacy, with younger and better-educated participants more likely to have received training and reported benefits. This is consistent with the observations of Sharma and Singh (2020), who noted that generational and educational differences strongly influence technology adoption in tribal communities. Interestingly, gender was not found to be significantly associated with internet access, suggesting that, at least within this community, digital participation is not heavily constrained by gendered barriers,

although further qualitative exploration may be required to understand underlying patterns of use. Occupation was also a critical factor, with agricultural workers reporting greater perceived benefits, particularly in accessing market information. This supports prior findings by Malhotra and Singh (2020), who emphasized the potential of digital tools to enhance rural and agricultural livelihoods.

Despite these positive trends, barriers such as high costs, poor connectivity, limited availability of culturally relevant content, and mistrust of digital platforms continue to hinder digital inclusion. These findings echo the concerns of Dandekar (2020) and Suri and Arora (2022), who highlighted the persistence of structural barriers that prevent marginalized groups from fully engaging in the digital economy. The evidence from this study reinforces the argument that digitalization can only serve as an enabler of sustainable development when access is complemented by capacity building, trust-building, and localized content that resonates with cultural and linguistic contexts.

Taken together, the results underscore that digital inclusion in tribal communities is not a linear outcome of infrastructure provision but a multidimensional process shaped by education, occupation, training opportunities, and socio-cultural relevance. The study contributes to the growing body of evidence that bridging the digital divide requires not only technological solutions but also context-sensitive interventions aimed at enhancing digital skills, reducing costs, improving trust in systems, and creating locally meaningful content. In this way, digitalization can move beyond symbolic access to become a genuine instrument of empowerment and sustainable development for marginalized populations.

Challenges and Policy Implications

Key Challenges

The study identifies three major challenges hindering digital inclusion in the Jenu Kuruba community: low digital literacy, inadequate digital infrastructure, and persistent socioeconomic barriers. Furthermore, linguistic and cultural gaps between existing digital content and the users' dialects impede practical use and engagement. Additionally, a lack of trust in digital platforms also discourages wider usage and active use.

Policy Implications

To meet these challenges, a multi-faceted policy response is needed:

1. **Community-Based Digital Literacy Programs:** Develop localized training initiatives delivered to the people in their language to increase digital literacy.
2. **Low-cost digital access:** Support discounted provision of smartphones and community internet centers to lower the cost of access.
3. **Culturally Relevant Digital Content:** Create digitally relevant content and interfaces that accurately reflect tribal dialects and cultural varieties in order to improve usability.
4. **Integration with Welfare Schemes:** Make digital literacy and access programs a part of the existing tribal welfare schemes for better reach and effectiveness.
5. **Last-Mile Infrastructure Investment:** Prioritize funding to expand broadband connectivity to remote tribal communities so they have equitable access to the Internet.

Conclusion and Recommendations

This study has examined the role of digitalization in shaping the socio-economic inclusion of the Jenu Kuruba tribal community in Mysore District, Karnataka. The evidence indicates that while access to basic mobile devices has expanded, gaps in smartphone ownership, reliable internet connectivity, and digital literacy remain significant. More importantly, the analysis confirms that access alone does not translate into empowerment; instead, education, age, occupation, and particularly digital training determine whether technology can generate meaningful social and economic benefits. These findings highlight the persistence of a second-level digital divide, where disparities in skills and usage deepen inequalities despite improvements in basic access.

Theoretically, the study contributes to digital inclusion research by demonstrating how structural and demographic factors interact to shape the outcomes of technology adoption in marginalized communities. It reinforces the argument that digitalization must be viewed not as a uniform process but as one mediated by social, cultural, and economic contexts. Practically, the findings underscore the necessity of integrating digital literacy programs, culturally relevant content, and community-centered approaches into existing development strategies. Policy recommendations emerging from this research include the provision of affordable devices, investment in last-mile infrastructure, localized training in tribal dialects, and trust-building measures to improve confidence in digital platforms.

The implications extend beyond the Jenu Kuruba community. They suggest that for tribal and other marginalized groups, digitalization can become an enabler of sustainable development only when technology adoption is accompanied by skills, affordability, relevance, and inclusivity. As India continues to pursue ambitious digital transformation under the Digital India initiative, the results of this study provide a timely reminder that equity must remain central to digital development policies.

While this research offers valuable insights, it is not without limitations. The use of purposive sampling limits the generalizability of findings, and reliance on self-reported data may introduce bias. Future research could employ larger, representative samples across different tribal groups, incorporate longitudinal designs to track digital adoption over time, and use qualitative approaches to capture deeper cultural and behavioral dynamics.

In conclusion, bridging the digital divide for marginalized tribal communities requires more than technological provision. It demands a multidimensional strategy that aligns infrastructure development with digital skills training, socio-cultural relevance, and inclusive policy frameworks. By addressing these interrelated dimensions, digitalization can evolve into a genuine driver of social equity, economic opportunity, and sustainable development.

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APPENDIX

Appendix A: Structured Questionnaire

Section 1: Demographics

The following section represents the demographic backgrounds of the participants.
1 Age Open-ended numeric —
2 Gender Categorical □ Male □ Female □ Other
3 Education Level Categorical □ Non-literate □ Primary □ Secondary □ Higher Education
4 Occupation Categorical □ Agriculture □ Daily Wage Labor □ Unemployed □ Other (specify)

Section 2: Digital Access

Table 1: Emphasizes ownership and access to digital equipment among respondents.

Question Number	Question Response Type	Options
5	Do you own a mobile phone?	□ Yes □ No
6	If yes, is it a smartphone?	□ Yes □ No
7	Do you have internet access?	□ Yes □ No
8	If yes, is the internet connection reliable?	Yes □ No
9	Do you have access to a computer or tablet?	Yes □ No

Section 3: Digital Literacy and Usage

Table 2: Evaluate the degree of training and kinds of digital usage.

Question Number	Question Response Type	Options
10	Have you received formal training on digital devices?	□ Yes □ No
11	Which of the following activities do you perform on your phone or digital device?	□ Calls □ Messages □ WhatsApp □ Govt Portals □ Financial Apps □ Online Learning
12	How confident are you using digital devices?	□ Yes □ No

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Section 4: Perceptions and Benefits

Table 3: Measures perceived impact and barriers.

Question Number	Question Response Type	Options
13	Has digital access helped you access welfare schemes?	□ Yes □ No
14	Has it helped you get better market information?	□ Yes □ No
15	Has it improved communication with others?	□ Yes □ No
16	Has it increased your awareness of your rights?	□ Yes □ No
17	Do you feel digitally excluded?	□ Yes □ No
18	What barriers prevent you from using digital technology effectively?	□ Lack of skills □ Poor connectivity □ Cost □ Language barriers □ Distrust □ Other (specify)

Appendix B: Sample Data Analysis Tables

B1. Demographic Profile of Respondents (N=160)

Table 4: Demographic Variable Category Frequency Percentage (%)

Particular		No. of Respondents	Percentage
Gender	**Male**	93	58
	Female	67	42
Age	**21- 40 years**	96	60
	Others	64	40
Education Level	**Non-literate**	40	25
	Primary	64	40
	Secondary	40	25
	Higher Education	16	10
Ocupation	**Agriculture**	56	35
	Daily wage labor	48	30
	Unemployed	24	15
	Others	32	20

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B2. Digital Access and Usage

Table 5: Variable Category Frequency Percentage (%)

Particular	Yes/No	No. of Respondents	Percentage
Mobile phone ownership	Yes	104	65
Smartphone ownership	Yes	48	30
Internet access	Yes	80	50
Reliable Internet	Yes	29	18
Computer/tablet access	Yes	19	12
Received digital training	Yes	32	20

B3. Perceived Benefits of Digital Inclusion

Table 6: Benefit Frequency Percentage (%)

Particular	No. of Respondents	Percentage
Access to welfare schemes	56	35
Better market information	35	22
Improved communication	64	40
Awareness of rights	45	28
Feeling digitally excluded	88	55

B4. Barriers to Digital Inclusion

Table 7: Barrier Frequency Percentage (%)

Particular	No. of Respondents	Percentage
Lack of digital skills	112	70
Poor Internet connectivity	88	55
High cost	80	50
Language/content barriers	64	40
Distrust of digital systems	40	25

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Appendix C: Hypothesis Testing – Chi-Square Analysis

Hypothesis Variables Chi-Square Value df p-value Interpretation
H1: Education level is associated with receiving digital training Education & Digital Training 18.45 3 <0.001 Significant association
H2: Age is associated with receiving digital training Age & Digital Training 10.24 2 0.02 Significant association
H3: Gender is associated with internet access Gender & Internet Access 1.23 1 0.27 Not significant
H4: Occupation is associated with perceived benefits Occupation & Perceived Benefits 15.36 3 0.001 Significant association
H5: Digital training is associated with perceived benefits Digital Training & Benefits 22.47 1 <0.001 Strong significant association

Notes:

1. Chi-square tests were conducted to test the relationships between demographic and digital inclusion variables.
2. $p < 0.05$ was considered statistically significant.