The Asian Thinker
A Quarterly Bilingual Peer-Reviewed Journal for Social Sciences and Humanities
Year-7 Volume: IV (Special), October-December, 2025
Issue-28 ISSN: 2582-1296 (Online)
Website: www.theasianthinker.com **Email**: asianthinkerjournal@gmail.com

16. Exploring contemporary applications of the Indian Knowledge System

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Abstract

In recent years, the term "Indian Knowledge System (Bharatiya jñāna Parampara)" has gained popularity but its meaning and underlying principles needs to be clearly explained. Many myths need to be explored and connect with present day observables. Our inherent knowledge based on experience, observation and experimentation of that period e.g. tool and techniques used for subsistence, ethnobotany, traditional medicine and surgery, celestial navigation, craft skills, ethnoastronomy etc., need to be collaborated with contemporary knowledge and this paper will attempt to explore those inter Connectedness. Many scholars have made significant effort to highlight the rich history and achievements of Indian tradition of science mainly in the field of ayurveda, mathematics, astronomy, etc. but there is still need of much wider discussion on understanding of philosophical foundation of Indian traditional knowledge. In this paper an attempt has been made to discuss few existing myths and actual facts about the Indian Knowledge System. It is essential to explain the contemporary applications of Indian Knowledge System in the fields of philosophy, political science, economics, sociology, mathematics, astronomy, metallurgy, architecture, health science, water management, etc. Taking a particular example of principles of Tantrayukti an attempt has been made to explain the application of Indian Knowledge System in modern research methodology specially in designing thesis, research papers and similar texts.

Keywords: Bharatiya jñāna Parampara, Philosophical foundation, Tantrayukti and Research Methodology

Introduction:

A knowledge system is a structured framework that organizes, manages, and disseminates information and knowledge within a specific domain. It encompasses the methods, tools, and processes used to collect, store, retrieve, and share knowledge effectively. Knowledge systems are essential for various fields, including education, research, healthcare, business, and technology, as they facilitate the creation, sharing, and application of knowledge [1].

The Indian Knowledge System (IKS) is biggest and richest source of ancient wisdom, scientific exploration, and artistic expression that has evolved over thousands of years [1-5]. It encompasses a wide range of disciplines, including philosophy, mathematics, astronomy, medicine, arts, and literature. IKS is characterized by its holistic and integrative approach,

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where different areas of knowledge are interconnected and often aligned with broader spiritual and ethical principles [1].

The IKS has been tested through practice, verified and has been improved over thousands of years [6]. The roots of IKS can be traced back to the Vedic period (before 3000 BCE), during which the foundational texts, the Vedas, were composed. These texts contain hymns, rituals, and philosophical discourses that form the bedrock of Indian philosophy and spirituality. The Upanishads, which are considered the concluding part of the Vedas, delve deeper into metaphysical concepts such as the nature of reality, the self, and the ultimate truth (Brahman) [1].

In the period 3000 BCE to 500 CE [1] many masterpieces were created including Vedanga-jyotisa, Manu-smrti, Sulba-sotras, Sušruta-samhita, Astädhyayi, Nirukta, Natyaśastra, Buddhist Texts, Nyaya and Vaišesika Sütras, Jaina Mathematical works, Arthasästra, Chandah-sastra, Yoga-sūtras, Kamasütra, Maha-bhäsya, Rasaratnakara, etc. From 500 CE to 1800 CE Aryabhatiya, Arya-siddhanta, Pancha siddhantikā, Mayamata, Brahmasphuta siddhänta, Manasara, Aryabhatiya bhasya, Mahabhäskariya, Narada-Silpa-sástra, Gagita sara-sarigraha, Siddhanta Sekhara, Samarangaga-sotradhara, Siddhanta Siromani, Kasyapa-Silpa-Sastra, etc. were written.

The Indian Knowledge System is founded on the principles of 'wellbeing of all', which is evident from following mantras [6]:

सर्वे भवन्तु सुखिनः सर्वे सन्तु निरामया।
सर्वे भद्राणि पश्यन्तु मा कश्चित् दुःखभाग् भवेत्।। (तैत्तिरीय उपनिषद्)
अयं बन्धुरयं नेति गणना लघुचेतसाम् ।
उदारचरितानां तु वसुधैव कुटुम्बकम् ॥ -- (महोपनिषद्)
कृण्वन्तो विश्वं आर्यम् | (स्वामी दयानंद सरस्वती)
एकम् सत् विप्रा बहुधा वदन्ति| (ऋग्वेद)

IKS is based on a deep understanding of human being as well as of nature and entire existence. Key contribution of IKS may be summarised as:

1. Philosophy and Spirituality:

   a) Vedas and Upanishads: These texts are the cornerstone of Indian philosophy, providing profound insights into the nature of existence, consciousness, and the universe.
   b) Yoga and Meditation: Practiced for millennia, yoga and meditation are integral to achieving mental and physical well-being.

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c) Vedanta and Advaita: Schools of thought emphasizing non-dualism and the unity of all existence, propounded by philosophers like Adi Shankaracharya.

2. Science and Mathematics:

a) Ayurveda: An ancient system of medicine that focuses on holistic health and well-being through natural remedies and preventive care.
b) Sanskrit Mathematics: Indian mathematicians like Aryabhata and Bhaskara made significant contributions to algebra, arithmetic, and geometry. The concept of zero, which revolutionized mathematics, originated in India.
c) Astronomy: Advances in understanding celestial bodies and their movements were made by astronomers like Aryabhata and Varahamihira.

3. Arts and Literature:

a) Classical Music and Dance: Forms like Bharatanatyam, Kathak, and Carnatic music are deeply intertwined with spiritual themes and philosophical concepts.
b) Literature: The epics Mahabharata and Ramayana explore human values, ethics, and societal norms, and continue to influence contemporary Indian culture and literature.

Facts and myths regarding IKS:

In this section few existing myths about IKS has been discussed [1, 7-10]:

Myth 1: The Indian Knowledge System is purely religious.

Fact: While it's true that many aspects of the Indian Knowledge System have roots in spiritual and religious texts, it is far from being purely religious. The system encompasses a wide range of disciplines, including mathematics, astronomy, medicine, arts, and philosophy. Ancient texts like the Vedas and Upanishads, while having spiritual elements, also contain significant scientific and philosophical insights.

Myth 2: Ayurveda is outdated and unscientific.

Fact: Ayurveda is one of the world's oldest holistic healing systems, emphasizing a balanced lifestyle and natural remedies. It includes a vast repository of knowledge about herbs, diet, and lifestyle practices. Modern research is increasingly validating many Ayurvedic practices and their effectiveness. For example, turmeric, an essential herb in Ayurveda, has been scientifically proven to have anti-inflammatory and antioxidant properties.

Myth 3: Indian mathematics and science are primitive.

Fact: Indian mathematicians and scientists made groundbreaking contributions that were advanced for their time. The concept of zero and the decimal system originated in India. Mathematicians like Aryabhata and Brahmagupta made significant strides in algebra, arithmetic, and trigonometry. Aryabhata's work on planetary motion and eclipses was highly advanced.

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Myth 4: Indian classical arts are obsolete and irrelevant.
Fact: Indian classical arts, including music, dance, and theatre, are vibrant and continue to evolve. Forms like Bharatanatyam and Kathak are not only performances but also embody spiritual and philosophical teachings. These art forms are celebrated globally and contribute to cultural diplomacy and international cultural exchange.
Myth 5: The Indian Knowledge System is incompatible with modern science and technology.
Fact: The Indian Knowledge System is not opposed to modern science but rather complements it. The principles of yoga and meditation are now widely accepted and practiced worldwide for their mental and physical health benefits. Traditional knowledge in fields like agriculture and environmental conservation offers sustainable solutions to contemporary problems. Additionally, concepts from Vedic mathematics have applications in modern computational algorithms.
Myth 6: IKS is a discipline/ subject/ specialization.
Fact: IKS represents a collection of interconnected disciplines.
Myth 7: IKS is written by Hindus.
Fact: A lot of IKS is within the Hindu or rather Shindhu. But Jainas, Bauddhas, Sikhs, Muslims etc. have also contributed to IKS e.g. Kabir, Rahim, Mahavira, Guru Nanak Dev are few examples.
Myth 8: IKS has answers to all problems of life.
Fact: Our ancestors tried to answer the problems which were prevalent in their times. Hence, it does not have answers to all questions.
Myth 9: IKS is only written by men.
Fact: Indian texts mention the names of many learned ladies like Viśwavarā, Apalā, and Ghośa, and also many texts written by many Indian women can be found.

The Indian Knowledge System is a testament to the depth and breadth of ancient Indian intellectual and cultural achievements. By dispelling myths and understanding the facts, we can appreciate the continued relevance and potential of this rich heritage in addressing contemporary global challenges.

Contemporary applications of IKS:

The Indian Knowledge System (IKS) continues to have a significant impact on contemporary society, offering valuable insights and practical applications across various fields. Some examples of modern applications of IKS are listed in Table 1 [1].

Table 1: Contemporary applications of IKS

S. No.	Field	Notable IKS texts	Contemporary applications
1.	Vedic Philosophical and	Darsanas, Upanishads, Prasthana Trayi, Yoga	Use Data science to create tools, maps, and databases. Newer

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	Cognitive Sciences		methods to manage stress and anxiety
2.	Historical and Civilizational Sciences	Purva Mimamsa, Samhita, Brahmana, Shrauta Sutras, Grihya Sutra, Shulba Sutra, Itihasa, Purana, Dharma sastra, Kavya	Data Science methods to predict current trends in historical context, behaviour of various communities, geographical regions, Visualisations of Historical contexts in Movie and mass media
3.	Mathematical, Physical and Astronomical Sciences	Aryabhatiya, Jyoutisha, Shulba Sutras	New pedagogical methods for teaching mathematics, improving provenance of mathematical concepts
4.	Speech and Linguistics	Siksha, Vyakaranam, Chandas, Nirukta, Mimamsa, Mantra Shastra	Automatic Speech recognition, Text-to-speech, Automatic parsing, Computational Linguistics, Tools for lexicography
5.	Political, Economic and Strategic sciences	Dhanurveda, Artha Sastra, Dandaniti, Rajaniti	Public policy doctrines for current contexts, Strategies to mitigate and derisk, Governance and Public Administration
6.	Medical and Health sciences	Ayurveda, Yoga, Sankhya	Use of ancient Indian medicinal and Healthcare practices in alleviating current medical problems, Yoga for lifestyle diseases, Ayurveda in Systems Biology, Instrumentation / Diagnosis for Ayurveda
7.	Culinary, Nutritional and Pharmacological Sciences	Paka sastra, Vrikshaayurveda, dravya vijnana, ayurvediya kalas, Siddha, Folk medicine	Computational astronomy for recipe discovery based on ancient principles, Apply nutritional principles embedded in paka sastra, Biochemistry of Indian recipes, Food and lifestyle versus medicine
8.	Agricultural Science, Veterinary and animal husbandry	Krushi vijnana, vriksha-ayurveda, best practices in agriculture and animal husbandry	Cropping practices for climate change and mitigation, Instrumentation for native crop species monitoring, Computer Vision methods for characterisation of plants and crops

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9.	Mechanical & Digital Design &Engineering	Yantra Kala, Rasa shastra, Dhaatu Shastra, Vaastu Shastra, Purana, Itihasa	Audio Recording/Video Recording for Heritage Visualisation, Museum experience Technology, 3d printing to better understand ancient Indian tool making, Ancient Designs Scalable manufacturing methods, recreation of ancient boats, chariots, carts and their biomechanics. Search retrieval systems, applications, software for data mining, integration, immersive visualisation
10.	Civil and Architectural Science	Vaastu sastra, Shilpa sastra, Tantra, Shulba Sutras	Modern structures based on ancient Indian principles of construction, Sustainability principles form Heritage structures, Novel Visualisation methods for Heritage walks and museums
11.	Chemical, Metallurgical & Material Sciences	Rasayana sastra, Dhaatu sastra, Itihasa, Purana, Kavya	Support native metalwork artisans with suitable modern methods without altering core principles; sustainable materials, organic materials based on traditional principles
12.	Fashion and Interior Design	Alankaara sastra, Alankaara kala, Natya sastra, Yoga, Tantra	Methods to promote the use of ancient Indian fashion and interior design techniques as sustainable/organic alternatives; manufacturing at scale for traditional products; Scalable manufacturing methods for traditional Indian Gold Jewellery design

Thus, the Indian Knowledge System is a treasure of wisdom that continues to inspire and inform modern practices across various domains. Its holistic and integrative approach offers a unique perspective that can address contemporary challenges while preserving cultural heritage.

Applications of IKS in documentation (research methodology)

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Tantrayukti is an ancient Indian methodology used for composing and interpreting scientific treatises, particularly in Ayurveda. It consists of 36 principles that ensure logical coherence and clarity in scholarly works. Some key principles include [1]:

1. Adhikarana (Topic of Discourse): Clearly defining the subject matter.
2. Yoga (Appropriate Arrangement): Structuring the content logically.
3. Hetvartha (Extension of Concepts): Expanding on ideas with references.
4. Padartha (Correct Meaning): Ensuring accurate interpretation of words.
5. Pradesha (Partial Adumbration): Providing partial explanations.
6. Uddesha (Concise Statement): Making brief, clear statements.
7. Nirdesha (Elaboration): Offering detailed explanations.
8. Vakyashesha (Supply of Ellipsis): Filling in missing parts of the text.
9. Prayojana (Purpose): Stating the objective.
10. Upadesha (Authoritative Instruction): Providing authoritative guidance.

These principles help in creating a structured and comprehensive approach to scholarly writing, ensuring that the content is both precise and accessible which is consistent with the modern research methodology [11].

Conclusion:

The Indian Knowledge System remains highly relevant in contemporary times, offering valuable insights and practices that can address modern challenges. Its holistic, sustainable, and culturally rich approach provides a unique perspective that complements modern scientific and technological advancements. By integrating IKS into various domains, we can foster a more inclusive, innovative, and culturally aware society. Especially in light of NEP 2020 [12] which emphasizes the importance of integrating IKS into the education system and to create a more inclusive and culturally rooted educational framework that values traditional knowledge alongside modern scientific advancements.

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