

## Use of Technology in Tribal Livelihood Enhancement: An Empirical Study

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### Abstract:

Tribal communities in India face significant socio-economic challenges including poverty, limited access to education, and inadequate technology penetration. Recent advances in information and communication technology (ICT), mobile platforms, and digital marketing offer transformative opportunities for livelihood enhancement. This study investigates the role of technology in improving tribal income, skill development, and awareness through a mixed-method research approach. Data were collected from 120 tribal respondents and supplemented by secondary sources including government reports and scholarly literature. Findings reveal that technology adoption contributes to improved market access, financial inclusion, and self-reliance among tribal populations. Policy implications for digital literacy, infrastructure expansion, and gender-focused initiatives are discussed.

**Keywords:** Tribal Livelihood, ICT, Digital Empowerment, Sustainable Development, Technology Adoption.

### Introduction

Tribal communities constitute an essential part of India's socio-cultural and economic landscape, representing nearly 8% of the population (Government of India, 2020). Despite their rich traditional knowledge and skills, these communities experience chronic poverty, low literacy rates, and limited access to health, education, and markets. Livelihoods are primarily dependent on agriculture, forest produce, animal husbandry, and handicrafts, all of which are vulnerable to environmental and socio-economic disruptions (Sindakis & Showkat, 2024).

In recent years, technological interventions have emerged as catalysts for development. Mobile phones, ICT applications, digital banking, and e-commerce platforms are enabling tribal households to access information, enhance productivity, and expand market reach (Aker & Mbiti, 2010; Mehta et al., 2020). However, adoption varies due to digital

literacy, connectivity, affordability, and gender disparities (Arya & Pradeep Kumar, 2025).

This study aims to examine the role of technology in enhancing tribal livelihoods, focusing on economic outcomes, skill development, and awareness. The research addresses the following questions:

1. How does technology adoption affect income levels in tribal households?
2. What is the role of ICT in skill development and awareness among tribal populations?
3. What challenges hinder technology adoption, particularly among tribal women?

### Conceptual Framework:

#### 1. Sustainable Livelihood Approach (SLA):

The Sustainable Livelihood Approach provides a framework for analyzing how households use their assets to maintain and

improve their living standards (Purnima, 2023).

SLA categorizes assets into five capitals:

- **Human Capital:** Skills, education, and health. Technology improves human capital through e-learning platforms and skill development apps.
- **Social Capital:** Relationships and community networks. WhatsApp groups, on-line forums, and digital community platforms enhance connectivity.
- **Financial Capital:** Savings, credit, and financial resources. Mobile banking, digital payments, and microloans increase financial inclusion.
- **Physical Capital:** Tools, infrastructure, and housing. Technology-enabled agricultural tools and equipment improve productivity.
- **Natural Capital:** Access to natural resources. Apps providing weather updates, forest produce management, and soil health monitoring enhance sustainable resource use.

**2. Technology Adoption Theories:** Two widely accepted theories explain technology adoption patterns:

- **Diffusion of Innovations (Rogers, 2003):** Describes how innovations spread in communities. Tribal populations can be categorized as innovators, early adopters, early majority, late majority, and laggards. Early adopters often influence the wider adoption of technology in remote areas.
- **Technology Acceptance Model (Davis, 1989):** Suggests that perceived usefulness and perceived ease of use determine the intention to adopt technology. Tribal women's adoption is often influenced by cultural acceptance and household support.

### 3. Proposed Conceptual Model:

Technology adoption enhances skill development and market access, which in turn improves income and empowerment.

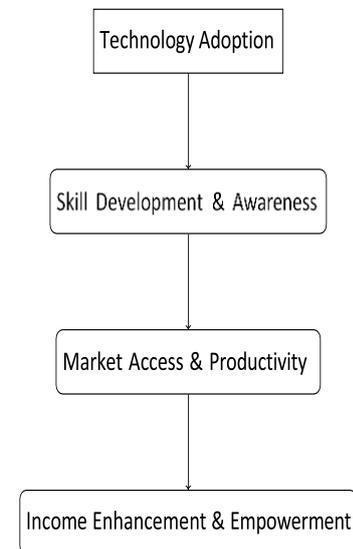


Figure 1: Enhanced Technology-Livelihood Conceptual Model

### Study Area and Sample Profile:

The study was conducted in selected tribal villages in Maharashtra, including Nandurbar, Melghat, Gadchiroli, and Javhar. These areas are characterized by forested terrain, limited road connectivity, and seasonal agriculture.

A total of 120 respondents participated in the study. The sample included both men (52%) and women (48%), aged between 18 and 60 years. Occupations comprised agriculture (45%), handicrafts (25%), wage labor (20%), and others (10%). Literacy levels varied from 20% to 65%.

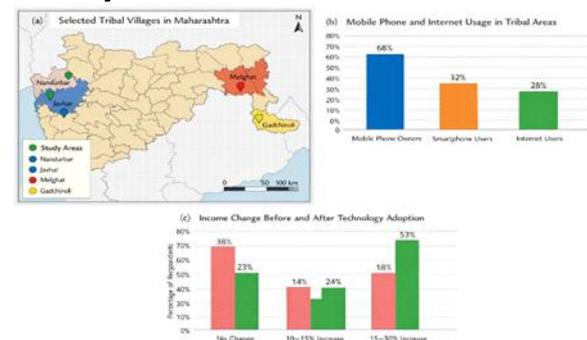


Figure 2: Study Area: Selected Tribal Villages in Maharashtra

Table 1: Sample Distribution by Gender and Occupation

Gender	Agriculture	Handicrafts	Wage Labor	Others	Total
Male	25	10	15	7	57
Female	29	20	9	5	63
Total	54	30	24	12	120

### Research Methodology:

- 1. Research Design:** A mixed-method approach was used, combining quantitative (survey) and qualitative (interviews, focus groups) methods. This approach allowed comprehensive insights into technology adoption patterns and livelihood outcomes.
- 2. Sampling:** Random sampling was used for household selection, ensuring representativeness. Purposive sampling targeted artisans and tribal women to understand specific challenges.
- 3. Data Collection:**
  - Structured questionnaires with 25 questions on technology use, income, awareness, and skill development
  - Semi-structured interviews for qualitative insights
  - Observational notes on digital literacy and market participation
- 4. Data Analysis:** Data analysis included descriptive statistics, cross-tabulations, and

graphical representations. Key metrics: technology access, income variation, skill development, awareness, and gender differences.

- 5. Ethical Considerations:** Ethical standards included voluntary participation, informed consent, anonymity, and cultural sensitivity. Local languages were used for communication where necessary.

### Data Analysis and Results

**1. Access to Technology:** 68% of respondents owned mobile phones; 32% had smartphones with Internet access. About 54% used technology for livelihood activities including market information, advisory services, and digital payments.

**2. Income Enhancement:** Income increased for 61% of respondents by 15–30% after adopting technology.

Table 2: Income Change after Technology Adoption

Income Change	Respondents	Percentage
No change	28	23%
10–15% increase	19	16%
15–30% increase	73	61%

**3. Skill Development and Awareness:** 57% participated in technology-enabled training programs. Awareness of modern practices and financial management increased for 49% of participants, with women's participation at 42%.

### Discussion:

The study indicates that technology adoption positively influences tribal livelihoods by improving income, skills, and awareness.

Comparisons with prior research (Aker & Mbiti, 2010; Mehta et al., 2020; Nayak & Berkes, 2014) confirm these trends.

- 1. Gender Analysis:** Women face barriers due to literacy, cultural norms, and affordability. Participation in training programs and digital activities remains lower for females, highlighting the need for gender-focused interventions.

2. **Economic Impact:** Digital tools have increased income for the majority of households. E-commerce platforms and market connectivity reduce dependency on middlemen.
3. **Skill Development and Awareness:** Technology-enabled programs enhance financial literacy and knowledge about government schemes. Tribal youth show higher adoption rates than elders.
4. **Policy Implications and Future Scope:** Local language apps and content creation - Female-focused digital literacy programs - Infrastructure improvements in remote villages - Future research: AI advisory systems, IoT in agriculture, predictive weather apps

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