**Information and Communication Technology (ICT) As a Characteristic Tool for Development of Tribes: A Study by Using Data Mining**

Mayank Singh and S. K. Shrivastava

Dr. C. V. Raman University,
Kota Bilaspur, C. G., INDIA.

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**ABSTRACT**

Information and Communication Technologies (ICTs) have potential to play a vital role in social development. Several projects have attempted to adopt these technologies to improve the reach, enhance the coverage base by minimizing the processing costs and reducing the traditional cycles of output deliverables. ICTs can be used to strengthen and develop the information systems of development plans exclusively for tribal and thereby improving effective monitoring of implementation. Tribal in India have been deprived of opportunities because of many factors. One of the important factor is unavailability of suitable infrastructure for the development plan to reach to them. The shift in tribal economy and diversification of occupations has been corroborated in the People of India report by the Anthropological Survey of India. The report maintains that the number of communities practicing hunting and gathering has declined by 24.08 percent, as forests have disappeared and wildlife has diminished. Ecological degradation has severely curtailed the related traditional occupations. For instance, trapping of birds and animals has declined by 36.84 percent, pastoral activities by 12.5 percent, and shifting cultivation by 18.14 percent.

**Keywords** ICT, Tribal’s, Data Mining, Adiwasi.

1. **INTRODUCTION**

The modern day civilization is characterized by the powerful and prolific force of the Information and Communication Technology (ICT). The expansion and proliferation of ICTs have picked up the swiftness for economic and social change, across all areas of human activity worldwide. ICTs facilitate in interactive communication unimpeded by space and time, volume and medium as well as are pocket friendly as they lessen the cost of
communication and information processing. Knowing the mammoth power that the ICTs possess and the instantaneous potential to transform the society, it’s best not to remain aloof. In many instances, poor people have experienced benefits in the form of income hike, advanced health facilities, better education and training, access to job opportunities, engagement with government services, contacts with family and friends, enterprise development opportunities, increased agricultural productivity etc.

However, in the recent years, there have been quite many studies that divulge, the gap that subsists between two categories of people i.e. those who have access to ICTs and those who do not. Such kind of compartmentalization causes exclusion, endangering social integration and hampering economic growth. The digital divide has many dimensions and can be categorized as global, regional and national. At national level, there is no single divide, but multiple divides: for instance; within countries, between men and women, young and elderly, rich and poor and most importantly rural and urban.

1.2 Application of Data Mining in The Field of ICT

The major reason that data mining has attracted a great deal of attention in information industry in recent years is due to the wide availability of huge amounts of data and the imminent need for turning such data into useful information and knowledge. The information and knowledge gained can be used for applications ranging from business management, production control, and market analysis, to engineering design and science exploration.

Data mining can be viewed as a result of the natural evolution of information technology. An evolutionary path has been witnessed in the database industry in the development of the following functionalities: data collection and database creation, data management (including data storage and retrieval, and database transaction processing), and data analysis and understanding (involving data warehousing and data mining). For instance, the early development of data collection and database creation mechanisms served as a prerequisite for later development of effective mechanisms for data storage and retrieval, and query and transaction processing. Become the next target systems opening query and transaction processing as common practice, data analysis and understanding has naturally

Data mining is the extraction of hidden predictive information from large databases, is a powerful new technology with great potential to help companies focus on the most important information in their data warehouses. Data mining tools predict future trends and behaviors, allowing businesses to make proactive, knowledge-driven decisions. The automated, prospective analysis offered by data mining move beyond the analysis of past events provided by retrospective tools typical of decision support systems.

2. SPATIAL DATA MINING

Spatial data mining refers to the extraction of knowledge, spatial relationships, or other interesting patterns not explicitly stored in spatial databases. A spatial database stores a
large amount of space-related data, such as maps, preprocessed remote sensing or medical imaging data, and VLSI chip layout data. Spatial Data Cube Construction and Spatial OLAP

As with relational data, we can integrate spatial data to construct a data warehouse that facilitates spatial data mining. A spatial data warehouse is a subject-oriented, integrated, time variant and nonvolatile collection of both spatial and non spatial data in support of spatial data mining and spatial-data-related decision-making processes.

There are three types of dimensions in a spatial data cube:

a. A non spatial dimension
b. spatial-to-non spatial dimension
c. spatial-to-spatial dimension

3. SPATIAL CLUSTERING METHODS

Spatial data clustering identifies clusters, or densely populated regions, according to some distance measurement in a large, multidimensional data set. Spatial Classification and Spatial Trend Analysis Spatial classification analyzes spatial objects to derive classification schemes in relevance to certain spatial properties, such as the neighborhood of a district, highway, or river.

1. Mining Raster Databases

Spatial database systems usually handle vector data that consist of points, lines, polygons (regions), and their compositions, such as networks or partitions. Typical examples of such data include maps, design graphs, and 3-D representations of the arrangement of the chains of protein molecules.

2. Multimedia Data Mining

A multimedia database system stores and manages a large collection of multimedia data, such as audio, video, image, graphics, speech, text, document, and hypertext data, which contain text, text markups, and linkages. Similarity Search in Multimedia Data When searching for similarities in multimedia data, we can search on either the data description or the data content approaches:

a. Color histogram–based signature
b. Multifeature composed signature
c. Wavelet-based signature

3. Multidimensional Analysis of Multimedia Data

To facilitate the multidimensional analysis of large multimedia databases, multimedia data cubes can be designed and constructed in a manner similar to that for traditional data cubes from relational data. A multimedia data cube can contain additional dimensions and measures for multimedia information, such as color, texture, and shape.
4. Classification and Prediction Analysis of Multimedia Data

Classification and predictive modeling can be used for mining multimedia data, especially in scientific research, such as astronomy, seismology, and geo-scientific research.

5. Mining Associations in Multimedia Data

a. Associations between image content and nonimage content features.
b. Associations among image contents that are not related to spatial relationships.
c. Associations among image contents related to spatial relationships.

6. Audio and Video Data Mining

An incommensurable amount of audiovisual information is becoming available in digital form, in digital archives, on the World Wide Web, in broadcast data streams, and in personal and professional databases, and hence a need to mine them.

7. Text Mining

Text Data Analysis and Information Retrieval Information retrieval (IR) is a field that has been developing in parallel with database systems for many years. Basic Measures for Text Retrieval: Precision and Recall.

8. Mining the World Wide Web

The World Wide Web serves as a huge, widely distributed, global information service center for news, advertisements, consumer information, financial management, education, government, e-commerce, and many other information services. The Web also contains a rich and dynamic collection of hyperlink information and Web page access and usage information, providing rich sources for data mining.

9. Security of Data Mining

Data security–enhancing techniques have been developed to help protect data. Databases can employ a multilevel security model to classify and restrict data according to various security levels, with users permitted access to only their authorized level. Privacy sensitive data mining deals with obtaining valid data mining results without learning the underlying data values.

THE TRIBAL’S IN CHHATTISGARH

Traditionally referred to as adivasis, tribes, or tribals, scheduled tribes (STs) constitute about 9% of India’s population.

In pre-colonial times, nomadic communities sustained themselves through livelihood options such as cattle rearing, trade, crafts, carrying items for barter etc. The adivasis of India repeatedly rebelled against the British in the Northeast, Bengal, Bihar, Madhya Pradesh, Maharashtra, Gujarat and Andhra Pradesh. Adivasi rebellion in hills and forest was
concurrent with education of the rest of India\textsuperscript{1}. Branded as “criminals” during the long period of British rule, the land possessed by the “criminal tribes” was alienated. At the time of independence, India started to view the adivasis as primitive, and thus out of step with history\textsuperscript{1}.

As a basic component of human development, the 83rd Amendment to the constitution has made free elementary education a fundamental right of all the citizens of India. Successive governments have attempted to balance the inequity in the education system, particularly for the marginalized groups. Acknowledging that tribals comprise the most deprived and marginalized groups with respect to education, a host of programs and measures have been initiated since India’s Independence. With education viewed as a crucial input for total development of tribal communities, elementary education has been made a priority area in the tribal sub-plans since the 5th Five Year Plan (1974-79).

Many people outside tribals are ignorant towards their existence and their customs. Contrary to the general belief, Indian tribals are not backward. Their beliefs and thinking resembles the city people. There is no system of dowry, there is no caste division, even divorce and widow remarriage are socially accepted among them. They are an exemplary society when it comes to social practices yet they live a life of poverty and discrimination. People outside tribals area looks upon them as wild, barbaric and unruly. This is largely because of myth and lack of infrastructure to establish effective communications between inhabitants of mainland and tribals.

The perception of people towards tribals in India has been changing since the time people have started interacting with tribals and many developmental and welfare projects were initiated by the government of the day. Nearly 8.10% of the total population of India is tribals. Majority of them are in North eastern states, Jharkhand, Odessa, Chhattisgarh, Andhra Pradesh and Andaman & Nicobar Island. No nation can think of development ignoring this size of population and their rich cultural heritage.

There is difference between them and mainland people in respect of what materialistic comfort that they don’t have. This ‘haves’ is wrongly used as measure of cultural index. And once we use wrong measurement indices/parameters, the result and any inference based on this is bound to be misleading. This is what happening with tribals in India. Independence in 1947 did not bring about any difference in their lives. Instead,
because of absence of any monetary funds, these people had to leave their native places in search of work which led to the loss of their rich heritage. Many of these places today are converted into holiday destinations and resorts by contractors who are driving out the tribals and taking away their resources. Those people who have escaped such fates and still continue to make artifacts, like masks, paintings, wood cutting etc, get meager prices for their products even though the artifacts are generally sold for large sums of money and most of it, is pocketed by middle-men. Sometimes it even leads to the problem of Naxalism. This is largely due to the unawareness among the tribals about their rights, privileges and economic value. ICT may help in filling this gap and therefore our discussion is restricted in this paper to the use of ICT for the improvement of livelihood of tribals in India. There is a section of society who are replacing their IT gadgets every three months whereas there are these 8.1% populations, a majority of them have not even seen a computer. There is an urgent need to not only fill this e-gap but also to work on methodology to make this technology usable for the upliftment of the tribals.

ICT FOR TRIBALS DEVELOPMENT

Information and Communication Technology (ICTs) are extensively used to bring transparency and thereby improving governance. The technology is being used to oversee and monitor the implementation of various welfare and developmental plan in India. Though ICT is in use at various level of e-governance in India, it is worrisome that there is no reliable statistical tool that can be used to measure actual impact of ICT on the livelihood of deprived and under privileged section of the society. ICT is used as an effective tool for enhancing peoples’ livelihood through increased access to information relevant to their economy, healthcare, transport, distance learning etc. There are many ICT projects initiated by Government and local bodies for development of tribal population in India. Many such projects have been successful in other rural area but not in tribal areas because of many reasons as analyzed below. Their requirement is different, and to make the ICT usable for them, a lot of work is required to be done.

Tribals follow a very strong system of oral cultures. The collective memory and importance placed on the elders to store information creates a strong system for information flow. There is a need for an effective interface between the traditional and emerging information systems while introducing ICT in tribal areas. This is more so because tribals are accustomed to receiving information orally from a known and trusted source. It is a challenging task to bring this society to this new digital text based information system. An effective interface model is suggested that may be helpful for sustainable introduction of this technology for the benefits of tribals.

SOME ICT PROJECTS

Information and Communication Technologies (ICT) are used these days at almost every level of decision making process like in the planning, implementation and monitoring. Several social welfare projects and developmental programs have been successfully implemented using ICT under strictly specified timeline. Recently, e-Governance projects
have offered easy access to citizen services and improved processing of government-to-citizen transactions. Some of these have attracted even international attention and won prestigious awards. They have become reference models for future e-governance project implementations. However, an equal number of such projects have faced acute problems of sustenance after their successful launch by the dynamic project champions. An analysis of these projects suggests that comprehensive effort is needed to ensure that citizens derive real benefits from such ICT projects. Many back-end government activities need to be re-engineered and desirable process change is required to be introduced to match the citizen expectations by taking advantage of the storage, processing and distribution powers of emerging ICTs. In addition, an image building exercise through exhibition of transparency is essential to remove the distrust among the citizens on the functioning of service delivery mechanisms. Private participation will have to be facilitated to bring in the expertise, cost sharing, speed of implementation, and to offer better value proposition to citizens. The governments will also have to address more serious management issues of identifying and preparing project champions, ensuring appropriate tenures, smooth transition, and internalization. We present here some studies to substantiate our observations. It is important to highlight the a few ICT projects aimed for the benefits of tribals in India.

Norrish observed once that there is need to move from looking at technology and asking, "What can we do with this?" to looking at peoples’ needs and asking, "Which technology might help here?" Many ICT applications in various sectors like banking, transportation, utility bill payments, land records management, pension management, public grievances redressal systems etc have really changed the perception of ICT in general public. Why not the same can be emulated for tribals? Instead of waiting for the time when tribals will be ready to use ICT, it is time to work in the direction to make them ready to use ICT. Thereby ICT will be helpful in reducing the evolving time for the tribals to be e-ready and that too without losing their rich cultural heritage.

LIVELIHOODS AND EMPLOYMENT STATUS

Traditionally, the tribes in India pursued an economy, which was closer to nature, and used indigenous technology. This is reflected in their dependence on forests and other natural resources available in their habitat. This does not mean that the traditional tribal economy, was in any way, monotonous. While some tribal communities have adopted a way of life, similar to the neighboring non-tribal communities, there are other tribal groups, whose livelihoods are characterized by (a) forest-based livelihoods, (b) pre-agriculture level of technology, (c) a stagnant or declining population (d) extremely low literacy and (e) a subsistence level of economy. A variety of economic activities were pursued by the tribes of India, depending on the availability of resources in their respective habitats. In a study on traditional economic activities pursued by the tribes of India, Vidyarthi and Rai have delineated the following categories:

i) Hunting,
ii) Hill-cultivation,
iii) Plain agriculture,
iv) Simple artisan,
v) Pastoral and cattle-herding,
vi) Folk-artists, and
vii) Agricultural and non-agricultural labour.

Traditional tribal economy was largely a combination of several types of activities. For example, hill cultivators and plain agriculturists, were also occasionally hunting and gathering to supplement their income. Similarly, pastoralists were engaged in agriculture to meet their basic food requirements. Therefore, the above typology of economy is only indicative of the main activities.

However, hunting and foraging have been the main sources of traditional livelihoods for several tribes, including the Birhor, the Hill Kharia, the Pahariya, the Birijia, the Korwa, the Chenchu, the Kurumba, the Paliyan, the Kadar, the Jarawa, the Onge and the Sentinelese. With reduced forest cover and implementation of Wildlife Protection Act, hunting and foraging are on the decline among these tribes. Over the decades, the tribal economy and the livelihood strategies have undergone substantial changes. Since the tribes were traditionally dependent on natural resources, the change was all the more visible due to the depletion of resources. In post-independence period, the rapid phase of urbanization and industrialization alienated the tribes from their traditional natural resource base and forced them to search for newer livelihood options. Increase in population among some tribes, lower availability of food and alienation from natural habitats, made the tribes dependent on urban markets. Many of them left their homes and migrated to urban areas, in search of income and employment. As a result, the already vulnerable tribes were exposed to all kinds of exploitation and marginalization in the new, unfamiliar urban space. Those who continued to live in their original habitats diversified their occupations to ensure their sustenance.

The shift in tribal economy and diversification of occupations has been corroborated in the People of India report by the Anthropological Survey of India. The report maintains that the number of communities practicing hunting and gathering has declined by 24.08 percent, as forests have disappeared and wildlife has diminished. Ecological degradation has severely curtailed the related traditional occupations. For instance, trapping of birds and animals has declined by 36.84 percent, pastoral activities by 12.5 percent, and shifting cultivation by 18.14 percent.

![Figure: 2. Change in Occupations among Scheduled Tribes [Census of India, 1981].](image)
However, there is a rise in horticulture (34.4 percent), terrace cultivation (36.84 percent), settled cultivation (29.58 percent), animal husbandry (22.5 percent), sericulture (82.6 percent), and bee-keeping (60 percent). Many of the traditional crafts have disappeared and spinning, in particular, has suffered (25.58 percent). Related activities such as weaving (3.32 percent), dyeing (33.34 percent) and printing (100 percent) have similarly suffered. Skin and hide work as also stone carving has declined.

**CONCLUSIONS**

This paper is based on the study of the impact of different national level ICT projects implemented in India for the development of rural mass. The Information and Communication Technologies is useful in facilitating the design of solutions to deliver government services for social development at the door step of tribals. The approach is already experimented and successfully implemented in many e-governance projects. ICT projects involve all stakeholders such as government officials, legislators, regulatory agencies, citizens, voluntary organizations, technology consultants, vendors, academics, researchers, funding agencies, and media in the design level. Most of these were accomplished using the public-private-partnership (PPP) model. The benefits derived from such projects were very significant as seen from the mentioned e-SEVA projects.

**REFERENCES**