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THE INDIAN KNOWLEDGE SYSTEM: AN INTERDISCIPLINARY CRITICAL REVIEW OF TRADITIONAL WISDOM, PRACTICES, AND THEIR CONTRIBUTIONS TO SCIENCE, PHILOSOPHY, AND CULTURE

Sangeeta Kadam

Assistant Professor, Nirmala Institute of Education, Altinho-Panaji, Goa-India, Affiliated to Goa University

ABSTRACT
The Indian Knowledge System (IKS) encompasses a diverse body of philosophical, scientific, medical, linguistic, artistic, ecological, educational, and community-based traditions developed across the Indian subcontinent. Rather than constituting a single or uniform framework, it reflects multiple regions, languages, schools of thought, social groups, and modes of transmission. This critical integrative review examines the historical, conceptual, and epistemological foundations of IKS and evaluates its contributions to Philosophy, logic, Mathematics, Astronomy, Ayurveda, Metallurgy, Architecture, Agriculture, Environmental Knowledge, Literature, Music, Dance, Education, Governance, and Social Life. The review also considers the role of oral traditions, Indigenous communities, artisans, women, and occupational groups in preserving practical and lived knowledge. Particular attention is given to the distinction between historically documented achievements, empirically supported practices, promising but incomplete claims, and assertions requiring further validation. The review identifies major concerns relating to colonial interpretation, nationalist romanticisation, pseudoscience, translation, caste and gender exclusion, intellectual property, and community ownership. It argues that IKS should neither be glorified uncritically nor dismissed because it developed outside modern Western disciplinary frameworks. Its contemporary relevance depends on historical accuracy, interdisciplinary inquiry, appropriate scientific evaluation, ethical documentation, social inclusion, and meaningful participation of traditional knowledge holders. Such an approach can strengthen cultural continuity, academic understanding, and sustainable human development in changing contemporary social contexts.

KEYWORDS: Indian Knowledge System, traditional knowledge, Indian philosophy, Indigenous knowledge, critical review, sustainable development

INTRODUCTION

Indian Knowledge System (IKS) is a vast collection of knowledge, practices, values, methods of enquiry and modes of transmission that evolved in the Indian subcontinent over time. It encompasses Philosophy, Medicine, Mathematics, Astronomy, Language Analysis, Ecological Practices, The Arts, Architecture, Agriculture, Governance, Ethics and Community Knowledge. IKS is not a homogeneous or entirely textual tradition, because it came into being through a process involving the interaction between the Vedic, Buddhist, Jain, tribal, regional, vernacular, artisanal and folk cultures. It was developed through debate, observation, experience, memory, apprenticeship, commentary, and daily practice. Indian knowledge production prior to colonialism, then, was plural and institutionally diverse, not only in the formal texts but also in lived and occupational cultures of learning and knowledge (Gurukkal, 2016).

In the past few years, the interest in IKS has grown in academia, policy, and education. This renewed interest stems from a need to understand Indian intellectual history, rediscover forgotten traditions, and examine the significance of traditional knowledge in modern social and environmental issues. The National Education Policy 2020 has envisioned embedding of Indian intellectual, cultural and knowledge traditions in education and has connected it with multidisciplinary approach and cultural awareness (Government of India, Ministry of Human Resource Development, 2020). Most importantly, recent publication trends suggest that IKS has gained ground in Philosophy, Health, Agriculture, Sustainability, Language, Culture and Education, but is still not well established or focused in a single discipline (Hazarika & Sudhier, 2025).

The study of traditional knowledge is an important one as many of its forms developed from sustained observation of the local environment, human health, social relations and material practices. In the Indian Himalayan region, for instance, traditional knowledge remains relevant when explored within its social and ecological context, indicating the continued relevance of traditional practices in shaping the use, management, and adaptation to biodiversity (Negi et al., 2023). A similar relevance of IKS is visible in the environmental, social, and economic aspects of sustainable development is also similar, but it is not automatically assumed, instead it is required to be carefully evaluated (Sharma et al., 2025). Indian traditions have also provided distinctive approaches to mental health and well-being, self-discipline, consciousness, and ethical life, providing conceptual resources that may be analyzed with the modern psychological tradition without being reduced to it (Bhati et al., 2025).

Meanwhile, there are significant challenges of conceptual and methodological nature to the study of IKS. Research is frequently divided among historians, philosophers, scientists, medical scholars, anthropologists, linguists and cultural researchers. Bibliometric analysis reveals that interest in traditional knowledge is rising, while also highlighting data gaps, thematic imbalances, inter-disciplinary linkages and a lack of critical appraisal (Anand et al., 2025). A competent review needs to refrain from excessive exaggeration and rejection. Historically supported contributions must be distinguished from symbolic interpretations, subsequent reconstructions, and overstated claims in which modern scientific accomplishments are attributed to ancient texts in circumstances where they are not substantiated. This review takes an interdisciplinary critical perspective on the bases, key contributions, current significance, debates and shortcomings of the field of IKS as it develops in the sciences, philosophy, culture, medicine, ecology, education and social life. It progresses from the basic concepts to the contribution to the discipline and then to critical debates and directions for further research. The objectives of the review are:

- To examine the historical, conceptual, and epistemological foundations of the Indian Knowledge System.
- To critically evaluate its contributions to Science, Philosophy, Culture, Medicine, Ecology, Education, and Social Life.
- To identify its limitations, contested interpretations, contemporary applications, and future research needs.

2. METHODOLOGY

This review adopted a critical integrative approach to examine the Indian Knowledge System across History, Philosophy, Science, Medicine, Linguistics, Ecology, Education, Cultural Studies, Anthropology, And Social thought. Relevant literature published between 2016 and 2025 was identified through Google Scholar, Scopus, Web of Science, PubMed, and Shodhganga. Earlier foundational works were considered only when required to explain established concepts, historical developments, or classical knowledge traditions. The search used combinations of terms such as “Indian Knowledge System,” “Traditional Indian Knowledge,” “Indian Philosophy,” “History of Science in India,” “Ayurveda,” “Indian Mathematics and Astronomy,” “Traditional Ecological Knowledge,” “Indigenous Knowledge in India,” “Indian Aesthetics,” and “Traditional Education in India.” Journal articles, scholarly books, edited volumes, government documents, authoritative translations, historical studies, archaeological research, and documented community practices were considered. Sources were included when they directly addressed the historical development, epistemological foundations, scientific contributions, philosophical ideas, cultural traditions, social relevance, or contemporary applications of Indian knowledge. Promotional materials, unsupported internet claims, unverified civilizational assertions, and sources lacking identifiable evidence were excluded. The selected literature was organised thematically according to the major sections of the review. Each source was assessed for historical context, conceptual clarity, methodological reliability, empirical support, and relevance to the review objectives. Particular attention was given to scholarly disagreements, differences between textual and lived traditions, and the distinction between historically documented contributions, practices requiring further validation, and exaggerated claims. The synthesis combined thematic description with critical comparison to present a balanced account of the scope, contributions, limitations, and contemporary significance of the Indian Knowledge System.

3. Historical, Conceptual, And Epistemological Foundations of The Indian Knowledge System

3.1 Meaning, Scope, and Diversity of Indian Knowledge Systems

Indian Knowledge System is a wide and complex system of ideas, practices, institutions and methods of learning that took shape in the Indian subcontinent over a long period. It has philosophical underpinnings, medical knowledge, linguistic heritage, scientific knowledge, agriculture, crafts, ritual, knowledge of the environment and community-based knowledge. It should not be considered a uniform or unified intellectual tradition. Knowledge was created and disseminated across the regions, linguistic communities, religious groups, occupational communities and social groups in different ways. There were also classical traditions in texts, oral traditions, tribal traditions, vernacular traditions, artisanal traditions, and household traditions. Indeed, Tamil intellectual history shows that knowledge production was achieved in regional languages, local institutions and literary cultures, and not just Sanskrit traditions (Champakalakshmi, 2016). This means that the scope of IKS should also involve the use of both formal scholarly systems and practical knowledge that is acquired in everyday life. Treating IKS as homogeneous can obscure internal debates, social inequalities, regional differences and the role of communities who were excluded from the dominant textual institutions. The interdisciplinary scope of the Indian Knowledge System extends across Philosophy, Science, Medicine, Ecology, Language, Arts, Education, Governance, and Community-based knowledge, as illustrated in Figure 1.

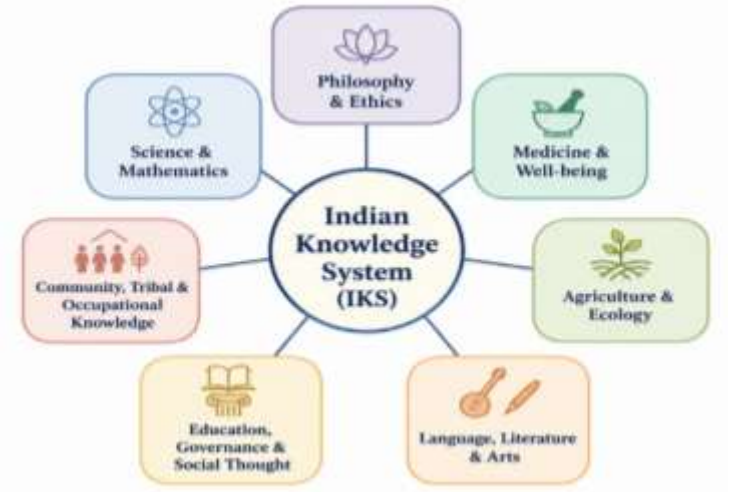

Figure 1. Major Domains of the Indian Knowledge System

3.2 Historical Development and Sources of Knowledge

The development of Indian knowledge traditions took place over several historical phases. Vedic and post-Vedic thought offered early reflections on nature, language, ritual, ethics, and human life. Later the influential studies of Buddhist and Jain traditions of perception, consciousness, causation, nonviolence and the nature of the self-emerged. During the classical and medieval periods, Philosophy, Grammar, Medicine, Astronomy, Mathematics, Literature, and Artistic theory flourished. The knowledge was also shaped by bhakti, Sufism and Indo-Persian traditions, via translation, devotional expressions, cultural exchange and contact between various religious and linguistic communities. Medical traditions like Ayurveda, too, were not static collections of old rules, they were continuously interpreted, practiced, classified, adapted and developed (Varier, 2016). The sources of IKS are the Vedic literature, Upanishads, the commentaries on the Vedas, Buddhist and Jain texts, medical texts, inscriptions, manuscripts, archaeological finds, oral traditions and occupational practices. Colonial rule changed the status of many traditions through the imposition of new educational frameworks and systems of scientific authority, and more recently national and post-colonial projects have aimed at reclaiming and reinterpreting indigenous intellectual production.

3.3 Knowledge Production, Transmission, and Epistemology

Indian traditions in knowledge production included observation, experience, reasoning, debate, testimony, memory, and application. In classical Ayurveda, knowledge was not based on inherited authority alone, but it had to be observed, interpreted, inferred, and subjected to systematic judgment with respect to health, disease, and treatment (Valiathan, 2016). These four modes of knowledge generation – textual learning, clinical practice, teacher-student instruction, and experiential evaluation – were also employed in the generation of Ayurvedic knowledge (Venugopalan Nair & Shankar, 2016). Gurukulas, monasteries, pathshalas, family occupations, apprenticeships, oral recitation, commentatorial tradition and community practice are all means through which knowledge was passed on.

In India, there are also elaborate descriptions of valid knowledge. Different philosophical schools accepted perception, testimony, presumption, comparison, inference or non-perception in various combinations. The explanation of the reliability of drawing a conclusion from the observed signs and set relations became particularly significant in the field of inference (Rajendran, 2016). Debate also served as an orderly way of testing arguments, finding out their internal inconsistencies, and sharpening intellectual stances, rather than just winning them (Raghuramaraju, 2016). These practices demonstrate that the knowledge of Indians was developed differently through several approaches of enquiry which included textual authority, rational study, experience, and empirical testing.

The Indian Knowledge System includes diverse textual, practical, oral, and community-based traditions, as summarised in Table 1.

Table 1. Major Domains and Forms of the Indian Knowledge System

Domain	Major knowledge forms	Common modes of transmission
Philosophy and ethics	Logic, epistemology, consciousness, duty, liberation	Debate, commentary, teacher–student instruction
Science and medicine	Mathematics, astronomy, Ayurveda, metallurgy	Texts, observation, calculation, clinical practice
Agriculture and ecology	Farming, biodiversity, water and forest management	Community practice and intergenerational learning
Language and literature	Grammar, poetry, narratives, oral histories	Texts, recitation, storytelling
Arts and crafts	Music, dance, theatre, sculpture, weaving	Apprenticeship, imitation, embodied practice

Community knowledge	Tribal healing, fishing, food, household and occupational knowledge	Oral transmission and everyday experience

The generation, transmission, application, and preservation of knowledge within IKS occurred through an interconnected and continuous process, as illustrated in Figure 2.

Figure 2. Process of Knowledge Generation and Transmission in the Indian Knowledge System

4. Contributions to Philosophy, Logic, Ethics, and Understanding of Human Existence

4.1 Major Traditions of Indian Philosophy

Indian philosophy emerges from a number of schools offering different explanations of the nature of knowledge, reality, consciousness, morality and liberation. Nyāya taught about logic and proper knowledge, Vaiśeṣika studied substances, qualities, movement and the kinds of reality. Sāṃkhya explained reality in terms of two fundamental principles—*Puruṣa* (consciousness) and *Prakṛti* (material nature)—while Yoga developed techniques for controlling the mind. Mīmāṃsā explored language, interpretation, duty, and scriptural authority, and Vedānta gave rise to alternative accounts of the nature of the individual self, the world and ultimate reality. Buddhist philosophy challenged the concept of a permanent self and studied impermanence, dependent arising, and suffering. Jain philosophy upheld a plural understanding of reality and linked knowledge with ethical restraint. Classical Indian ideas of personhood therefore varied in their conceptions of personal continuity, awareness, agency, moral responsibility, and the self (Chadha, 2022). Traditions can also be seen interacting in the effects of ideas from Navya-Nyāya on Mādhva Vedānta, for instance in discussions about the meaning of reference, the non-existence of entities, and the scope of meaningful expression (Williams, 2021).

4.2 Logic, Epistemology, Reality, and Causation

Indian philosophers have developed elaborate theories about the ways in which knowledge is gained and the ways in which valid cognition can be distinguished from doubt, error and illusion. Nyāya recognised the importance of perception, inference, comparison, and testimony as the sources of knowledge, and they elaborated on the structure of argument in terms of propositions, reasons, examples, applications, and conclusions. Subsequent thinkers such as the Navya-Nyāya thinkers further developed the technical terms for the analysis of cognition and justification. In the epistemology of Gaṅgeśa, for example, it was considered whether a true belief could count as knowledge if its truth depended partly on favourable conditions or epistemic luck (Das, 2021). Questions of causation were also significant. Buddhist thinkers understood phenomena in terms of conditions or dependent relations; Nyāya maintained that there is causal regularity, while Sāṃkhya explained effects as changes in pre-existing causes. Early Buddhist sources also linked language with perception, conceptual construction, and how humans organise perceived reality (Divino, 2025b).

4.3 Self, Consciousness, Ethics, Yoga, and Human Flourishing

There were different conceptions of consciousness and of the self in Indian traditions. Vedānta regarded consciousness as fundamental reality whereas Buddhism focused on the analysis of experience and rejected the existence of an independent, eternal self. Abhidhamma thought analysed cognition as changing mental events arising under specific conditions – as a systematic phenomenology of attention, perception, feeling, and intention (Divino, 2025a). Although the theories and terms used in Indian traditions do not directly translate into the psychological categories of the modern era, they can be compared to modern research in cognitive science and added to the ongoing discussion of the nature of awareness, self-

representation, attention, and mind–body relations (Sedlmeier & Srinivas, 2016). Vedāntic descriptions of the pure self also provide a unique approach to the study of the subjective experience and consciousness transcending the traditional concept of the ego (Louchakova-Schwartz, 2023).
Self-discipline and liberation were closely linked with ethical development. Jain ethics positioned ahiṃsā as the focus of responsible action, and moral carefulness was extended to humans, animals and other living beings (Donaldson, 2019). For the transformative knowledge, Liu (2023) highlighted moral preparation, detachment, mental control, endurance, concentration, and desire for liberation, as emphasised by Advaita Vedānta. Yoga also linked bodily discipline, mental discipline, ethics, attention, and meditation with freedom from mental disturbance.

4.4 Critical Appraisal of Indian Philosophical Thought

The hallmark of Indian Philosophy is its intellectual variety and continuous probing of aspects of knowledge, consciousness, human suffering, ethics, and human flourishing. It is not a single spiritual worldview; it includes realist, idealist, pluralist, materialist, devotional, and skeptical positions. However, comparisons with western Psychology should not take concepts out of context, both philosophically, ethically and culturally. Aimed at liberation, yoga psychology has become misinterpreted in modern times, with liberation now being interpreted as management of stress or the individual's well-being alone (Schleim, 2025). A critical evaluation should, therefore, identify the ongoing relevance of Indian philosophical perspectives as well as see some internal dissent, the historical background, translation issues, as well as the inherent challenges of applying classical philosophies to modern scientific theories.

5. Contributions to Science, Medicine, Technology, and Environmental Knowledge

5.1 Mathematics and Astronomy

Indian mathematical traditions made significant contributions to numerical notation, Arithmetic, Algebra, Geometry, Trigonometry, combinatorics, and infinite processes. The place-value system and the use of zero became influential, and later mathematical contributions laid out principles for equations, series, and geometric computation. A critical account should not consider "Indian Mathematics" as a unified, universal achievement, but rather explore the historical contexts in which various methods came into being and spread (Divakaran, 2016). Astronomy also embraced calendrical calculation, models of the planets, and ritual timekeeping. The recorded significance of the heliacal rising of Canopus is an example of the connection between the observation of the sky and seasonal knowledge and navigation (Rao et al., 2016).

5.2 Ayurveda, Siddha, Yoga, and Healing Traditions

Ayurveda is one of the important medical traditions of IKS and includes several concepts of body constitution, diet, lifestyle, diagnosis, pharmacology, prevention and treatment. It has a historical importance in the systematic categorisation of medical knowledge and focus on the interplay between health, environment, behaviour and everyday life (Jaiswal & Williams, 2017). Dietary wisdom of Ayurveda is also rooted in relationships between food, digestion, season, constitution, and well-being, providing a preventive approach to health that is more than just a treatment-focused approach to illness (Payyappallimana & Venkatasubramanian, 2016). The medicinal plants are still used today, and this is evident in the Ayurvedic Pharmacopoeia of India, and the variety of the medicinal plants makes the identification, dosage, quality and standardisation of the botanicals difficult (Yao et al., 2023). Siddha medicine, yoga-based practices, tribal healing, and ethnomedicine also preserve therapeutic knowledge which requires evaluation based on the kind of evidence they have. The concept of prakriti illustrates this issue clearly: it is a core part of Ayurvedic diagnosis, but the existing assessment tools have been found to be inconsistent for both their reliability and their measurement and scientific validation (Venkatesh et al., 2025).

5.3 Metallurgy, Architecture, Engineering, and Water Management

Through the intergenerational process of training, Indian technological knowledge was formed in relation with craft communities, material experiences, local resources and other elements. Evidence of the extraction of zinc, the use of high-tin bronze, and gold smithing, as well as various other aspects of metallurgical manipulation, shows advanced knowledge of manipulating heat, alloys, casting, and material properties (Srinivasan, 2016). Architectural and engineering traditions also adapted buildings to climate, topography, water availability, and social use. Stepwells are significant examples since they serve multiple purposes such as water storage, access to groundwater, public architecture and climatic responsiveness (Selvaraj et al., 2022). These traditional systems can inform present debates on sustainability, but they must be adapted to current hydrological, demographic, and governance conditions (Singh & Shreya, 2025).

5.4 Agriculture, Food, and Ecological Knowledge

Traditional Ecological Knowledge (TEK) is embedded in farming, seed selection, use of forest resources, food preparation, monitoring seasons, and conservation of biodiversity. Ethnobotanical knowledge can be useful for sustainable resource utilization since it links the properties of plants and their utilization by the people and their local ecosystems (Kumar et al., 2021). Rajouri has also been found to have conservation outcomes that are influenced by community perceptions and customary knowledge, while livelihood changes, institutions and environmental pressures also influence them (Ridwan et al., 2023). The Ruza water-management system of Nagaland demonstrates how Indigenous water management, terracing, land use, and community practice can support sustainable resource management (Wonglangka et al., 2025). In Goa, the traditional Khazan ecosystem demonstrates how indigenous ecological knowledge, community participation, and customary institutions have enabled the sustainable management of coastal wetlands for centuries

through integrated agriculture, fisheries, and water management (Sonak, 2014). The sacred groves of Pernem Taluka in Goa, illustrate how traditional nature worship and community stewardship have contributed to biodiversity conservation. These culturally protected forest patches preserve native flora and fauna while reinforcing indigenous ecological knowledge and sustainable environmental practices (Roy et al., 2026). Another avenue of contribution is from indigenous foods. Finger millet and kionaar leaves show that traditional food systems can be a source of high nutritive value products and contribute to local value chains and livelihoods (Downs et al., 2022). In the Sauria Paharia community, access to Indigenous foods is linked to dietary quality, cultural identity, and food security (Ghosh-Jerath et al., 2020). However, the nutritional value of traditional foods is not uniform and depends on the method of preparation, antinutrient presence, bioavailability of minerals, availability of minerals, and shifting consumption patterns (Kapoor et al., 2022). In Goa, indigenous food systems are reflected in a variety of traditional fermented foods and beverages that have been prepared and consumed by local communities for generations. These foods are produced using locally available ingredients and traditional fermentation techniques that have been passed down through families and communities over time. Besides preserving culinary traditions, these practices support sustainable use of local biological resources and strengthen cultural identity, demonstrating the enduring relevance of indigenous knowledge in food systems (Furtado & Velho-Pereira, 2020).

5.5 Evidence, Validation, and Limits of Scientific Claims

There is a need for a multi-layered process in evaluating the scientific contributions of IKS. Historical evidence exists for some achievements like documented mathematical procedures, astronomical observations, metallurgical techniques and structures of water. Other practices have empirical evidence for specific cases; these may not be applicable to all cases. A third group of claims, such as medicinal, constitutional, and therapeutic claims, is promising but needs to be better clinically validated, standardised measurements, reproducible methods, and safety monitoring. Historical importance should not be confused with present scientific effectiveness. Metaphorical passages, philosophical ideas, or symbolic descriptions should not be used as evidence of modern technology. However, useful knowledge gained from long-term observation and practice should not be dismissed because of exaggerated claims. This comparison can help to avoid cultural dismissals and indiscriminate celebrations of TK. A balanced review should distinguish evidence from belief, remain open to testing, and evaluate each claim according to appropriate historical, experimental, clinical, or ecological standards.

Traditional Knowledge claims differ considerably in their historical documentation, empirical support, and contemporary applicability. To avoid treating all claims as scientifically equivalent, Table 2 classifies them according to their evidentiary status and the type of scholarly evaluation they require.

Table 2. Critical Classification of Scientific and Practical Claims in IKS

Evidence category	Examples	Required approach
Historically documented	Mathematics, Astronomy, Metallurgy, stepwells	Verify through texts, archaeology, and material evidence
Empirically supported	Indigenous foods, water management, biodiversity practices	Assess within specific ecological and social contexts
Promising but incomplete	Selected herbal, dietary, and yoga practices	Conduct stronger and reproducible studies
Requiring validation	Prakriti assessment and some diagnostic practices	Develop standardised tools and safety measures
Philosophical or symbolic	Karma, liberation, self, consciousness	Interpret within philosophical contexts
Unsupported or exaggerated	Claims of modern technologies in ancient texts	Reject unless credible evidence is available

6. Contributions to Language, Literature, Arts, and Cultural Traditions

6.1 Language, Grammar, Literature, and Narrative Traditions

Indian knowledge traditions developed complex systems of language, grammar, interpretation, narration and literary expression. Sanskrit grammar developed precise techniques for analysing phonetics, word construction, syntax and semantics, and Tamil and other regional grammars created their own linguistic and literary systems. Vedic literature, epics, Puranic literature, classical poetry, drama, Buddhist and Jain compositions, Bhakti literature, Sufi Literature, Folk Literature, Community Literature etc. are all a part of Indian literature. These traditions enabled the preservation of religious ideas, social memories, ethical values, historical experiences, and regional identities. Oral traditions played a particularly significant role in the history of communities that lacked formal written documents. For instance, in the Mizo and Angami narratives, cultural memory is maintained and reconstructed through oral transmission, while the processes of migration, identity, conflict, and social values are also preserved (Khiangte et al., 2025). Oral knowledge is thus not less important than textual knowledge, but it must be interpreted carefully, as there may be differences in the presentation of narratives from generation to generation and from social setting to social setting.

6.2 Aesthetics, Music, Dance, and Theatre

Indian aesthetics developed sophisticated explanations of artistic experience through concepts such as rasa, dhvani, and alamkara. These ideas examined how emotions are represented, communicated, and experienced by audiences through

poetry, drama, music, and performance. Indian musical traditions similarly organised knowledge of rhythm, melody, improvisation, emotional expression, and disciplined training. Research on North Indian classical music suggests that particular musical structures can produce varied emotional responses shaped by melodic movement, performance context, and listener experience (Valla et al., 2017). Improvisation is not simply spontaneous expression; it emerges from long-term training, imitation, repetition, listening, and the gradual internalisation of musical rules (Sayers, 2025). Premodern musical categories such as prabandha also demonstrate that genres changed in meaning and function across historical periods, making fixed modern classifications inadequate for interpreting earlier musical knowledge (Keerthi, 2016).
Dance and theatre involve body movement, gesture, rhythm, story, costume, music and the expression of emotion. Kathakali relies on a rigorous regimen of physical training, observation, repetition, and close interaction between teacher and student to convey knowledge. The body itself is a storehouse for technical and cultural knowledge and indicates that performance traditions are not solely accessible in written texts (Narayanan, 2016).

6.3 Visual Arts, Crafts, and Artisan Knowledge

Indian painting, sculpture, temple art, weaving, pottery, metalwork, woodcraft, textile production and regional decorative traditions are included in the visual and material traditions. Such knowledge was often preserved within artisan families and occupational communities. Craft production was characterised by knowledge of the materials, tools, proportions, symbols, environment, and market needs. These traditions were linked to both art and livelihood, as well as social identity, religion and community memory. The significance of these historical facts is to show that cultural knowledge was not only created by high-ranking scholars, but also by skilled people who were often overlooked in formal intellectual histories.

6.4 Cultural Continuity, Transformation, and Critical Assessment

Indian cultural traditions have not been static throughout the ages. These emerged from a process of interaction between Hindu, Buddhist, Jain, Islamic, tribal, regional and colonial influences. They were constantly reinvented and repurposed by migration, trade, patronage, technology, commercialisation and globalisation. A critical assessment cannot, therefore, paint a picture of culture as ‘eternal’ or ‘authentic’. Revival can preserve threatened traditions, but it can also homogenize the various traditions, remove them from local communities or commercialise them. Historical change should be acknowledged, the living practitioners supported, and the oral, folk, regional and artisan knowledge, as well as the classical, celebrated traditions included in cultural preservation.

7. Social, Educational, Political, and Contemporary Significance of Indian Knowledge

7.1 Educational Thought and Pedagogical Practices

Educational traditions in India emerged through institutions and methods such as Gurukulas, pathshalas, monasteries, community learning, memorisation, dialogue, observation, repeated practice, and apprenticeship. Learning was frequently linked to ethical conduct, discipline, intellectual debate, and the practical concerns of daily life. In addition to formal education, knowledge was passed on by families, professions, ritual groups, artistic lineages, and local contexts. These traditions have been revived in the modern era of higher education and are currently promoted in the context of integrating these traditions into multidisciplinary programmes in the fields of Indian Philosophy, Language, Science, Arts, Health Knowledge, and cultural practice (University Grants Commission, 2023). This integration can provide a solid foundation for cultural awareness and intellectual diversity, as long as it is grounded in evidence and is inclusive. The use of IKS in education should not create social exclusion or be used to teach the historically questionable claims as truths.

7.2 Political, Administrative, and Economic Thought

Indian knowledge traditions also contain ideas related to governance, diplomacy, taxation, law, public welfare, trade, resource management, and occupational organization. Political and administrative knowledge was shaped through texts, customary practices, local institutions, guilds, agrarian systems, and community decision-making. Economic thought was highly interwoven with the domains of agriculture, craft production, markets, household management and access to natural resources. These traditions reveal that knowledge was often applied in everyday life and towards sustaining social order, livelihood and collective survival. However, the prescriptions of the classical era should not obscure the fact that they are not necessarily valid descriptions of historical society. Their relevance is largely based on the critical comparisons with material evidence, regional experience, and the social status of the groups whose knowledge was recorded or ignored.

7.3 Community, Tribal, Occupational, and Gendered Knowledge

Community knowledge involves activities such as farming, fishing, preparing food, healing, using the forests, making crafts, water management, and observation of the environment. In Nagaland, the Ao and Sumi tribes follow traditional fishing practices that illustrate the relationship between local knowledge and aquatic environment, seasonal cycles, fishing tools, and fishing experience among the communities (Kechu & Pankaj, 2023). In the case of millet production in Koraput, the findings indicate that indigenous knowledge can be useful for improving productivity, labour efficiency and adaptation when compared to modern needs for ergonomics (Chapke et al., 2025). Similarly, in Goa, the traditional fish curry–rice food system reflects indigenous knowledge of coastal ecology, seasonal fish availability, the use of locally cultivated rice, and coconut-based food practices. The integration of locally available ingredients and traditional culinary knowledge has supported household nutrition, cultural identity, and sustainable use of coastal resources (Alvares & Gadgil, 2002). Tribal food systems also help to sustain important nutritional and cultural knowledge. The comparison of Santal food patterns with the contemporary EAT–Lancet dietary guidelines highlight the strengths of the traditional food pattern and effects

of food transition (Armes et al., 2024). Women often have key roles in seed selection, food processing, home health, craft production and transmission of knowledge, but are under-represented in formal documentation of IKS.

7.4 Contemporary Applications, Sustainability, and Digital Preservation

IKS is clearly seen today in the fields of healthcare, education, sustainable agriculture, food security, conservation of biodiversity and cultural heritage. The incorporation of Ayush into primary health care signals an effort to bring together traditional medicine and public health institutions, and brings up questions regarding regulation, evidence, safety and integration with biomedicine (Nesari et al., 2025). Traditional knowledge can contribute to sustainability when it is adapted to present ecological and social conditions rather than reproduced without evaluation. Oral records of cultural practices, community histories, and oral narratives are also important to be preserved digitally. But, the nature of the digitisation process includes community participation, cultural sensitivity, proper ownership and protection from any possible extraction or misrepresentation (Dutta, 2019). For IKS to have its contemporary value, it requires critical assessment, respect for living knowledge holders, ethical use, preservation, and social inclusion.

8. Critical Debates, Limitations, and Future Research Directions

8.1 Definitional, Historical, and Evidentiary Problems

Indian Knowledge System is not easily definable since it encompasses classical texts, oral wisdom, local practices, religious notions, medical knowledge, ecological knowledge and skills related to occupation. These forms of knowledge differ in their histories, methods, and evidentiary bases. Some claims are complicated to verify due to manuscript variations, uncertain dates, later commentaries, and limited archaeological evidence. The burgeoning field of Ayurveda research also presents a differential distribution of research themes, institutions and methods highlighting the need for better research priorities and inter-institutional linkages (Nedungadi et al., 2023). Historical importance, continuing cultural use, and current scientific effectiveness are therefore separate but related issues.

8.2 Colonialism, Nationalism, and Romanticization

European disciplinary divisions were often used to categorise Indian traditions and some text-based traditions were chosen to represent Indian tradition, while oral, tribal, vernacular and practical traditions were discounted. Such marginalisation has been the subject of postcolonial recovery, but decolonial language may also be used by nationalist projects that sanitise and politically package the history in a way that is only partial and convenient (Lewis & Lall, 2024). Romantic narratives can depict precolonial India as a scientific utopia, as a single culture or as lacking in social stratification. Such claims weaken scholarship by replacing historical inquiry with civilizational assertion. Rather, Research with tribal communities should question inherited categories and allow knowledge holders to shape the representation of their traditions (Tripura, 2023).

8.3 Pseudoscience, Validation, and Translation Problems

Traditional concepts are often presented in modern scientific terms, but without adequate substantiation. Philosophical metaphors can be formulated as technological descriptions or therapeutic claims may be generalised beyond the available evidence. The contrast between maintaining a unique medical system and the expectations of safety, reproducibility, clinical evidence and quality control (QC) of modern times is demonstrated in Ayurveda research (Ghooi, 2022). Globalisation also reframes traditional practices through markets, regulation, branding, and policy expectations via markets, regulation, branding, and policy expectations, and sometimes in an idealised form that is different from the lived one (Kudlu, 2025). Validation must be in terms of measurable claims, in appropriate and transparent ways, but not by forcing concepts into biomedical categories.

8.4 Caste, Gender, Knowledge Ownership, and Social Exclusion

Caste and social status had historically affected access to literacy, formal education, sacred texts and recognised intellectual authority. However, caste is not something that can be ignored as a peripheral matter as it influenced occupations, social mobility and opportunities for the production and transmission of knowledge (Goghari & Kusi, 2023). Other marginalised groups, such as women, Dalit communities, Adivasi, artisans, healers and farmers, have also been largely underrepresented in elite textual narratives. The ethical issues are exacerbated when community practices are digitised, patented or commercialised. The Traditional Knowledge Digital Library provides safeguards against unauthorized patent applications; however, it also poses questions regarding the classification of TK and who defines, organises, and controls traditional knowledge (Fredriksson, 2023). However, if consent is not granted and benefit sharing is ignored, digitisation can preserve knowledge but also remove it from community control (Paul, 2023).

8.5 Research Gaps and Future Directions

Future studies should draw on historical research, fieldwork, and scientific assessment, as well as community involvement. The role of regional languages, oral learning, women's role, tribal culture, craft traditions, and informal learning modes are to be accorded more attention. Manuscript reliability can be enhanced through critical editions, clear validation procedures, comparisons, and documentation. Traditional knowledge holders should be actively engaged in research and ethical guidelines for consent, ownership, attribution and benefit sharing should be established. Such an effort can help preserve intellectual diversity and distinguish credible contributions from unsupported claims. The major limitations of IKS research and their corresponding future priorities are presented in Table 3.

Table 3. Major Challenges and Future Priorities in IKS Research

Critical issue	Main concern	Future priority
Broad definition of IKS	Diverse traditions are treated as one system	Develop plural and context-sensitive definitions
Weak historical evidence	Uncertain dating, authorship, and manuscript variation	Use critical editions and archaeological evidence
Translation problems	Traditional terms are equated directly with modern concepts	Use interdisciplinary and historically sensitive interpretation
Romanticisation	Cultural pride produces unsupported scientific claims	Separate documented evidence from speculation
Social exclusion	Women, Dalit, tribal, and artisan knowledge is neglected	Include marginalised knowledge holders
Ownership and commercialisation	Knowledge may be patented or digitised without consent	Ensure community control and benefit sharing
Limited validation	Some health and scientific claims lack reliable evidence	Conduct transparent clinical and experimental research
Disciplinary fragmentation	Different fields study IKS separately	Promote interdisciplinary collaboration

9. CONCLUSION

The Indian Knowledge System is a plural, multi-regional, multilingual, community-based, intellectually diverse, practice-oriented, and historically evolving body of knowledge. It has roots in Philosophy, Logic, Ethics, Medicine, Mathematics, Astronomy, Linguistics, Ecology, Architecture, Literature, Arts, Education, governance and day-to-day social existence. These traditions do not fit neatly into one civilisational narrative due to the fact that they came about as a result of debate, observation, experience, textual interpretation, oral transmission, apprenticeship, and community practice. They are important because of what they accomplished and how they thought about knowledge, human life, nature, health, creativity, and social responsibility. More than cultural celebration is needed to develop a critical understanding of IKS. Claims of scientific or technological achievement should be supported by sound textual, archaeological, historical, experimental, or clinical evidence. Theories, symbols and cultural beliefs should not be equated with contemporary scientific findings. However, the indigenous traditions of knowledge in India should not be dismissed merely because they developed outside modern Western disciplinary frameworks. This would neglect value of intellectual traditions, knowledge and experiences of the community that are still relevant in education, health, agriculture, environmental management, arts and cultural identity. The contemporary utilisation of IKS must then be based upon historically accurate information along with careful translation and scientific assessment, if applicable, and an awareness of internal differences and social injustices. Improved focus needs to be paid to women, Dalit, Adivasi, artisans, healers, farmers, performers and other knowledge holders whose contributions have been under-represented. Respect for community ownership, informed participation, ethical documentation, and fair benefit sharing is equally necessary. An inclusive and evidence-informed approach can preserve intellectual diversity and enable Indian knowledge traditions to contribute meaningfully to contemporary scholarship, cultural continuity, and sustainable human development.

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