Journal of Library and Information Studies 22:2 (December 2024) pp. 1-19
https://doi.org/10.6182/jlis.202412_22(2).001

Identification of Key Indicators for Measuring the Digital Divide of Tribes: A Content Analysis Approach

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Abstract

India is home to the second-largest tribal population in the world. Tribal communities have always played a significant role in Indian society. They have distinctive lifestyles and customs as well as rich traditions, culture, and heritage. They also have many characteristics in common, such as residing in relative isolation from other social groupings and are relatively more homogeneous and independent. But they fall far behind in reaping the benefits of digital technology applications when compared to non-tribal population. There exists a huge gap in the access and use of digital devices and services between the tribal and non-tribal population. There might be internet facilities in tribal villages because the government has been keen in uplifting the lives of tribal people through various initiatives such as Digital India programme, but the fact remains that they lack the skill and infrastructure to utilize the benefits of the internet. Hence it is evident that there exists digital divide which hinders the economic and social development of the tribes. This paper attempts to identify a set of core dimensions and indicators that could be potentially used to measure the digital inclusion of the tribes. The digital divide between the tribal group and non-tribal group deepens with the ever-changing digital landscape and for ensuring digital inclusion, this digital divide should be eliminated. Qualitative content analysis of selected documents using MAXQDA software, one of the leading software for qualitative and mixed methods research, was used in this study. Five key dimensions—Accessibility, Affordability, Awareness, Ability and Attitude (5As) that play a crucial role in identifying the extent of digital inclusion of the socially excluded group of population were extracted from the documents subjected to qualitative content analysis.

Keywords: Digital Inclusion; Digital Divide; Tribal Development; Content Analysis; MAXQDA

1. Introduction

Tribal population constitutes about 8.6% of the country's total population according to 2011 census. Tribes are a group of people having their own customs, culture and language tradition which make them distinct from other sections of the population. "Adivasi" or "original inhabitants" is the term which denotes hundreds of India's tribal people (Survival, n.d.). The International Labour Organization has classified such people as "indigenous" (Tribal Co-operative Marketing Development Federation of India [TRIFED], 2020). According to Press Information Bureau (2018), almost 90% of the tribal population live in rural areas. As per Census 2011, at all India level, literacy rate of Scheduled Tribes (STs) was 59% whereas the overall literacy rate was 73% (Press Information Bureau, 2020).

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Despite the efforts of the government, tribal areas continue to suffer from poor maternal and child health services and ineffective coverage under national health and nutrition programmes. Research and data available through surveys have found that infrastructure like Sub-Centres, Community Health Centres (CHCs), Public Health Centres (PHCs) and others are less than required in the tribal areas (Mathew & Sachin, 2019). The percentage of Scheduled Tribes living below the poverty line in rural areas is 45.3% whereas the percentage of Scheduled Tribes living below the poverty line in urban areas is 24.1% (Press Information Bureau, 2014). A recent report by the Internet and Mobile Association of India (IAMAI) states that only 29% of rural population has access to the internet as compared to 64% of urban population (Ganesan, 2023).

India is witnessing an era of digital revolution with the Digital India initiative of the central government which aims to transform India into digitally empowered society and digital economy. While urban people have access to these digital devices and services, rural people remain excluded from this digital revolution. This may be mainly due to lack of infrastructure facilities, lack of awareness about digital technologies or due to poor socio-economic conditions.

In today's digital world, almost all the activities related to our daily life are influenced by information and communication technologies (ICT). The prevalence of digital tools, devices and technology have profoundly changed the way people communicate and work. The availability of information on the internet and the various means to access it such as smart phones, laptops, tablets supplemented by social media platforms and applications has led to the creation of virtual communities and networks. This makes communication easier and quicker, but the world seems to be shrinking at the hands of internet. According to Basuroy (2023), the country's digital population is approximately 692 million active users as of February 2023. This is the result of India government's Digital India initiative and due to the increase in internet penetration over the years. Those who can easily adopt and adapt to the changing technologies tend to benefit out of it. Those who are not able to adopt and adapt to the technology shifts are greatly affected both economically and socially. This creates a divide between the digital haves and have-nots. Even though 70% of Indian population lives in rural areas, urban areas have the highest number of internet connections. During the financial year 2023, the total internet connection in rural India is 343.82 million whereas the total internet connection in urban India is 507.12 million (Sun, 2023).

Many factors such as low income, illiteracy, geographic location, language, availability of relevant content, etc., are responsible for digital divide. The barriers to digital technology applications are predominant in rural areas where developments do not reach or are slow. The only solution to bridge this digital divide is to undertake studies to know the problems leading to digital divide in rural areas and make the authorities aware of existing situation so that appropriate measures can be framed and adopted to overcome the digital divide.

2. Definition of Terms

The key constructs used in the paper are tribes of India, digital divide and digital inclusion. In

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order to provide a theoretical understanding of the concepts dealt within this study, the definitions of these concepts are given below:

2.1 India's tribal community

India's tribal community refers to the diverse groups of indigenous people, often living in specific geographical areas with their distinctive cultures, languages, and socio-economic conditions. These communities are known for their distinct social structures, traditions and close links to nature and are also known as Scheduled Tribes or Adivasis. India's tribal communities are an integral part of the country's cultural diversity, and their specific needs and challenges need to be addressed for promoting inclusive development (TRIFED, 2020).

2.2 Digital divide

Digital divide refers to the socio-economic and geographical disparities in access to, adoption of, and expertise in ICT such as the internet. It encompasses inequalities in access to digital devices, consistent internet connectivity, and the ability to leverage digital technologies for socio-economic and educational development and for civic participation. Digital divide highlights the gap between those who have effective access to digital resources and those who do not, which further contributes to broader inequalities in opportunities and outcomes (Organisation for Economic Co-operation and Development, 2008).

2.3 Digital inclusion

Digital inclusion is a comprehensive and equitable approach aimed at ensuring that all individuals, regardless of socio-economic background, geographical location, or demographic characteristics, have meaningful access to and use of ICT. It goes beyond basic internet connectivity and includes factors such as digital literacy, affordability, and the availability of relevant online content and services. Digital inclusion seeks to bridge the digital divide by empowering individuals and communities to participate fully in the digital age, fostering socio-economic development, and reducing barriers to access and use of technology (National Digital Inclusion Alliance, n.d.). Digital inclusion is a crucial and significant measure to eliminate digital divide.

3. Tribes and Digital Divide

India is home to the second-largest tribal population in the world. Tribal communities have always played a significant role in Indian society. The indigenous people of the nation have distinctive lifestyles and customs as well as rich traditions, culture and heritage. They also have many characteristics in common, such as residing in relative isolation from other social groupings and are relatively more homogeneous and independent. They typically love to coexist with nature.

Such indigenous groups have a strong knowledge base developed over centuries by accumulating the data acquired from environmental interactions, lifelong experiences, observations, lessons learned and skills developed (Ganesan, 2023). This traditional knowledge must be preserved and harnessed so that it can positively stimulate development of major sectors such as forest, environment, medicine, agriculture, etc. Providing a platform for indigenous communities, preferably digital platforms, to engage with each other could be more effective.

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The fact that the tribal population remain isolated from the mainstream society and are economically poor, makes it difficult for them to afford digital gadgets and access digital technologies. Economic divide fosters digital divide and the hardships that the tribal people face in accessing electronic technology widens the digital divide between the tribal and non-tribal population. This further hinders the socio-economic development of the tribes because of the increased dependency on the internet by almost all sectors especially education, healthcare, banking, business, etc.

The Government of India has taken massive steps to transform the country into a digitally empowered nation through the Digital India program, that was launched in 2015. In the same year, United Nations member states adopted the 2030 Agenda for Sustainable Development in which a 15-year plan was framed to achieve a set of 17 sustainable development goals. Reducing inequalities is one of the 17 goals and aims to promote the socio-economic inclusion of all citizens regardless of their age, sex, ethnicity, or any other status (United Nations Sustainable Development Group, n.d.).

4. Digital Inclusion of Tribes

Digital India programme was launched by the Government of India with the aim to transform India into a digitally empowered nation by providing adequate digital infrastructure, digital services, and digital empowerment, thereby bridging the digital divide, and ensuring digital inclusion of even the marginalised group of population. While digital divide aims to address the gap between those who have and those who do not have access to different forms of ICT, digital inclusion addresses all the issues responsible for causing digital divide at the policy making level.

When addressing the digital inclusion of rural people, particularly tribal population, it is necessary to identify and develop digital inclusion indicators based on the specific conditions taking into consideration the socio-economic, geographical, educational, cultural, and behavioral patterns of the tribal population. Using appropriate indicators, the extend of digital inclusion/exclusion of tribes must be identified. Only then decisions can be taken at policy making level to intervene into the digital inclusion of tribes. The digital empowerment of the tribal community needs to be ensured if they must progress in this virtual era and the progress of the tribal communities will positively affect the overall progress of the nation. With an aim to develop a set of appropriate indicators to measure the digital inclusion of tribes, this paper aims to answer the following key research questions:

1. What indicators are used by key global indexes to measure digital inclusion?
2. Identify/Develop a set of key indicators that can be used to measure digital inclusion of tribal population.

5. Methodology

Exploratory technique employing qualitative content analysis is used to explore deeper into the research questions identified. According to Swedberg (2020), “exploratory research consists of an attempt to discover something new and interesting by working your way through a research topic.” Exploratory research is usually carried out to get a deeper understanding of the existing problem but need not necessarily provide

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conclusive results and it is often difficult to predict whether anything new and innovative can be found out or not. In exploratory research, both primary and secondary research methods can be employed. This study is done using secondary research method by analysing studies that have already been done. Krippendorff (2019) defined content analysis as "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use." According to Luo (2023), content analysis is a method used to identify patterns in recorded communication. In order to conduct content analysis, systematic collection of data from a set of texts, which can be written, oral, or visual has to be done. This study is structured in five steps: content selection, identification of the units of analysis, defining categories, coding the text using MAXQDA 2022, and analysing the results using MAXQDA.

5.1 Content selection

First step in the process was the selection of content for analysis. The chosen initiatives were identified through an online search in English language, using single and combined keywords including digital inclusion, digital exclusion, marginalised population, digital inclusion measurement, digital inclusion metrics, digital inclusion initiatives, digital inclusion index, etc. While attempting the literature search of similar studies to understand the parameters used for measuring digital inclusion, 14 digital inclusion indexes of international and national coverage were identified. The inclusion criteria included relevance of the index, coverage and alignment to the objective of the study.

5.1.1 Relevance of the index

It refers to the extent to which the content and indicators of the selected indexes are pertinent to the study's focus on digital inclusion in the Indian context.

The document is considered relevant if it contains indicators and information directly linked to digital inclusion, especially measurable within the context of tribal populations in India. If an index includes specific indicators related to digital literacy, internet accessibility in rural areas and awareness in technology adoption, it is deemed relevant.

5.1.2 Coverage

Coverage pertains to the comprehensiveness of the selected indexes in addressing various dimensions or aspects of digital inclusion.

A document is considered to have sufficient coverage if it addresses a diverse set of dimensions within the broader concept of digital inclusion. An index that covers aspects like infrastructure, affordability, skills, and community engagement is more likely to meet the coverage criterion compared to an index focusing on a single dimension. The population covered by the indexes is also considered. The indexes selected for the study measure digital inclusion either nationally or globally taking into consideration diverse population, irrespective of the area (urban or rural) and gender.

5.1.3 Alignment to the objective of the study

Alignment refers to whether the content and goal of the selected sources match the objectives of the study.

A document is considered aligned with the study's objectives if the information provided in the document is directly applicable to the research questions and goals outlined in the study. An index aligns well if it includes information about

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the indicators that are universally relevant and adaptable for different socio-economic settings.

Only 11 indexes satisfied the inclusion criteria, and 3 studies were excluded since they did not fulfil the requirement of the study. As there was only a small amount of text that met the selection criteria, all 11 of them were taken for analysis.

5.2 Identification of the units of analysis

Next step was to determine the level at which analysis of the selected indexes must be done. The term "unit of analysis" refers to the basic element of the content that is being analyzed during content analysis. Unit of analysis could be either a word, a phrase, a sentence, a paragraph, or even an entire document, depending on the research objectives. Here, in this study, "unit of analysis" is used in a slightly different way. The "dimensions" such as accessibility, affordability, ability, awareness and attitude are considered as the units of analysis. The study is focused on examining and comparing how these dimensions are addressed or measured across the chosen 11 indexes. In this study, the "unit of analysis" is being applied at a higher level, perceiving the all-encompassing nature of the dimensions used by the selected indexes.

5.3 Defining categories

In this step, the categories under which the units of analysis can be organised were identified. Categories were identified based on the objective of the study. The categories identified should be able to answer the proposed research questions. Only if the categories are defined, coding of the textual data could be done in a reliable manner. It was ensured that consistent coding of the entire content of all the selected texts was completed.

5.4 Coding the text

Coding means to organize the units of analysis into the categories identified as in the previous step. The entire content was analyzed in detail and all the relevant data was recorded under the suitable predefined categories. Coding can be done either manually or by using any qualitative content analysis software package. In this study, coding of the textual data was done using the MAXQDA 2022 software.

5.5 Analyzing the results

In the final step, the coded data was analyzed to draw conclusions to find answers to the research questions. Further, the distribution of the codes, i.e., the units of analysis inside each document, is analyzed and their distribution is mapped. This analysis proved helpful in identifying the core dimensions and the indicators used in measuring digital inclusion at national and international level. The findings when summarized also helped in developing a set of dimensions and indicators that could probably be used when measuring the extent of digital exclusion/inclusion of the tribal community.

6. Digital Inclusion Measurement Initiatives

For the study, 11 initiatives taken up by international organizations, governments, or research institutions which are based on rigorous data collection methodologies and analysis are taken. Indicators are those specific, observable and measurable characteristics used to identify

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the progress of an initiative towards achieving a definite outcome (United Nations Women, 2010). Only those initiatives were selected which used indicators that are valid, relevant to the problem, easily measurable, quantifiable and revisable. The 11 initiatives taken for the study are:

1. ITU ICT Development Index (ITU-IDI)
   The ITU ICT Development Index is developed by International Telecommunication Union to assess the development of ICT in countries around the world. The index makes use of 3 components—Access, Use and Skills to measure the ICT developments (International Telecommunication Union, 2018).
2. Inclusive Internet Index (III)
   The Inclusive Internet Index is developed by the Economist Impact to measure the extent to which the internet is accessible, affordable, and relevant. The index measures the performance of 100 countries based on 4 key dimensions: Accessibility, Affordability, Relevance and Readiness (Economist Impact, 2022).
3. Digital Economy and Society Index (DESI)
   The Digital Economy and Society Index is developed by the European Commission to assess and track the progress of the digital performance of European Union countries. It measures Europe's digital performance using key dimensions such as Connectivity, Human Capital, Integration of Digital Technology and Digital Public Services (European Commission, 2022).
4. E-Government Development Index (e-GDI)
   The E-Government Development Index is an index developed to measure the e-governance of countries and the survey report is published biennially since 2001 by the United Nations Department of Economic and Social Affairs (UNDESA). This index measures the e-governance of countries based on 3 dimensions—Human Capacity, Provision of Online Services and Telecommunication Infrastructure (United Nations, n.d.).
5. GSMA—Mobile Internet Connectivity Index (GSMA-MICI)
   The Mobile Internet Connectivity Index is developed by Groupe Speciale Mobile Association (GSMA), a group of mobile network operators all over the world. The tool measures the performance of 170 countries, representing 99% of the global population, using the key dimensions of mobile internet adoption—Infrastructure, Affordability, Consumer Readiness and Availability of Content and Services (Groupe Speciale Mobile Association, 2021).
6. Global Competitiveness Index (GCI)
   The Global Competitiveness Index is developed by the World Economic Forum (WEF) to measure the competitiveness of countries and economies around the world based on three dimensions—Human Capital, Innovation Ecosystem and Enabling Environment (World Economic Forum, 2020).
7. Network Readiness Index (NRI)
   The Network Readiness Index was initially launched by the World Economic Forum in 2002, and was redesigned in 2019 by its founders and co-editors, aiming at providing a comprehensive assessment of digital readiness that reflects the crucial role of digital technologies in current society. The key dimensions used by the index are—People, Technology, Governance and Impact (Portulans Institute, n.d.).

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8. Affordability Drivers Index (ADI)
   The Affordability Drivers Index is a tool developed by the Alliance for Affordable Internet (A4AI), an alliance of organizations focused on promoting affordable internet access all over the world, to assess the countries regarding its policy and regulations to provide more affordable internet using 2 key dimensions—Access and Communication Infrastructure (Alliance for Affordable Internet, 2021).
9. Australian Digital Inclusion Index (AUS-DII)
   The Australian Digital Inclusion Index was developed in 2015 through a collaborative partnership between RMIT University, Swinburne University of Technology, and Telstra as a tool to measure the extent of digital inclusion in Australia. It measures the digital inclusion in Australia against three key dimensions—Access, Affordability and Digital Ability (Australian Digital Inclusion Index, n.d.).
10. Roland Berger—Digital Inclusion Index (RB-DII)
    Roland Berger, a global consultancy firm that developed a Digital Inclusion Index to measure the digital inclusion of countries across the globe, uses 4 key dimensions of digital inclusion—Accessibility, Affordability, Ability and Attitude (Low et al., 2021).
11. Digital Future Society—Digital Inclusion Index (DFS-DII)
    Digital Future Society is an initiative supported by the Ministry of Economic Affairs and Digital Transformation of the Government of Spain in collaboration with Mobile World Capital Barcelona. They developed a digital inclusion framework based on the analysis of nine global initiatives measuring digital inclusion and the key dimensions of the framework were Access, Skills, Use and Supportive Environment (Digital Future Society, 2019).

6.1 Excluded indexes

The 3 indexes excluded are: Global Innovation Index (GII) published by the World Intellectual Property Organization, the Digital Inclusion Index (DII) developed by the University of Hong Kong for the Office of Government Chief Information Officer (OGCIO) of the Hong Kong Special Administrative Region Government, and the Digital Inclusion Index proposed by Bonadia, Maria da Silva and Ogushi in Brazilian context.

GII focuses on measuring and assessing a country's overall innovation performance by using the indicators—Infrastructure, Business Sophistication, Human Capital and Research and Institutions (World Intellectual Property Organization, n.d.). Even though one of the indicators is infrastructure, it does not fulfil the criteria—Relevance of the Index and Coverage, as it does not provide indicators and information directly linked to digital inclusion. It only provides valuable insights into a country's innovation landscape and cannot be considered as a dedicated digital inclusion index.

DII, which is developed by the University of Hong Kong, uses the indicators—Access, Knowledge, Usage and Affordability to measure the use of ICT among the disadvantaged groups in comparison with the mainstream society (Wong et al., 2009). Though the index meets the criteria Relevance of the index, it fails to meet

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the second and the third criteria. It does not comprehensively cover various aspects of digital inclusion such as disparity in the availability of ICT infrastructure, access to public facilities, level of digital proficiency and usage of the internet, which are key to measure the digital inclusion. The indicators used are not found to be universally applicable and are not aligned to the goals and objectives of this study.

An index was proposed for measuring digital inclusion based on the concept of barriers to digital inclusion particularly tailored for the socio-economic, cultural and educational scenario of Brazil (Bonadia et al., 2011). The indicators available in the index are Accessibility, Usability, Intelligibility and Information Society. All the indicators mentioned in the index are not universally relevant and do not totally align with the objectives of the present study. Digital inclusion study has not been conducted using the index and speaks only of the theoretical framework. The index does not include a diverse set of dimensions that come within the broader scope of digital inclusion. These indexes were not found to be pertinent to the research questions and objectives and are therefore excluded.

7. Analysis

The data analysis was conducted using MAXQDA 2022 software. MAXQDA (https://www.maxqda.com) is a software that is used for qualitative and mixed methods of data analysis, developed by VERBI software, Berlin. MAXQDA begins with MAX, a bow to the German sociologist Max Weber, and ends with QDA denoting Qualitative Data Analysis, the first version of which was released in 1989. It can be easily used to manage the entire research by easily importing all types of data formats such as documents, interview transcripts, surveys, questionnaires, web pages, images, audio and video files, video file subtitles, tables, bibliographic data, data from YouTube and even tweets. Here, it was used for qualitative content analysis. By using several tools of MAXQDA to analyze and visualize data in the selected documents for creating codes and retrieving it, it shows the selected digital inclusion measurement initiatives to identify the key dimensions that were used in the above-mentioned indexes. This was further used to derive a set of dimensions and indicators that can be ideally used to measure the digital inclusion index of tribal population. The results of the analysis done are detailed below.

7.1 Code explorer

The Code Explorer option was used to give an overview of the use of a particular code throughout the documents. The distribution of codes as analyzed from the 11 documents are shown in Table 1.

Using the Code Statistics tool, frequency tables and charts for top-level codes (key dimensions)

Table 1. Distribution of Codes

Code	No. of documents
Accessibility	11
Affordability	10
Ability	10
Awareness	8
Attitude	5

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and subcode frequencies were created. The core dimensions identified using the Code Statistics tool are shown in Table 2.

The first column shows the various categories of the variable which denotes the core dimensions in this case and the second column shows the absolute frequency. The third column shows the corresponding percentages. The fourth column shows percentages based on valid values, which means the missing values are not included. If there are no missing values among the variables, the percentages shown in the third and fourth columns will be identical.

The analysis showed that there are indicators which could be associated to each core dimensions analyzed. The subcodes (indicators) identified for each core dimension from the documents analyzed is shown in Figure 1.

7.2 Code matrix

The visualizing tool Code Matrix was used to visualize the codes (dimensions) and indicators assigned to each document. The code matrix obtained from MAXQDA during analysis is shown in Figure 2.

In Figure 2, the documents are listed in columns, with codes and subcodes listed in rows. Code matrix visualising tool visualizes the codes and subcodes which have been assigned to each document. This figure gives an idea of the presence of codes and subcodes in the document segments of the indexes. Here the documents are analyzed completely to determine only the existence of codes and subcodes in multiple documents and not the number of occurrences.

7.3 Text search and autocoding

Text search and autocoding were used to identify important text passages in each document. This helped in identifying the number of occurrences of the indicators in the documents under study. The findings are listed in Table 3.

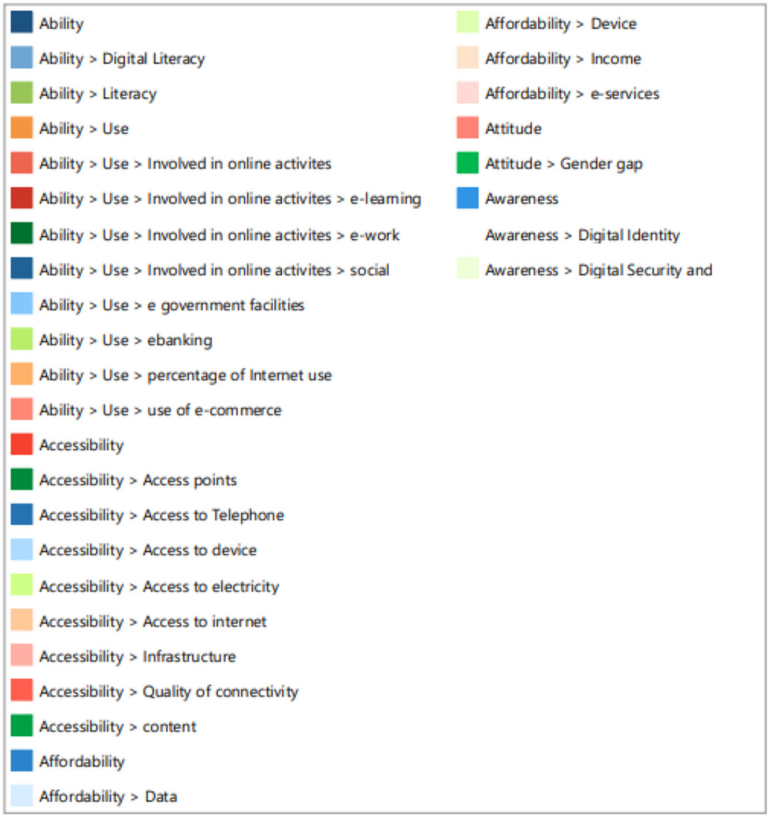
After analysing the documents, a code book was generated consisting of the key dimensions and indicators that can be used to study digital inclusion. The code book generated is represented in Figure 3.

Table 2. Top Level Codes Identified Using Code Explorer

Dimensions	Documents	%	% (Valid)
Affordability	10	90.91	90.91
Awareness	8	72.73	72.73
Attitude	5	45.45	45.45
Ability	10	90.91	90.91
Accessibility	11	100.00	100.00
Documents with code(s)	11	100.00	100.00
Documents without code(s)	0	0.00	-
ANALYZED DOCUMENTS	11	100.00	-

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Figure 1. Indicators (Sub-codes) Identified for Each Core Dimension



7.4 Word cloud

The most frequently assigned dimensions and indicators are visually represented as word cloud using the Code Cloud feature in MAXQDA. It denotes the codes used across all the documents analyzed for the study. The word cloud identified after analysis is shown in Figure 4.

8. Findings

The content analysis of 11 documents selected revealed that "Accessibility" is the top-level dimension that needs to be measured. The indicators that come under the accessibility dimension are accessibility of infrastructure, accessibility of content, availability of access points, quality of connectivity, and access to internet, devices, electricity and telephone. "Affordability" and "Ability" come next to accessibility in the key dimensions to be measured. Affordability of data, devices and digital services, along with income level, are the indicators identified from the documents. The indicators that fall under ability include the extent of literacy, extent of digital literacy as well as the ability to use the internet in different activities such as e-commerce, e-banking, e-governance, e-learning, e-work and involvement in social

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Figure 2. Code Matrix (Visualizing Tool)

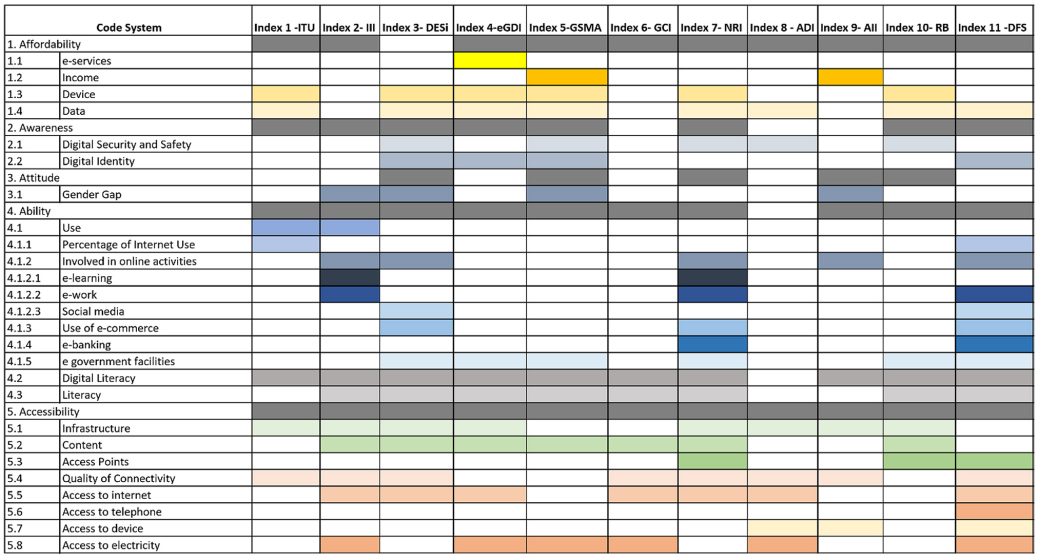
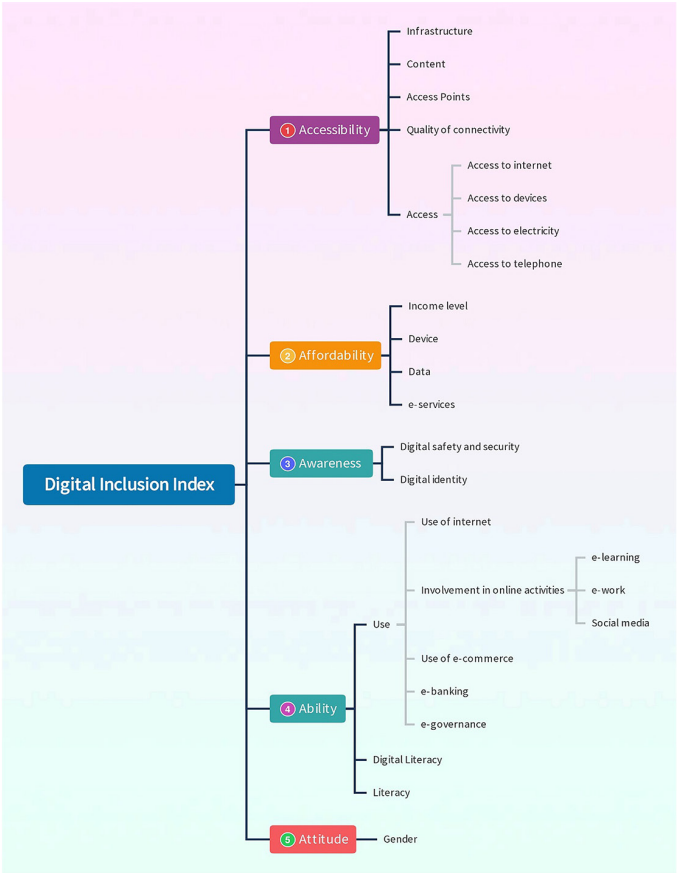


Table 3. Number of Occurrences of Codes in Documents

Document analyzed	Dimensions - No. of occurrences				
	Accessibility	Awareness	Affordability	Attitude	Ability
ITU ICT Development Index (2018)	267	1	43	0	57
Inclusive Internet Index (2022)	40	2	12	0	30
Digital Economy and Society Index (2022)	25	1	0	8	41
E-Government Development Index (2022)	438	10	59	0	228
GSMA—Mobile Internet Connectivity Index (2021)	89	15	81	5	67
Global Competitiveness Index (2020)	77	0	4	0	15
Network Readiness Index (2022)	619	1	8	4	402
Affordability Drivers Index (2021)	141	0	64	0	0
Australian Digital Inclusion Index (2021)	53	0	14	6	43
Roland Berger—Digital Inclusion Index (2021)	67	6	24	10	58
Digital Future Society—Digital Inclusion Index (2019)	141	1	32	0	151
TOTAL	1,957	37	341	33	1,092

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Figure 3. Code Book

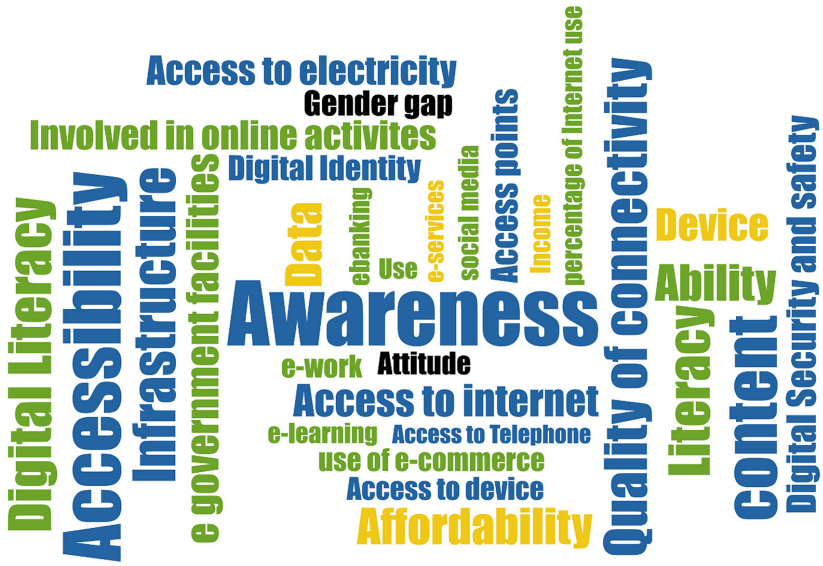


media. Awareness is yet another key dimension that is dealt within 8 documents out of the total documents analyzed. Without awareness regarding the availability of digital content, various accessibility features and options and cyber security, accessibility and affordability are futile.

Another key dimension that was identified as important is "Attitude." Attitude was noted in 5 documents that were analyzed to have an important role in digital inclusion studies. Although attitude is not treated as a key dimension in many digital inclusion measurement initiatives, there are studies analysing gender differences in ICT access to study the digital inclusion and social inequality which use attitude as a characteristic. Studies also suggest that digital inclusion should be measured taking into consideration the unique needs of different socio-economic groups in particular social contexts (Rashid, 2016). Australian Digital Inclusion Index revealed that the dimensions of digital inclusion change according to people's socio-economic conditions as well as geographic locations. The differences in attitude of gender towards the digital facilities and services are to be analyzed and their perception about the digital infrastructure, digital

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Figure 4. Word Cloud



ability and digital devices have to be explored especially while measuring the digital inclusion of people who are marginalized from the rest of the society.

9. Limitations of the Study

The study has potential limitations that are listed below:

1. The dimensions identified are foundational principles of digital inclusion. Further narrow indicators and subindexes must be included in data collection tools for an extensive study on Indian tribal population.
2. There are many more efforts evaluating digital inclusion, but this research only looks at 11 of them. Supplementing the results of this analysis with more research on national strategies for data collecting and indicators linked to digital inclusion would be appreciable.
3. MAXQDA is a software used for comprehensive data analysis that works with diverse data sets. It offers powerful tools for advanced coding and retrieval. The full potential of the qualitative data analysis software MAXQDA could not be leveraged because managing and analysing an extensive amount of data can be time consuming and laborious. Only limited analysis, that is found to be most relevant to the study was done.
4. This kind of study is not amenable for human quality checks. The study relied entirely on computer mediated text mining or coding, and automated coding usually has built-in features for consistency checks, syntax validation, and error highlighting. Computer coding is often objective and deterministic in nature, which reduces the dependence on subjective human judgment for reliability

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checks. Human reliability checks are more applicable in studies that involve subjective judgment, interpretation, or nuanced decision-making and this study applies an entirely different methodology.

10. Conclusion

Digital inclusion plays an important role in ensuring social equality and social cohesion. Ragnedda et al. (2022) analyzed that socially excluded people are the ones who are more likely to lack the digital skills required to exploit the advantages of the internet to the maximum, which leads to further marginalization of their position and strengthening of inequalities. Digital inequality inversely affects social equality and it is the socially disadvantaged groups that are greatly affected by digital exclusion. Hence, policy making should rightly focus on providing conditions and facilities to impart necessary competencies and ample opportunities for the marginalised population to fully exploit the benefits of digital world. It is of prime importance to analyze the extent of digital exclusion of the marginalised group of population.

This paper attempted to identify the core dimensions and indicators that could be used to measure the digital inclusion of tribal population by using qualitative content analysis of selected digital inclusion measurement initiatives. The 5 core dimensions identified are Accessibility, Affordability, Ability, Awareness and Attitude. Digital inclusion studies usually encompass dimensions that have universal relevance and can be applied to different contexts, including that of indigenous populations. The dimensions identified in the study—Accessibility, Affordability, Ability, Awareness, and Attitude—have universal significance as they address the foundational facets of digital inclusion and are a common concern worldwide which can be adapted to different cultural and socio-economic settings.

Moreover, the indexes selected for the qualitative analysis assess the digital scenario either at the national level or international level including both urban and rural population. Hence, this paper aims to provide a broad framework on which digital inclusion studies can be designed, as the dimensions identified through the study have been applied in diverse socio-economic contexts globally as read from the chosen indexes. Digital inclusion studies have demonstrated that these dimensions are adaptable and relevant across different economic and cultural landscapes and is therefore applicable to the unique circumstances of Indian tribal population. Most of the countries, including India, often align their initiatives and policies with global benchmarks, and the use of national and international indicators to measure the digital inclusion of the tribal population helps in devising policies and initiatives that are aligned with broader national and global goals.

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(Received: 2023/11/9; Accepted: 2024/3/12)

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圖書資訊學刊　第22卷第2期　（2024.12）　頁1-19
https://doi.org/10.6182/jlis.202412_22(2).001

以內容分析法鑑別部落數位落差之關鍵測量指標

Identification of Key Indicators for Measuring the Digital Divide of Tribes: A Content Analysis Approach

Chitra S[1,2], S. Thanuskodi[3]

摘　要

印度擁有世界上第二大的部落人口，部落保存獨特的生活方式、習俗，以及豐富的傳統與文化遺產。部落多與世隔絕，也相對更同質而獨立。然而，相較於非部落人士，部落社群從數位科技應用獲益較少，在近用數位裝置與服務方面具有莫大落差。儘管透過「數位印度計劃」等倡議，政府在部落設有網路設施，但仍缺乏網路的基礎建設與使用技能。這樣的數位落差阻礙了部落的社經發展，也隨著數位環境變化而不斷加深。同時為確保數位包容，數位落差必須被弭平。

本文使用MAXQDA軟體，透過質性內容分析辨識出一組可用於測量部落數位包容的核心面向與指標，包含可存取性、可負擔性、意識、能力與態度五大關鍵面向，能夠在辨識社會排斥族群的數位包容程度中扮演重要角色。

關鍵字：數位包容、數位落差、部落發展、內容分析、MAXQDA

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註：本中文摘要由圖書資訊學刊編輯提供。
以APA格式引用本文：Chitra S, & Thanuskodi, S. (2024). Identification of key indicators for measuring the digital divide of tribes: A content analysis approach. *Journal of Library and Information Studies, 22*(2), 1-19. https://doi.org/10.6182/jlis.202412_22(2).001
以Chicago格式引用本文：Chitra S and S. Thanuskodi, "Identification of key indicators for measuring the digital divide of tribes: A content analysis approach," *Journal of Library and Information Studies* 22, no. 2 (2024): 1-19. https://doi.org/10.6182/jlis.202412_22(2).001

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