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Preservation and Promotion of Indigenous Knowledge through Digital Media Technologies for the Sustainability of Indian Languages

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Abstract: ***In the current era of globalization, the preservation and promotion of Indian indigenous languages and the traditional knowledge associated with them have become extremely important. These languages are not merely means of communication, but invaluable repositories of unique knowledge systems, cultural expressions, and distinct worldviews that significantly enrich the rich tapestry of human diversity. The preservation of Indian indigenous knowledge is not limited to safeguarding memories of the past; it is also a means of perpetuating the traditions, history, and collective wisdom that communities have relied upon for generations to sustain their social and cultural lives. This research paper presents an in-depth analysis of the role of digital media technologies in the documentation, revitalization, and dissemination of Indian indigenous knowledge and languages. The findings indicate that digital media technologies enhance accessibility and support community-led documentation and sustainable knowledge sharing practices. A key contribution of the study is that digital media functions not merely as a tool for preservation, but also as a catalyst for the revival and re-contextualization of indigenous knowledge in contemporary society. The paper concludes by outlining future prospects and challenges and offers recommendations for strengthening sustainable and ethically grounded digital initiatives for safeguarding Indian indigenous languages in the digital age.***
Keywords: Digita media technology, Preservation ,Indigenous language, Indigenous knowledge.

I. INTRODUCTION

Today, as a human community, we face two major challenges; rapidly declining ecological diversity and steadily diminishing linguistic diversity. The erosion of linguistic diversity in the Indian context is particularly worrying as India has always been known for its linguistic and cultural plurality. India is a country of diverse linguistic and cultural heritage. According to the 23rd edition of Ethnologue: Languages of the World, there are 7,117 living languages worldwide. The linguistic situation in India is interesting on the one hand and a matter of concern on the other. According to Ethnologue, India has 460 established languages, of which 447 are living, 13 extinct, 419 indigenous, 64 institutional, 122 developing, 111 endangered and 14 endangered languages. However, there are serious threats to these languages, as many languages are found in the endangered category. According to the American linguist Michael Cross (1934-2019), if the current trend continues, about 90% of the languages of mankind will be either extinct or in serious danger in the coming century. At the same time, according to the Foundation for Endangered Languages (England-based organization), more than half of the world's languages are in a moribund state, that is, they are not effectively communicated to the next generation. Efforts are being made to identify and preserve the endangered languages of India, because when a language goes extinct, along with it, the knowledge that has been preserved for generations is also lost. Efforts are being made by the Linguistic Survey of India and Government institutions to document and preserve the languages so as to preserve the traditional knowledge systems associated with these languages. Among other efforts at language preservation in the country, preservation and promotion of Indigenous Knowledge through digital media technologies is becoming ever more important for the sustainability of Indian languages, especially in the context of globalization and the national identity (Ajani et al.,2024: Saikia,2024).

Indigenous Indian languages are not just a means of communication; they are repositories of cultural identities, distinctive worldviews, historical narratives a comprehensive knowledge system (Annet et al.,2024). However, these languages and their associated Indigenous Knowledge Systems (IKS) are facing serious challenges from factors such as globalization, westernization, gaps in generational transmission and dominance of widely spoken languages such as English and Hindi (Bhat,2025). Digital media technologies provide a powerful medium to counter these threats as they enable documentation, preservation, dissemination and revitalization efforts (Gope & Khan,2025; Tella et al.,2025).

The contemporary digital age, characterised by the pervasive influence of cyber-physical systems and the Internet, is radically transforming the process of integration and distribution of information (Ajani et al.,2024).Digital technologies including mobile applications, software, geographic information systems (GIS), cloud-based platforms and artificial intelligence (AI) play an important role in the documentation, preservation, promotion and sharing of Indigenous Knowledge Systems(Tella& Ngoaketsi,2024).These digital archives can store diverse formats of indigenous content, including oral histories, traditional practices, mantras in Vedas and Puranas, knowledge of medicinal plants and a wide range of agricultural techniques, (Goswami,2023; Ngulube,2023; Huidina,& Yamsani,2024; Kanhar& Tripathy,2025).These can be made available in all local languages of India.

As globalization and digital transformation are rapidly reshaping Indian society, it has become imperative to understand the profound cultural, historical and ecological significance of Indian indigenous languages. The many indigenous and tribal languages spoken in India are not only a symbol of linguistic diversity, but they are also a rich repository of the Indian Indigenous Knowledge specific worldviews, traditional lifestyles and cultural identities. As a result, understanding the importance of preserving indigenous knowledge associated with these languages is the cornerstone of effective conservation efforts. Along with acknowledging the value of indigenous knowledge preservation, it is equally necessary to identify and address the multifaceted challenges that Indian languages are facing. These challenges arise from historical factors, social dynamics, urbanization, limited resources and inadequate institutional support, which present complex barriers to the preservation of Indian languages.

Digital media also empowers language revitalization through interactive learning tools. Mobile applications, such as the Kaytetye Indigemoji app, demonstrate how innovative digital tools can support language-learning and revitalization in the context of low-prestige languages. Such efforts transform resource development into a vibrant platform for language teaching and learning. Additionally, AI-powered translation tools, such as Bhashini, anuvadini, Google Translate, and DeepL, are becoming increasingly effective in bridging linguistic barriers and reducing the degradation of endangered languages, thereby preserving India's rich linguistic diversity. These digital resources can be made available in all local languages of India, ensuring inclusiveness and accessibility. However, the application of digital technology is not without challenges. A key issue is to ensure that technologies developed for indigenous languages are not imposed from outside the community (Sabido & Sabido,2025), as they can have an adverse impact if this happens. When technologies themselves evolve from within communities, they become powerful means of expression and preservation. At the same time, it is necessary to address the digital divide to ensure equitable access to these technologies and prevent marginalisation of indigenous communities that do not have adequate digital infrastructure (Khan, & Gope,2025). Another important aspect is the ethical integration of indigenous knowledge into digital platforms, especially in the context of the development of artificial intelligence (AI). If Western epistemological frameworks overpower AI frameworks, the threat of ‘cognitive imperialism’ may arise, leading to increased bias (Ofosu-Asare,2024). To balance this, it is necessary to incorporate diverse epistemologies and adopt a participatory approach, incorporating indigenous approaches, so that AI can be beneficial for all.

In the ensuing discussions, this paper comprehensively exploration the multifaceted challenges and opportunities underpinning the preservation and promotion of Indian indigenous knowledge through digital media technology. Overall, the paper also offers unique perspective on the preservation and promotion of Indian languages using digital media technology as a catalyst of change. Further emphasizing, the paper highlights the critical role that digital media technologies play in preserving and revitalizing indigenous knowledge systems, especially in the context of Indian language sustainability. Further, the paper also highlights the innovative strategies and collaborative efforts required to preserve and promote Indian indigenous languages. However, these insights have put the position of this paper in a unique direction, hence the need to bridge the gaps observed in the literature. So, this paper will contribute to the growing body of knowledge in terms of policy, practice and literature in the field of indigenous knowledge.

II. IMPORTANCE OF INDIAN INDIGENOUS KNOWLEDGE AND LANGUAGES PRESERVATION

Indian indigenous and mythological knowledge is a living tradition associated with our lives. They are not concepts limited to books. It is not just the words preserved in texts, but the experience that has been passed down orally among families, communities and generations. Indian communities at home and abroad still keep their cultural identity alive through this knowledge. The value of these traditions lies in the fact that they contain the life experience of the ancestors, their thinking and their vision. Studies show that the social significance of this indigenous knowledge is profound. It strengthens the sense of unity, collectively and cultural identity in Indian society and inspires people to stay connected to their roots. Therefore, National Education Policy 2020 emphasizes on making India’s education system holistic, inclusive, multilingual and Indian context-based. Recognizing the importance of indigenous languages, continuous efforts are being made to revive and preserve them.

For example, the United Nations Declaration on the Rights of Indigenous Peoples emphasizes that indigenous communities have the right to preserve, revitalize, and communicate their languages to succeeding generations (Hohmann and Weller, 2018). Indigenous knowledge and languages play the role of a guide not only to the heritage of the past, but also to the present and the future (Masenya 2024; Ajani et al.,2024). Indigenous knowledge is often deeply associated with rituals, spiritual beliefs and language. Indian linguist Rabindranath Srivastava (1936-1992) has called language as "mother's language, language of swing". They believe that the child constructs his linguistic cognition and life cognition through the mother language. The national history of a diverse country like India should be based on the narratives of the people, as these are not just carriers of the past, but also give a vision of the future. It is, therefore, extremely necessary to preserve and disseminate the history embedded in the cultural memories of all indigenous communities.

This communities have lived in harmony with their natural surroundings for centuries. These communities incorporated spiritual and moral teachings as well as practical training related to agriculture, resource management and ecological balance into their lives (Bhattacharya, 2025). Indian indigenous knowledge was based on these basic principles; the interconnectedness of all life forms, reverence and respect for nature, balance and sustainability in the use of resources, transmission of ecological knowledge from generation to generation they provide a principled understanding of how to mitigate climate change, protect bio-diversity and preserve ecosystems. In many indigenous communities of India, certain animals and birds are considered sacred or as totems. For example, the Bishnoi community of Rajasthan considers the blackbuck and the Khejri tree sacred, the Gond and Bhil tribes consider certain animals such as the tiger, cobra, peacock to be clan-symbols or sacred, and there is a tradition of cobra worship in Kerala, Karnataka, Bengal etc. It is clear from these examples that in Indian indigenous traditions, reverence for animals and birds is not just a religious sentiment, but a practical ecological strategy. Indigenous languages are a powerful medium for transmitting this type of indigenous knowledge, through which knowledge connected to the physical and spiritual world, as well as an understanding of appropriate ways to communicate and interact with others, is passed down from generation to generation (Angelo et al.,2022). Today, this communication is no longer limited to oral forms, but also takes place through written and various digital media. In addition, culturally significant singing, chanting, storytelling, dance, gestures, hand signals, symbolic signs, and experiential activities conducted on the traditional lands of the speakers (on-country experiences) also play a central role in the preservation and dissemination of Indigenous knowledge. Thus, indigenous languages are not only a means of communication, but they are also the lifeline of culture, identity, and knowledge traditions.

III. DIGITAL MEDIA TECHNOLOGY AS A TOOL FOR SAFEGUARDING INDIGENOUS KNOWLEDGE AND LANGUAGES

Indigenous knowledge is an invaluable repository of information, developed and refined by indigenous communities over centuries. Technologies can be used to preserve indigenous and endangered languages (Martín-Mor, 2017). Digital media technology plays a pivotal role in supporting localization. The term 'localization' can be understood as a communicative, technical, textual, and cognitive process through which interactive digital texts are modified to make them usable by audiences that differ from the originally targeted audience. Sandrini (2008) emphasizes that the goal of localization is to ensure that individuals in specific regions and environments can use software and websites easily and effectively in their native language. Technological devices such as scanners and voice recorders can be used to digitize language-related documents, voices, and audio, allowing them to be easily stored in electronic format. Optical Character Recognition (OCR) software is suitable for digitizing documents, as it converts hardcopy documents and images into digital format (Hocking & Puttkammer, 2016). For cultural institutions, digital media technology provides powerful tools for the documentation and archiving of indigenous languages (Ajani,2025). This serves two main purposes: first, protecting vulnerable collection materials from physical deterioration or format obsolescence; and second, facilitating access to collection materials, including those related to indigenous cultures (Souza et al., 2016).

Furthermore, digital media technologies provide accessible resources that support both formal education and community-based learning (Abingosa et al.,2025). For example, mobile applications specifically address the mobility and connectivity needs of Indigenous communities and offer features not possible with traditional print resources-such as audio pronunciation guides, interactive search functions, and the inclusion of multimedia. For geographically dispersed communities like those in India, digital media technology can bridge physical distances and provide continuous access to linguistic resources regardless of location. Local leaders and elders play a central role in preserving local languages through oral traditions, rituals, and community gatherings (Abatayo & Gumapang,2024), but in the absence of written materials, digital content, and standardized orthography, access to and transmission of India's endangered languages and indigenous knowledge remain limited in modern contexts.

Digital media technology applications have played a transformative role in bridging this gap. For example, mobile applications, online platforms, and interactive software provide opportunities for self-paced language learning, vocabulary acquisition, and grammar instruction. These platforms not only provide accessible learning resources but also serve as a means for the documentation, archiving, and revitalization of endangered languages (Pandapatan et al.,2024).

In addition, digital platforms, particularly in the realm of social media, offer vast opportunities for the promotion of language and art, and for community engagement. Pradhan & Goswami (2025) analyzed the contribution of YouTube, Facebook, and Instagram in promoting and preserving selected folk performances of Odisha and found that social media plays a significant role in the promotion and preservation of these traditions. These platforms effectively connect speakers, learners, language enthusiasts, and artists, fostering a sense of community and encouraging collective efforts to revitalize indigenous languages. Digital media technology makes the participation of language communities and their diverse members in the proper documentation and description of languages more efficient and inclusive (Everson &Honore,2019).The role of technology in Indigenous language has evolved rapidly, reaching a stage where it is no longer merely an extension of dominant Western paradigms (Kelly-Holmes, 2019), but has become a field in which indigenous communities play an active and crucial role particularly in how technology is used, conceived, and developed(Cassels & Farr,2019). Even though some of the underlying software may be in English, indigenous Indian creators and developers are “firmly embedding Indian indigenous thinking and practices into the design and development process.”

In the context of existing and future initiatives, digital technology serves as a means to reclaim pride in indigenous Indian languages and cultures, and also provides a pathway for learning and communication for current and future speakers and learners. Integration of digital media technology with the goal of revitalizing Indigenous languages presents a transformative opportunity for language revitalization, learner engagement, and strengthening relationships within communities. Through digital platforms, Indigenous communities can document and share their traditional ecological knowledge, cultural practices, and information related to medicinal plants (Adam et al., 2022). This not only preserves and protects Indigenous knowledge for future generations but also contributes to broader cultural heritage preservation initiatives (Meighan.2021). The internet and digital technologies can create a transnational space where colonial nation-state binaries and linguistic boundaries dissolve (Darwin & Norton, 2014). Indigenous communities can assert their “right to speak” in their own languages and in ways that are respectful of local communities (Darwin & Norton, 2014).

IV. DIGITAL INTERVENTIONS FOR INDIGENOUS KNOWLEDGE AND INDIAN LANGUAGE PRESERVATION

In recent times, numerous digital interventions have emerged as powerful resources for language preservation and indigenous knowledge, providing innovative avenues for documentation, learning, and revitalization efforts. The Indian natural language processing (NLP) community has witnessed a new and powerful resurgence in the direction of digitizing constitutionally recognized languages. This new trend is playing a significant role in strengthening corpus creation, language resource development, machine translation, speech processing, and other AI-based applications for Indian languages (Chopra et al., 2019; Abraham et al., 2020; Madaan and Agrawal, 2022; Doddapaneni et al., 2023; Khan et al., 2024; Bhat et al., 2024; Joshi et al.,).These Interventions include social media, online dictionaries and lexicons, IT and information systems (IT&S) policies, voice recorders, websites, Bharatvani android app, machine translation and speech recognition (Dei et al,2025; Acharya, 2025).These systems significantly impact the preservation of indigenous knowledge, which encompasses diverse fields such as agricultural knowledge, rituals and ceremonies, health, religion, forestry, water management, natural resources, land management and language learning (Dei et al,2025).The advent of various online applications and social media platforms, including knowledge documentation software, archiving systems, text analysis software, language learning applications, and language translation software, has reshaped the landscape of language preservation for endangered and indigenous Indian languages (Ajani,2023).

Today, social media has become an integral part of our daily lives. Due to cultural interconnectedness and interdependence, its importance in human life has continuously increased (Minhas&Salawu,2025). Social media has become a powerful medium for promoting and preserving indigenous languages in many countries (Botangen et al, 2017). For example, Facebook, you tube and Instagram has interventions emerged as a crucial tool in the process of reviving indigenous knowledge and languages (Lawati &Rana,2022). Social media has played a dual role in the preservation of Indian languages. On one hand, platforms like Facebook, Twitter, and Instagram have provided a space for expression in regional languages, allowing users to engage with content in their mother tongue. On the other hand, YouTube channels and regional content creators have contributed to increasing the visibility of languages that were previously underrepresented in mainstream media (Bhat,2025). Thus, Streaming services like Netflix, Amazon Prime, and Jio Hotstar have started incorporating more and more regional language content, which has increased people's interest in and appreciation for linguistic diversity.

Furthermore, the advent of Bharatvani apps technologies has given rise to immersive traditional learning experiences, providing learners with an interactive and dynamic platform to connect with indigenous Indian languages. With the help of the Bharatavani Android app and multilingual knowledge portal, over 5,500 pieces of content have been successfully made available in approximately 118 Indian languages. These include India's 22 official languages and 96 other Indian languages and mother tongues. The exact number of Indian languages covered by Bharatavani may change over time as new content is added, but the aim is to include a comprehensive range of books and diverse knowledge resources in approximately 121 languages (Acharya,2025).Thus, artificial intelligence (AI)-based reading apps, such as Google's Read Along (formerly "Bolo"), use speech recognition technology to listen to children reading aloud and provide them with real-time feedback and corrective suggestions. Read Along supports multiple languages, giving children from diverse linguistic backgrounds access to an accessible, interactive, and self-directed reading learning experience. The app supports several languages, including Hindi, Bengali, Tamil, Telugu, Marathi, Urdu, and English (Sahu,2025). Through website and mobile app, people worldwide can access information in over 100 languages from a single platform. The long-term impact of apps in ensuring the availability of multilingual content could prove to be extremely significant. Online digital platforms dedicated to specific languages have also emerged as important resources. The Bhashini National Language Translation Mission, launched by the Government of India. These platforms, such as Bhashini, an AI-based platform that provides open APIs for translation and speech-to-text in Indian languages, support 22 scheduled Indian languages and aim to break the language barrier in digital content. Similarly, digital libraries like Pratham Books' StoryWeaver offer a rich repository of stories accessible in numerous indigenous languages. These online platforms reinforce traditional linguistic practices and foster peer collaboration, social support, and networking among individuals interested in preserving endangered languages. Moreover, AI can enable the creation of chatbots and virtual assistants that can respond to questions and provide information in indigenous languages (Huang et al.,2023; Tell et al,2025). By using these digital tools and artificial intelligence (AI) applications, numerous successful initiatives have reached a wide audience, facilitated language learning and enabled the long-term preservation of endangered languages through the creation of digital repositories, interactive platforms, and AI-based analytical tools. These initiatives clearly demonstrate the potential and effectiveness of digital media technology in the field of language preservation.

In the era of digital innovations and artificial intelligence, the preservation of Indian indigenous knowledge (rich expertise related to ecosystems, biodiversity, traditional medicine, cultural history, and sustainable lifestyles) is increasingly being recognized as a crucial effort for protecting cultural heritage and promoting sustainable development (Tell et al.,2025; Botangen et al.,2017). Indigenous communities, especially in India, possess a vast wealth of traditional knowledge, developing disease-resistant varieties of wheat and rice and knowing which plants can treat our ailments; they have the capacity to create from nothing. Singh and Kumar (2022) argue that digital technologies hold the transformative potential to empower Indian indigenous communities, broaden access, foster intercultural dialogue, and ensure the continuity of indigenous knowledge amidst rapid social and environmental changes. In India, the digitization of indigenous cultural heritage interacts deeply with ingrained cultural traditions, particularly in the context of documentation, preservation, access, dissemination, and community participation. Indigenous knowledge resources on digital tools and platforms serve to powerfully amplify the voices of these communities. Going further, the establishment of the Traditional Knowledge Digital Library (TKDL) in the context of India's domestic policies remarkable initiative in the projection of using digital technologies for traditional knowledge perseveration. Fredriksson (2022) add that traditional knowledge digital library has been developed and adopted in international and national contexts with the ideals of protecting local and marginalized knowledge in a way that inspires the creation of a database that makes it possible to utilize the traditional medical knowledge accumulated over generations by various regions and ethnic and religious communities of the Indian subcontinent for the benefit of the state.

Exploring further,India's National Education Policy 2020 has taken significant steps towards the preservation and promotion of indigenous knowledge, cultural heritage, and traditional ways of life (Sharma,2024). The curriculum incorporates folk tales, oral traditions, customs, traditional agricultural practices, handicrafts, and scientific knowledge associated with spiritual beliefs (Moitra and Madan,2025).Furthermore, these are being digitized and documented. This process not only utilizes technological tools but also encourages the active participation of local communities, educational institutions, and research organizations (such as ICSSR and IKS centers). Programs like Digital India not only preserve indigenous knowledge but also help make it accessible, relevant, and vibrant for future generations. Several mobile applications have been developed to promote language learning and the revitalization of indigenous and under-resourced languages(Abingosa et al., 2025),especially in linguistically diverse countries like India.These mobile applications also include offline dictionary, transliteration keyboard, speech-to-text and text-to-speech features for low-resource languages, literacy-based tutorials and culturally relevant content such as folktales and traditional songs(Aisha,2024). For example, the “IndoGuruji Indian Language Teacher” application aims to facilitate the learning of regional Indian languages through a user-friendly interface(Rugge et al.,2023).

In present times, the use of advanced technologies such as artificial intelligence (AI) and deep learning has also increased rapidly to support indigenous languages.Indeed, the way in which language-based AI systems are creating new possibilities and future prospects for India's marginalized languages,such as Gondi, Maithili, Rajasthani, and Mundari is proving instrumental not only in the revitalization but also in the long-term sustainability of these indigenous linguistic systems (Pradhan and Dey,2025).In this context, datasets like 'IndicDialogue' are also being developed, aiming to enable language modeling for ten major indigenous Indian languages(Arnob et al.,2024).Various practical challenges still remain for mobile and digital initiatives in the context of indigenous Indian languages (Deroy and Maity,2024),including the limited availability of linguistic resources, the lack of standardized orthography for many languages, low digital literacy in remote communities, and the lack of natural language processing (NLP) infrastructure for many indigenous Indian languages (Choudhary et al.,2023).Keeping these challenges in mind, the Government of India launched the 'Bharatavani' project in 2016, with the aim of documenting the socio-cultural and linguistic knowledge of India's 121 languages and making it accessible to a wider audience through technology.

Digital storytelling platforms have emerged as a crucial medium for the presentation of Indigenous narratives and cultural knowledge (Shiri et al., 2021).For example, social media and digital platforms operated by tribal communities in India,such as Ango Khabar, Adivasi Lives Matter, and Trilingo.in are actively engaging the younger generation in the process of reimagining and redefining indigeneity in contemporary contexts (Valeria,2025). Similarly, in the context of digital initiatives run by Indigenous communities in India, the platform adivaani ("the first voices") is a significant example (Hembrom and Narayan,2024). It is dedicated to publishing and documenting Indigenous voices in English and places a strong emphasis on the principle of self-determination in cultural narratives. Furthermore, digital technologies are playing a vital role in the preservation of Traditional Tribal Knowledge (TTK) in India. The Traditional Knowledge Digital Library (TKDL) is a highly important digital repository in this regard, systematically documenting various Indigenous practices, including traditional medicinal knowledge (Panda and Kaur,2023). This digital infrastructure not only helps prevent cultural erosion but also serves as an effective means of protecting Indigenous knowledge from unauthorized patents and biopiracy(Brayko et al.,2022; Dutta & Mukoupdhyaya,2022;Garcia-Lara &Cordova,2023).These platforms provide Indigenous communities with the opportunity to present their stories to the world in diverse formats such as video, audio, and text, and to share them with a wider audience. Geographic Information Systems (GIS) have also developed into a crucial technological tool for mapping Indigenous territories and managing natural resources(Rundstrom,1995; Engle,2001;Briggs et al.,2020).

Following the overall power of technology, digital technology is proving to be a highly effective medium for the preservation, transmission, and cultural continuity of indigenous knowledge, thereby also contributing to the achievement of the Sustainable Development Goals. However, the equitable distribution of the benefits of digital inclusion is only possible if indigenous rights and cultural contexts are adequately considered in the actual implementation of digital initiatives.

V. COLLABORATIVE APPROACHES TOWARDS THE SUSTAINABILITY OF INDIGENOUS KNOWLEDGE AND INDIGENOUS LANGUAGS IN INDIA

In India, collaborative initiatives for the preservation of indigenous knowledge and languages have focused on several key strategies. Digital language documentation has emerged as a crucial area, with projects like SiDHELA (Sikkim Digital Heritage of Endangered Languages) serving as a pioneering model.SiDHELA was developed through a collaboration between the Centre for Endangered Languages Studies and the Central Library of Sikkim University, working directly with resource-poor indigenous communities in Sikkim and North Bengal(Narayanan and Takhellambam,2021;Narayanan and Takhellambam,2022).Similarly, the Traditional Knowledge Digital Library (TKDL) is a unique digital repository of India's traditional intellectual heritage. It is assisting patent offices worldwide in searching for prior art based on Indian traditional knowledge. In addition, the National Biodiversity Authority is protecting indigenous knowledge by recognizing existing representative institutions or organizations of traditional communities (Jacob.2020).Similarly, the Government of India has undertaken numerous legal initiatives, including the Protection of Plant Varieties and Farmers' Rights Act, 2001,which was enacted to protect farmers' rights, strengthen seed sovereignty, and encourage the development of new plant varieties.The Biological Diversity Act, 2002, a key aspect of which is to ensure the right to benefit-sharing for indigenous/traditional communities. The Patents (Amendment) Act, 2005, plays a significant role in protecting traditional knowledge. The Geographical Indications of Goods (Registration and Protection) Act, 1999, protects geographical indications (GIs). GI registration assures the quality and uniqueness of a product, which is specifically associated with its place of origin.The Forest Rights Act (Scheduled Tribes and Other Traditional Forest Dwellers Recognition of Forest Rights Act) recognizes the rights of forest-dependent traditional communities over land and other resources. This includes ownership rights, use rights, and relief and development rights.

Partnerships established between Indian universities, community organizations, indigenous groups, policy frmaework, non-governmental organizations (NGOs), and technology companies have yielded successful indian indigemous knowledge preservation projects (Maheshkuma and Soundarapandian,2024; Kumar,2024).Universities provide research expertise, funding opportunities, and access to resources such as libraries and archives. NGOs and other community-based organizations play a vital role in ensuring community engagement, maintaining ethical participation, and preventing the misuse of indigenous knowledge. Government institutions play a central role in developing policy frameworks, providing legal support, and implementing grassroots initiatives. Meanwhile, technology companies contribute technical innovation, resources, and facilitate user adoption and the widespread dissemination of knowledge preservation tools (Hinton,2014). Digital preservation tools are currently proving particularly useful for the preservation of languages and cultural expressions (Oyelude,2023;Masenya,2023).

Digital media technologies can also help address the historical, social, resource-related, and institutional barriers that hinder language preservation (Ajani et al.,2024). The integration of indigenous knowledge with digital technologies, including mobile applications, software, Geographic Information Systems (GIS), and cloud-based platforms, is considered a vital step towards achieving sustainable development goals (Khan and Gope,2025). These technologies promote sustainability by facilitating the sharing of indigenous knowledge. For example, technological solutions developed from within the indigenous communities themselves have proven more effective than those imposed by external actors.Principles such as reciprocity, collaboration, and collective responsibility between indigenous communities and technology experts play a central role in the revitalization of indigenous languages for the well-being of both the communities and their ecological environment (Sherpa,2025;Ksenofontov,2024; Gafner-Rojas,2020).

Menon et al. (2021), Vijayan et al. (2022), Salim et al. (2023), and Maclean et al. (2024) have clarified the essence of collaboration in preserving indigenous knowledge through the following points. Some of the key points are as follows:

1) Preserving traditional knowledge, partnerships between scientists and traditional communities are essential. Such collaborations bring together science, which seeks to understand the world through research and experimentation, and traditional communities, who are the custodians of a vast body of knowledge accumulated over generations and passed down through oral traditions and practical experiences.

2) Cooperative efforts are crucial for the preservation and revitalization of traditional and indigenous knowledge systems. It is recognized that indigenous knowledge is not merely a collection of facts, but a living and evolving body of knowledge passed down through generations, rooted in people's own ways of thinking and worldview. Through these systems, oral histories, indigenous languages, and cultural heritage are preserved, and knowledge is transmitted from one generation to the next.

3) Collaborative efforts are also essential because in the past, Indigenous knowledge has often been ignored or misused. This injustice can be rectified through collaboration. It empowers Indigenous communities to protect their rights, participate in decision-making processes, and safeguard their cultural heritage.

4) In a culturally diverse country like India, collaboration is crucial for preserving various forms of indigenous knowledge, such as agricultural practices, the use of medicinal plants, biodiversity conservation, and oral traditions.

5) Collaboration also makes it possible for scientists and people with indigenous knowledge to work together to identify problems, determine research methods, and interpret results, so that both types of knowledge can be used effectively.

Aside from the collaborative efforts undertaken by Indian universities, communities, organizations, and institutions for the sustainability, preservation and prmotion of indigenous knowledge.Vaidya et al.(2024), state that collaborate with indigenous communities in significant ways to safeguard oral histories, traditional knowledge, culture, and local experiences. Hangshing and Laloo (2021) argue that Indian libraries are playing an active role in the recording, microfilming, digitization, and creation of digital repositories of traditional knowledge. Dangi and Saraf (2017), also add Indian libraries are instrumental in the documentation and digital archiving of traditional knowledge. As higlihted by Chigwada and Ngulube (2024)Narayanan and Takhellambam (2021), libraries can collaborate with local communities in the preservation and parmotion of indigenous knowledge and Indain claasical languages in the following ways:

a) Libraries can work with Indigenous communities to collect their knowledge, interviewing elders and knowledge keepers to record stories, traditions, songs, dances, and customs, preserving them as audio and video recordings, and understanding how they wish to share their knowledge.

b) Libraries can work with Indigenous communities to determine which knowledge will be made public and which will remain restricted. Some knowledge is considered sacred and sensitive, and therefore can only be accessed or recorded at specific times and in specific ways.

c) Libraries can collaborate with the community to organize cultural events such as storytelling sessions, language classes, folk dance performances, folk music concerts, art exhibitions, and festivals.

d) Libraries and communities collaborate to create digital archives of local languages, preserving language-related texts, audio, and video. This helps in the preservation of endangered and lesser-spoken languages.

e) Libraries can play an active role in preserving indigenous and local knowledge/languages, cultural heritage, and folk traditions. They can publish and preserve dictionaries, primers, local stories, and folk songs in local tribal languages, and also collect audio-visual materials and share them on digital platforms.This can include providing bilingual books, language learning materials, language immersion programs, and literacy programs tailored to community needs.

VI. FUTURE PROSPECTS AND CHALLENGES

Emerging technologies hold immense potential for advancing efforts related to the preservation of indigenous knowledge (IK) and Indian languages(Annet,2024). These modern technologies create new opportunities for indigenous communities by facilitating the documentation, revitalization, and integration of this knowledge into contemporary socio-educational frameworks, particularly through digital technologies and educational reforms (D and Susanti,2025).AI and natural langauge processing, particularly for low-resource languages, are highly promising areas for the revitalization of indigenous languages. AI-powered speech recognition and machine translation systems facilitate access to information for tribal communities, empowering indigenous communities in their efforts to preserve their knowledge and cultural heritage(Pradhan and Dey,2023).

Virtual reality (VR) is a powerful medium for the preservation, continuity, and revitalization of indigenous knowledge systems and cultural heritage(Hung et al.,2025).VR provides immersive experiences through which indigenous languages, traditions, and storytelling can be safeguarded(Park et al.,2022). Furthermore, VR can also strengthen community bonds, particulary indigenous communities that are experiencing cultural fragmentation due to urbanization, the historical impacts of colonialism, or increasing geographical distance from their traditional lands (Wallis and Ross,2020).However, a major challenge associated with VR-based initiatives in the context of Indigenous communities is Indigenous Data Sovereignty. Data sovereignty refers to the collective benefit derived from Indigenous communities' data, ensuring their ownership, accountability, and adherence to ethical standards(Jamieson and Chu,2025). Failure to uphold these principles can create, significant obstacles for knowledge preservation initiatives. Other challenges related to VR include the potential for distortion of cultural representations in virtual environments, power imbalances between Indigenous and non-Indigenous partners, and ensuring equitable access to research and technological training (Jones et al.,2025). To address these challenges, it is crucial to mitigate epistemic injustice(Not giving proper importance to Indigenous Knowledge in scientific and policy discussions),which often stems from traditional scientific research methods that have been extractive in nature(Ofosu-Asare,2024).This requires making the research process community-led, participatory, and based on co-ownership, so that Indigenous communities can control their knowledge, data, and outcomes, and thereby prevent epistemic injustice.Furthermore, the future of technology in Indigenous communities should have a say in the design and implementation of preservation projects on co-creation and co-teaching, where community participatory approach are crucial(Jones et al.,2025). Adopting decolonial design principles is essential, when using VR in Indigenous contexts, decolonial design principles should be adopted to mitigate the cognitive imperialism inherent in technological development (Syme,2020). A clear and mandatory focus on Free, Prior and Informed Consent (FPIC) is essential in this process to safeguard the consent, rights, and self-determination of Indigenous communities in any project (Stirling et al.,2023) Only then can technology truly become a tool for cultural enrichment and empowerment for Indigenous communities.The long-term success of efforts to preserve and prmot indigenous knowledge depends on the continued cooperation of various stakeholders, as the preservation of traditional knowledge is not a one-time task but a continuous process that requires ongoing commitment and resources. Several above studies have identified the following key factors associated with the sustainability of long-term preservation of indigenous knowledge: Sustainable financial resources, active participation of indigenous communities, special emphasis on education and intergenerational transfer, integration of technology and digital tools, policy support and institutional framework, Indigenous Data Sovereignty, CARE principles (Collective Benefit, Authority to Control, Responsibility, Ethics).

VII. CONCLUSION AND DISCUSSION OF THE STUDY

The culimination of this study underscore the profound importance of preserving and promoting indigenous Indian knowledge and languages, which are not only integral to the cultural heritage of indigenous communities but also directly influence their cultural experiences and narratives, language revitalization efforts, knowledge transmission and education, and heritage preservation and reconstruction. These traditions serve as invaluable repositories of knowledge systems, cultural expressions, and unique worldviews, contributing significantly to the rich tapestry of human diversity.

In the 21st century, digital media technology is emerging as a frontrunner in the preservation of Indian indigenous knowledge and languages. It provides innovative and powerful tools and platforms that are proving invaluable for the socio-cultural revitalization of Indian indigenous traditions. Digital media has enabled the creation of digital archives, mobile applications, and online resources that facilitate the documentation of indigenous knowledge and the dissemination of both formal and informal education. These technologies have overcome geographical and social barriers and offer an opportunity to address the epistemic injustice faced by indigenous knowledge systems. A significant and novel finding from our study is that digital media technology is not only a powerful catalyst for the dissemination and preservation of Indian languages but also for their revitalization and integration into contemporary socio-educational frameworks. Furthermore, this study has clarified that digital repositories, interactive platforms, and AI-based analytical tools can be instrumental in preserving, organizing, and disseminating indigenous knowledge and languages, provided that cultural protocols and intellectual property rights are respected. Consequently, these traditions become better equipped to flourish, adapt, and evolve in the digital age, securing their enduring place in the ever-changing cultural landscape of the future. Furthermore, in view of future prospects, it is essential to continuously encourage collaboration among all stakeholders involved in the preservation of indigenous knowledge through VR technology, libraries, projects like SiDHELA, the Traditional Knowledge Digital Library (TKDL), and legal initiatives.

VIII. RECOMMENDATIONS

Based on the above discussions in this study,it is recomanded that:

1) Ethics must come first when preserving and sharing Indigenous knowledge and languages. Indigenous communities should be actively involved in every step. This means we must respect their cultural rules, protect their intellectual property, respect their data rights, and take their free, prior and informed consent (FPIC) before using their knowledge.

2) In India's multilingual system, many indigenous languages are still pushed to the margins because English and Hindi are more dominant. Therefore, to implement language policies effectively, there should be proper coordination between language policy, educational practices, and community participation.

3) More investment should be made in projects like AdiBhashaa and Bharatavani. Also, researchers from linguistics, anthropology, education, and computer science should work together using a participatory and interdisciplinary approach.

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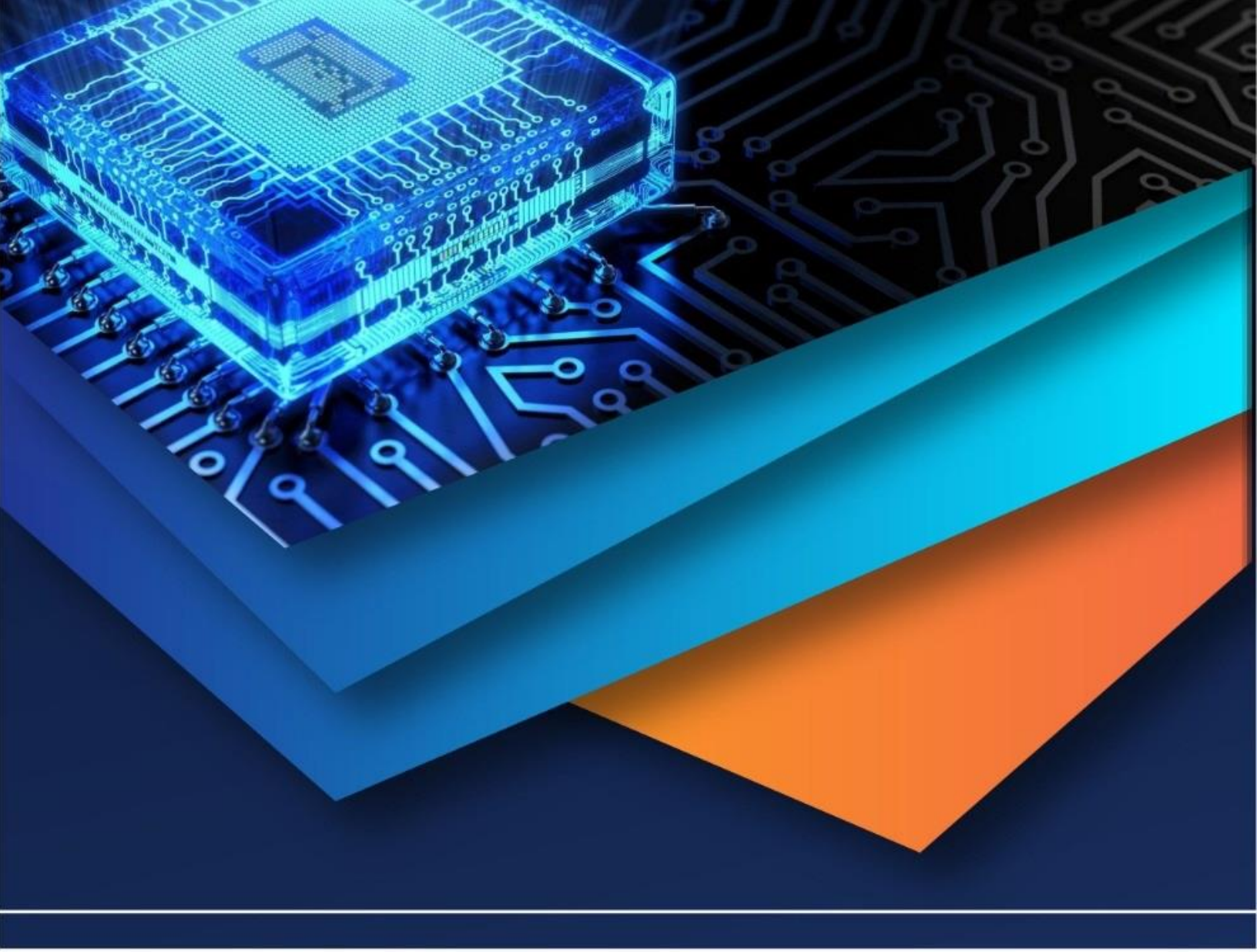

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