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ABOUT THE JOURNAL

The Educator - the FIMT Multidisciplinary Journal (ISSN No. 2277-9736) is a Bi-Annual and multidisciplinary journal to publish research papers in the fields of management, commerce, information technology, education, economics, and media studies. We publish the highest quality empirical, theoretically grounded work addressing the main areas of higher education and the dynamic role of the university in society. We seek to publish scholarship from a wide variety of theoretical perspectives and disciplinary orientations. Articles appearing in the Journal employ an array of methodological approaches, and welcome work from scholars across a range of career stages.

Objective: The most important objective is to give academicians and researchers a platform to submit their original research work for publication.

Review Process: Two or more reviewers will review all contributions by following the 'double blind' system.

The Educator -the FIMT Multidisciplinary Journal reserves the right of making editorial amendments in the final draft of the manuscript to suit the journal's requirements. All contributions to the journal are rigorously refereed and are selected on the basis of the quality and originality of the work. The journal publishes the most significant new research and review work in all areas pertaining to its scope and research being done in the world, thus ensuring its scientific priority and significance.

CHAIRMAN'S MESSAGE

It gives me immense pleasure to extend my warm greetings to all readers through the latest issue of *Educator: A Multidisciplinary Journal*, and to witness the continued growth and impact of this scholarly platform, which serves as a beacon of knowledge, research, and academic excellence.

I wholeheartedly welcome our valued academicians, researchers, and thought leaders to engage deeply with the contents of this journal and contribute meaningfully to the ever-evolving domains of research, education, and innovation. Through your insights and discoveries, we shape a brighter future for the next generation—one rooted in knowledge, compassion, and the welfare of all humanity.

Educator: A Multidisciplinary Journal aspires to bridge the gap between theory and practice by fostering a rich dialogue among scholars, practitioners, industry experts, policymakers, and educators from diverse disciplines. Its commitment to interdisciplinary collaboration and intellectual rigor has established it as a respected and reliable source of scholarly engagement.

I take this opportunity to express my sincere appreciation to the editorial board and contributors, whose unwavering dedication, scholarly integrity, and pursuit of excellence have brought this publication to life. Their efforts not only uphold the highest standards of academic publishing but also inspire a culture of curiosity, inquiry, and innovation within our academic community.

Let this journal continue to serve as a vibrant platform for ideas, discoveries, and collaboration that uplift and empower educators and learners across the globe

Warm Regards

V. K. N. Bhardwaj

Chairman

FIMT Group of Institutions



FROM THE EDITORIAL COMMITTEE

Dear Authors, Reviewers and Readers

On behalf of our editorial team, we feel honoured and fortunate to offer a word of thanks to our readers, contributors, authors, editors, and anonymous reviewers, who volunteered to contribute to the success of the journal and also for its mission to improve the quality of care and research in the form of publication in different areas of education.

We are thankful to the founder and chairman honourable Shri V.K.N Bhardwaj and Patron Dr. Nalini Joshi, who have always been a guiding spirit and prime inspiration to publish this journal. We are grateful for their continuous support and encouragement to bring out the journal in a proper form. We also appreciate advisory for their assistance, advice, and suggestion in shaping the journal in this form.

Finally, we express our profound gratitude to everyone who lent us their expertise as an advisor, peer reviewer and author. We wish your continuous support and thanks for being part of this vibrant community. We encourage you to continue sending us your feedback, ideas, and original works to further improve the quality and impact of the journal.

Sincere Regards

Editorial Committee



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1

SOCIO-ECONOMIC METAMORPHOSIS ON THE FACE OF TECHNOLOGY-DRIVEN DEVELOPMENT IN THE 21ST CENTURY

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Throughout all ages, society has been grounded in the journeys of all civilisations that unfolded under the influence of geographical, climatic, and occupational topography. Social aspects of human life and culture continued to take new shapes in response to the needs and demands of the environment at different points of time.

Man has ever been a researcher, thinker, and sociologist; hence, the world has seen many scientific, educational, and technological inventions in different areas whose knowledge ultimately was used in the service of man. It gave men the temptation to lead a better life and a more qualitative life based on the emerging philosophy of welfarism.

In this scenario, the economy also became an important area of study to be used as a catalyst for better qualitative human self-values; social, economic, and political theorists contributed in their own way by coding and methodological approaches, and searching for economic development. Adam Smith, Richard Keins, and JS Mill have been great economists of their time, formulating the path of economic development for future generations. They are still the guides of present-day economic and social researchers.

With the possession of this knowledge, this pace of change and development turned out to be revolutionary for human life and human civilization.

If we look back today and examine the contemporary socio, economic, and cultural scenes, we find not only the time change but we find a vertical and horizontal process of metamorphosis in human life and ultimately in society which means that all aspects and dimensions of human social life have been shaken beyond imagination and acceptance under the impact of a new landscape marked with technological development and process of globalisation.

In the contemporary society of the 21st century, the concept of development has been redefined keeping in view the parameters of human dignity, human aspiration and inclusiveness, equitarianism and egalitarianism, and interdisciplinary constitutionalism and related legal aspects are still the guiding and testing apparatus.

Another very important feature of today's changing scenario is global scale, along with technological innovation based on ongoing research and skill development, and an interdisciplinary approach. Frequently, the social space is evolving at an unprecedented pace, and it is at a critical juncture where the traditional framework is being tested by the rapid force of technological innovation, global economic integration, and a uniting social structure.

On this ground, it is the duty of every sensitive researcher to go into all the above referred aspect of academic study and research, focusing on and understanding the needs of human welfare.

Facts remain that every study that has ever been done on men and society confirms that in the present scenario, it is not only a change, but it is a metamorphosis, shaping society structurally, functionally, and occupationally, building a new face with new modes of values, relations, and a new normal in all areas of national life.

2

**CONNECTING DOTS OF “WHO AM I”
BASED ON ASHTAVAKRA GITA**

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ABSTRACT

In the Indian Knowledge System (IKS), self-knowledge of the true “I” is considered the highest form of knowledge in human life. Ancient Indian philosophical and spiritual texts such as the Upanishads, Bhagavad Gita, and Ashtavakra Gita are centered on exploring the fundamental question of human existence: “Who Am I?”. The objective of this research paper is to explain the concept of “Who Am I” by connecting various philosophical ideas based on the teachings of the Ashtavakra Gita. The Ashtavakra Gita is an important text based on Advaita Vedanta, in which the principles of soul, world, illusion (Maya), bondage, and liberation are presented in a very simple and direct manner through the dialogue between Sage Ashtavakra and King Janaka.

This research attempts to explain that human beings generally identify themselves with the body, mind, intellect, thoughts, emotions, and social identity. However, according to the Ashtavakra Gita, the true nature of a human being is pure consciousness, which is beyond all these identifications. In this study, the term “Connecting Dots” refers to understanding the different levels of identity step by step through which a person forms self-identity, such as body, senses, mind, thoughts, ego, witness, and finally the Self called Atman.

This research is based on qualitative research methodology, including textual analysis of the verses of the Ashtavakra Gita,

interpretive study, and conceptual analysis of Advaita philosophy. The study also proposes a conceptual model of self-inquiry explaining the journey from ignorance to self-knowledge.

The findings indicate that the question “Who Am I?” is not merely philosophical; rather, many human problems such as fear, sorrow, stress, dissatisfaction, and mental unrest originate from misunderstanding of one’s true identity. According to the Ashtavakra Gita, when a person realizes the Self, they understand that they are neither the body nor the doer but the witnessing consciousness. This realization leads to inner peace, freedom, and bliss.

The research contributes to Indian Knowledge Systems, philosophy, psychology, education, and life management. It also highlights the need to integrate self-knowledge, meditation, and consciousness-based education within modern academic frameworks.

Keywords: Indian Knowledge System, Ashtavakra Gita, Ego-full “I”, True “I”, Advaita Vedanta, Self-Inquiry

I. Introduction:-

The fundamental question “Who Am I?” has been explored extensively in Indian philosophical traditions. Unlike many philosophical systems that emphasize empirical knowledge of the external world, Indian philosophy focuses on inner realization and consciousness. The Upanishads, Bhagavad Gita, and other Vedantic texts emphasize that understanding the Self is the ultimate purpose of human life (Radhakrishnan, 1994).

Among these texts, the Ashtavakra Gita stands out for its direct and uncompromising teaching of Advaita Vedanta. The dialogue between Sage Ashtavakra and King Janaka presents the idea that liberation is attained through immediate

recognition of one's true nature as pure consciousness (Swarupananda, 2006).

In everyday life, individuals define themselves through various identities such as profession, social roles, relationships, achievements, and personal experiences. However, these identities are temporary and constantly changing. According to Advaita philosophy, the true Self remains unchanged and eternal.

This research attempts to connect philosophical teachings from the Upanishads, Bhagavad Gita, and Ashtavakra Gita to explain the progressive understanding of human identity through the concept of self-inquiry.

II. Literature Review:-

The Upanishads form the philosophical foundation of Vedantic thought[1-2]. They present the idea that the individual self (Atman) is identical with ultimate reality (Brahman). One of the most well-known Mahavakyas from the Chandogya Upanishad states[3-4]:

“Tat Tvam Asi” — Thou art That (Olivelle, 1996)(1)

This statement 1, suggests that the essence of the individual is identical with the universal consciousness. The Brihadaranyaka Upanishad also explains that the Self cannot be perceived through senses but can only be realized through inner inquiry and awareness. In the concept of Self in the Bhagavad Gita, it explains the nature of the Self in a practical context. Lord Krishna teaches Arjuna that the soul is eternal and indestructible[5-6].

The text states that the soul neither takes birth nor dies[4]:

“The soul is never born and never dies” (Easwaran, 2007).

The Bhagavad Gita also emphasizes detachment from ego and action, suggesting that individuals should perform

their duties without identifying themselves as the ultimate doer. In align with bhagwat gita, the Ashtavakra Gita presents one of the most radical expressions of non-dual philosophy [7-9].

In reference [8], studies have explored the integration of the philosophical insights of the *Ashtavakra Gita* with modern psychological therapeutic approaches such as Cognitive Behavioral Therapy (CBT) and Neuro-Linguistic Programming (NLP). These studies suggest that the concept of non-duality (Advaita) and the practice of witness consciousness (Sakshi Bhava) described in the *Ashtavakra Gita* can help individuals observe their thoughts and emotions without attachment. This perspective aligns closely with CBT techniques that aim to identify and restructure dysfunctional thinking patterns and with NLP strategies that focus on reframing limiting beliefs.

By encouraging de-tachment from ego-based identity and promoting awareness of the observing true-self, the teachings of the *Ashtavakra Gita* may enhance psychological flexibility, emotional regulation, and mental clarity. Consequently, this inter-disciplinary approach establishes a meaningful bridge between ancient Indian philosophical wisdom and contemporary mental health research, demonstrating the potential relevance of Advaita Vedanta concepts in modern psycho-therapy and well-being practices.

In reference [9], The text explains that liberation occurs the moment an individual recognizes that they are pure consciousness. According to the *Ashtavakra Gita*, bondage arises due to identification with body, mind, and ego. Once these identifications dissolve, the individual experiences liberation instantly.

III. Research Methodology:-

This study adopts a qualitative philosophical research methodology.

a) Textual Analysis

Primary texts including the Ashtavakra Gita, Upanishads, and Bhagavad Gita are analyzed to understand the philosophical interpretation of the Self.

b) Interpretive Approach

Philosophical interpretation is applied to analyze concepts such as Atman, Maya, witness consciousness, and liberation.

c) Conceptual Framework

A conceptual model called “Connecting Dots of Self Inquiry” is proposed to explain the progressive stages of understanding human identity.

d) Connecting Dots of “Who Am I”

Human identity can be understood through multiple layers as explained in next section.

IV. Conceptual Model of Self-Inquiry

The proposed conceptual model represents the journey from ignorance to self-realization.

Stages of Self Inquiry:-	Justifications:-
1. Identification with body	At the first level, individuals identify themselves with their physical body. However, the body constantly changes and therefore cannot represent the permanent Self.
2. Identification with senses	The senses allow humans to experience the external world, but they do not define the essence of the individual.
3. Identification with mind	Thoughts, emotions, and perceptions originate from the mind. However, these mental processes continuously change.
4. Identification with ego	The ego creates a sense of individuality and personal identity. However, Advaita philosophy suggests that the ego is merely a mental construct.
5. Recognition of witness consciousness	Beyond body, senses, mind, and ego lies the witnessing consciousness. This consciousness observes all experiences but remains unaffected by them.
6. Self realization (Atman awareness)	When individuals recognize themselves as pure awareness rather than limited identity, self-realization occurs.

V. Discussion

The important verses of ashtavakra gita with meanings are as follows[10]:-

यदि देहं पृथक् कृत्वा चित्ति विश्राम्य तिष्ठसि ।
अधुनेव सुखी शान्तो बन्धमुक्तो भविष्यसि ॥

अष्टावक्र गीता (1.3)

Meaning of above verse is as follows:-

If you detach yourself from identification with the body and rest in pure consciousness, you will immediately experience peace, happiness, and liberation. The Philosophical Insight is 'Liberation is not achieved through effort but through recognizing the Self as pure awareness'.

The verse which emphasize on the real knowledge of self is as follows[10]:-

आत्मा साक्षी विभुः पूर्ण एको मुक्तश्चिदक्रियः ।

असङ्गो निष्पृहः शान्तो भ्रमात् संसारवानिव ॥ अष्टावक्र गीता (15.4)

The literal meaning of verse is as follows[10]:-

The Self is the witness, infinite, complete, one, and free. It is pure consciousness without action, unattached and peaceful. Due to illusion, it appears as if it is bound in the world. The Self is always free, but ignorance creates the illusion of bondage.

Realization of Non-Duality as per great sage ashtavakra verse is as follows[10]:-

अहो निरंजनः शान्तो बोधोऽहम् प्रकृतेः परः।

एतावन्तमहं कालं मोहेनैव विडम्बितः॥ अष्टावक्र गीता (1.7)

Meaning of above verse is as follows:-

I am pure, peaceful consciousness beyond nature. For so long I was deceived only by ignorance. The philosophical insight of the above verse shows self-realization reveals that

the true Self was always free and pure. let's consider the sun in the sky. The sun is always bright and shining. However, sometimes clouds cover the sun, and it appears as if the sunlight has disappeared. In reality, the sun has not changed at all, it remains bright and pure. The clouds only create an illusion that the sun is hidden.

In the same way, the true Self (pure consciousness) is always peaceful, free, and pure. However, ignorance, ego, and identification with the body and mind act like clouds that cover this inner truth. Because of these mental 'clouds,' a person believes that they are limited, stressed, or bound by worldly problems.

When knowledge or self-realization arises, these clouds of ignorance disappear, and the individual understands that their true nature was always free and unchanged, just like the sun behind the clouds.

मय्यनन्तमहाम्भोधौ जगद्वीचिः स्वभावतः ।

उदेतु वा स्तमायातु न मे वृद्धिर्न च क्षतिः॥ अष्टावक्र गीता (2.16)

Meaning of this verse is as follows:-

In the infinite ocean of my consciousness, the world arises like waves. Whether they rise or disappear, they neither increase nor diminish me. The universe is like waves in the ocean of consciousness. The idea that "*the universe is like waves in the ocean of consciousness*" means that the entire world arises within the infinite awareness of the Self. Just as waves appear on the surface of the ocean and disappear after some time without affecting the depth of the ocean, similarly the experiences, events, and objects of the world arise in consciousness but do not change its true nature. Consciousness remains constant, infinite, and unaffected by the temporary changes occurring within it. Lets consider an example of the ocean and its waves. Waves rise, move, and dissolve

continuously, but the ocean itself remains vast and unchanged. The waves do not add anything to the ocean nor take anything away from it. In the same way, human thoughts, emotions, and worldly events arise and disappear within consciousness. These temporary changes may appear significant, but they do not alter the fundamental nature of pure awareness. Thus, the above analogy illustrates that the Self or consciousness is like the ocean, while the world and experiences are like waves - temporary expressions that emerge from and dissolve back into the same infinite reality.

The Mahavakyas (great statements) of the Vedas hold a central position in the philosophy of Advaita Vedanta and the Indian Knowledge System. These profound statements summarize the essential teachings of the Upanishads and reveal the ultimate truth about the relationship between the individual self (Atman) and the universal reality (Brahman). The Mahavakyas guide spiritual seekers toward the realization that the true nature of the Self is not limited to the body or mind but is identical with the infinite consciousness that pervades the entire universe.

Each Mahavakyas represents a stage in the journey of self-realization. They help individuals move from intellectual understanding to experiential knowledge of the Self. By contemplating these statements, a seeker gradually removes ignorance (Avidya) and recognizes the unity of all existence. This realization leads to liberation (Moksha), inner peace, and freedom from suffering.

Thus, the Mahavakyas serve as concise philosophical formulas that encapsulate the core message of the Upanishadic wisdom. They are considered powerful tools for self-inquiry, meditation, and spiritual awakening, helping individuals understand the fundamental truth that the individual consciousness and universal consciousness are essentially one.

S. No.	Mahavakyas (Sanskrit)	Meaning	Upanishad Source	Associate d Veda
1	Prajñānam Brahma	Consciousness is Brahman, ultimate reality is pure awareness.	Aitareya Upanishad	Rigveda
2	Tat Tvam Asi	Thou art That, the individual self is identical with universal reality.	Chandogya Upanishad	Samaveda
3	Aham Brahmasmi	I am Brahman, realization of unity between Self and Brahman.	Brihadaranyaka Upanishad	Yajurveda
4	Ayam Atma Brahma	This Self is Brahman, the inner self is identical with ultimate reality.	Mandukya Upanishad	Atharvaveda

The philosophical question “Who Am I?” has deep psychological and existential implications. Modern society faces increasing levels of stress, anxiety, and identity crisis. These problems often arise due to excessive identification with temporary roles and achievements. The teachings of the Ashtavakra Gita offer an alternative perspective by emphasizing awareness and self-knowledge as the foundation for inner peace. The integration of these teachings within education and psychology may contribute to more holistic human development. Author’s reflective verse inspired by Ashtavakra Philosopher. A self hindi-written poem is written below for the readers:-

सारी सृष्टि, आपकी दृष्टि, मौजूद हो कण कण में
जो जाने, वही माने, तुम्ही हो बैठे हर मन में.....
आप निराकार, सबके आधार, परम प्रिय हो शिव।
जो जाने नहीं, माने नहीं, निसंदेह अज्ञानवश वही हैं जीव।।
यहीं जीव, बने शिव, गर जान ले जो बसा है हर जन में...
सारी सृष्टि, आपकी दृष्टि, मौजूद हो कण कण में।
जो जाने वही माने तुम्ही हो बैठे हर मन में....
धरो ध्यान, अरे ओ इंसान, न मिलता जनम दोबारा।
पढ़ो वेद विज्ञान, पाओ ब्रह्मज्ञान, ब्रह्म से हो रहा सब विस्तार।।
आकाश रूप, है शिव स्वरूप, समय से परे, परन्तु प्रगट अब हर क्षण में.
सारी सृष्टि, आपकी दृष्टि, मौजूद हो कण कण में..
जो जाने वही माने तुम्ही हो बैठे हर मन में....

आदि अंत सबके नाथ हो तुम स
 मै, तू और वो, बनके साथ हो तुम सस
 तुम्ही द्रश्य, तुम्हीं द्रष्टा, तुम्हीं हो हर अब दर्शन मेंहुं.
 सारी सृष्टि, आपकी दृष्टि, मौजूद हो कण कण में
 जो जाने वही माने तुम्ही हो बैठे हर मन में....

—प्रोफेसर राजेश त्यागी

Summary of the above Poem written by author itself in the Light of Ashtavakra Brahma-Knowledge (अष्टावक्र ब्रह्मज्ञान)

This poem expresses the core Advaita (non-dual) philosophy of the Ashtavakra Gita, where the ultimate truth is that Brahman (Shiva) alone exists in all beings and in the entire universe. The poem explains that the whole creation is only a manifestation of divine consciousness, present in every particle and in every heart.

According to the idea reflected in the poem, the difference between “Jeev” (individual soul) and “Shiv” (Supreme consciousness) exists only because of ignorance. When a person realizes through self-knowledge and awareness that the same divine consciousness resides within all beings, the individual soul recognizes its true nature and becomes one with Shiva (Brahman).

The poem also emphasizes that human birth is precious and should be used for gaining Brahma-knowledge through wisdom, reflection, and awareness, as taught in the Vedas and spiritual philosophy. In the highest realization described in the Ashtavakra tradition, the knower, the known, and the act of knowing become one meaning that the observer, the observed, and the vision itself are all manifestations of the same universal consciousness.

Thus, the central message of the poem aligns with the teachings of the Ashtavakra philosophy All existence is one

consciousness realizing this truth transforms the limited individual (Jeev) into the realized self (Shiv).

a). Implications of this philosophical knowledge to Education, Psychology and life management

Education	Psychology
Educational systems can benefit from integrating self-awareness practices that encourage students to explore deeper questions of identity and purpose.	Modern psychological practices such as mindfulness and awareness-based therapy resonate with the concept of witness consciousness described in Advaita philosophy.
Life Management	
Self-knowledge helps individuals manage emotions, stress, and interpersonal conflicts more effectively.	

VI Conclusion and Future-scope

The question “Who Am I?” remains one of the most profound inquiries in human philosophy. Indian philosophical texts such as the Upanishads, Bhagavad Gita, and Ashtavakra Gita offer deep insights into the nature of the Self. This research explored the concept of identity through Advaita-Vedanta and proposed a conceptual model of self-inquiry. The findings suggest that the true Self lies beyond body, senses, mind, and ego, existing as pure witnessing consciousness. Understanding this truth leads to inner peace, freedom from suffering, and spiritual fulfillment. In future, researcher can compare the different spiritual and non-spiritual group and their features. Further, Interdisciplinary research may explore the relationship between consciousness studies, neuroscience, psychology, and Indian philosophical traditions.

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3

**ECONOMIC VALUATION OF INDIGENOUS
AGRICULTURAL PRACTICES FOR
SUSTAINABLE DEVELOPMENT*****Nazimuddin Alom****Student**Department of Economics, Banaras Hindu University, Varanasi***ABSTRACT**

When the subject of sustainable agriculture is raised, the first things that often come to mind are the latest technology, precision farming, bio-engineered seeds, or satellite-activated irrigation systems. But what about the traditional farming techniques of the original inhabitants of the land? This research explores whether traditional practices have measurable economic value and whether that value can meaningfully contribute to sustainable development goals. Before we can protect something, we need to understand what it is worth—not just culturally, but economically. The existing literature widely acknowledges the ecological benefits of indigenous agricultural practices, including soil conservation, biodiversity conservation, and climate resilience. Scholars such as Altieri (1995) and Pretty (2008) have also highlighted the superior sustainability of traditional agricultural practices compared to conventional practices, though most of the literature is qualitative. A significant gap exists in attaching concrete economic values to these practices, particularly in low-income agrarian communities in the Global South, which this study directly attempts to address. This research adopted a mixed-methods approach, collecting primary data collected through structured interviews and focus group discussions with a few indigenous farming families in three villages of northeastern

India. The Cost-Benefit Analysis framework, along with the Total Economic Value model, was used to assess the direct and indirect benefits to the farmers. In contrast, secondary data were used from government reports and field-based NGO studies for triangulation. The study found that these practices, which included seed saving, intercropping, and natural pest management, resulted in an average economic benefit of around ¹ 38,400 per household per year. In contrast, the traditional methods resulted in a mere ¹ 29,100. In addition to these economic benefits, the water retention and pollination services provided by these practices to farmers also had an estimated annual value of around ¹ 12,500 per farm unit, strongly suggesting that indigenous agricultural knowledge is not merely a cultural artefact but a seriously undervalued economic asset. The present study concludes that there is considerable economic value to indigenous agricultural practices that is largely ignored by current policy frameworks, and that incorporating this type of knowledge into national agricultural policies has the potential to address the goals of economic development and sustainability at the same time, which means that policymakers, development economists, and planners should stop considering indigenous knowledge as an alternative, but as a foundation for genuinely sustainable development.

Keywords: Indigenous agriculture, Economic valuation, sustainable development, Traditional Farming System, Cost-Benefit Analysis.

1. Introduction

Agriculture, for millions of people in rural and indigenous communities across the world, has never been simply about producing food. It is a way of life—woven into cultural identity, shaped by ecological understanding, and carried forward through generations of accumulated knowledge. Yet, in the

relentless push to modernise and industrialise food production, the farming systems developed by indigenous peoples have been steadily shoved to the margins. The official documents, budgets of the governments, and a majority of academic studies have strongly endorsed the high-input technology-based farming system as the only realistic route to achieving food security and development.

This form of bias is especially pronounced in cases such as India, where for decades the agricultural policy was based on the principles of the Green Revolution, which involved hybrid crops, synthetic fertilizers, mechanization of irrigation, and monocropping. There is no doubt about the effectiveness of such a policy from the perspective of increased crop production. However, in recent years, more and more attention is paid to the negative impact of such policies on agriculture, as soil degradation, water shortage, loss of biodiversity, growing debts among farmers, and increased exposure to climatic changes are real phenomena (Shiva, 1991; Pingali, 2012; DeLonge et al., 2016).

In this context, an increasing number of academics and development experts have taken a keen interest in exploring native agricultural practices as possible components of sustainable agricultural systems. Techniques including intercropping, saving of seeds, rotation of farms, and natural methods to manage pests have proved effective in enhancing soil fertility, conserving water, protecting pollinators, and ensuring crop diversification (Altieri, 2004; Berkes, 2012; Tittonell et al., 2020).

It is precisely the gap that the current study seeks to fill. The research question seems to be simple enough: what is the economic value of native agriculture, and does it have any real contribution to sustainable development?

In pursuit of this objective, this paper examines three

villages from the East Khasi Hills district of Meghalaya, which is in northeastern India, an area characterized by deep-rooted indigenous agricultural practices such as jhum (or shifting agriculture) and multi-layer agroforestry systems. It is evident that the Khasi and Garo tribes of this region have evolved extremely advanced agricultural practices over many generations.

The study makes use of a mixed methodology approach. For the quantitative component, cost-benefit analysis and total economic value are applied, together with statistical testing using t-test and regression. For the qualitative aspect, structured interviews and focus group discussions are used to explore the underlying experience of the data collected.

The sample comprises 250 farming households—a significant increase from earlier, smaller-scale studies on this topic—which strengthens the statistical reliability of the findings and allows for more meaningful comparisons between indigenous and conventional farming approaches.

The relevance of this study extends well beyond the three villages at its centre. If it can be shown that indigenous agriculture holds quantifiable economic value, it makes a strong case for integrating traditional knowledge systems into national agricultural policy—not as a sentimental footnote, but as a core component of development strategy. This has direct implications for several Sustainable Development Goals, including SDG 1 (No Poverty), Sustainable Development Goals 2 (Zero Hunger), 13 (Climate Action), and 15 (Life on Land).

In the end, the argument is a simple one: we cannot protect what we have not valued. And the economic valuation of indigenous agricultural knowledge is long overdue.

2. Literature Review and Research Gap

2.1 Indigenous Agricultural Practices: An Overview

Indigenous agriculture practices refer to the methods

that have been practiced by natives or tribes, which have developed unique agricultural practices through years of learning and experimentation. Although industrial agricultural practices rely on several external influences for agricultural production, some of the main features of indigenous agriculture practices are diverse crop usage, low reliance on external influences, ecological awareness, and comprehensive soil and microclimate knowledge (Altieri, 1995; Reyes-García et al., 2019).

Some of the best known indigenous agricultural practices include:

- Intercropping/Mixed Cropping: The planting of several crops together on the same piece of land, providing protection against pests, increasing fertility levels in soil, and ensuring stable production levels (Vandermeer, 1989; Brooker et al., 2015)
- Saving and exchange of seeds: Preservation of indigenous seeds through trading practices among different groups over periods of time (Brush, 2004; Coomes et al., 2015).
- Jhum cultivation: An agricultural practice which involves the clearing of forest lands, their cultivation for a limited duration, and then letting them rest in order to restore their natural fertility (Ramakrishnan, 1992; Heinimann et al., 2017).
- Natural pest control: Employing companion cropping, crop rotation, and biological methods for pest control without the use of any chemical substances (Altieri & Nicholls, 2004; Gurr et al., 2017).
- Agroforestry: Combining trees and shrubs into agricultural land to fulfill various purposes of providing

food, fodder, firewood, and many more benefits in a single productive activity (Nair, 1993; Mbow et al., 2014).

Such strategies have been found to provide substantial ecological advantages. According to Altieri (2004), conventional systems of agriculture have the capacity to attain higher productivity levels even while maintaining biodiversity at substantially higher levels than what is possible through intensive agriculture. In a meta-study of 286 initiatives undertaken in 57 developing countries, Pretty (2008) discovered that sustainable farming methods increased crop yield by 79 percent.

2.2 Ecological and Cultural Dimensions

Indigenous farming's contributions to ecology have been extensively recognized in the literature. Among the most commonly mentioned benefits are soil conservation, effective management of watersheds, and preservation of biodiversity. In his study, Berkes (2012) described the way indigenous societies across the globe manage common pool key natural assets like agricultural land, forests, and water through governance mechanisms.

Nevertheless, it is imperative that one does not romanticize these agricultural systems blindly. While some practices are sustainable, others, such as reduced fallow periods in shifting agriculture due to the need to feed large populations, can be unsustainable if there is an imbalance in the ecosystem (Heinimann et al., 2017).

However, the cultural element is equally important even though it is less quantifiable. Knowledge of agriculture in indigenous communities cannot be considered separately because it forms part of the culture itself. Agricultural traditions are connected to cultural traditions such as festivities and seed ceremonies (Posey, 1999; Barthel et al., 2013).

2.3 Economic Valuation: The Missing Piece

This is where the literature falls short. Despite the fact that the ecological and cultural importance of indigenous agriculture is a point that scholars seem to agree on, the economic importance of indigenous agriculture remains severely underexplored. The extant literature can be segmented into two categories depending on how they analyze the economics of indigenous agriculture. They may either compare the economics of indigenous agriculture to conventional agriculture or simply discuss its contribution without quantitative data.

One way of looking at it is through the Total Economic Value (TEV) framework, commonly employed in environmental economics. TEV comprises a number of elements:

- Direct Use Value - concrete products such as crops, fodder, medicines, firewood.
- Indirect Use Value – ecological services such as soil erosion prevention, climate control, carbon sequestration, and pollination.
- Option Value – possible future value in conserving biological diversity and genetic diversity.
- Non-use value: Values associated with cultural, spiritual, and existence reasons that individuals assign to traditional institutions irrespective of whether they actually gain anything from them (Pearce & Moran, 1994; TEEB, 2010).

2.4 Advances in Valuation Methodology

The landscape for methodologies of estimating ecosystem service values has changed dramatically from the seminal paper by Costanza et al. (1997). Further advances in methodology were made by de Groot et al. (2012) through a

more detailed approach to global ecosystem service valuation by biome. The TEEB (2010) project introduced a holistic approach that would integrate nature's values into decision-making processes. Most recently, the System of Environmental-Economic Accounting (SEEA) was endorsed by the UN Statistical Commission, providing standard methodologies for including ecosystem services in national accounts (United Nations, 2021).

2.5 The Research Gap

This gap may be stated concisely as:

1. There is no quantitative information available on the economic benefits of the system. Although there is a very good qualitative case for indigenous agriculture, without quantitative data, it is difficult to influence policy.
2. The Global South is underrepresented. Most economic valuation studies originate from well-funded research environments in high-income countries.
3. The TEV framework has rarely been applied to indigenous farming. Despite being well suited to this task, systematic TEV-based assessments of traditional agriculture are conspicuously absent.
4. Statistical rigour is lacking. The handful of existing studies tend to rely on descriptive statistics alone.
5. Policy translation is absent. Even where evidence exists, it has not been converted into actionable policy recommendations.

In this way, the current study directly deals with each of the above-mentioned research gaps in that it provides economic data in quantifiable terms, utilizes the TEV approach, includes the methods for valuation, uses inferential statistics, and concludes with policy implications.

3. Methodology

3.1 Research Design

Mixed methods were utilized in conducting this study, where the researcher used both the quantitative and qualitative approaches. This approach was selected because of the requirements of the research question. While the use of the quantitative approach offers the rigorous numeric framework for analyzing the research questions, the qualitative approach adds meaning.

3.2 Study Area

Fieldwork for the study was conducted in three villages located within the East Khasi Hills district of Meghalaya, India, which lies in the northeastern part of the country. These villages were chosen since they host indigenous Khasi farmers who use traditional techniques such as shifting cultivation, multiple cropping, and natural pest control alongside a few families that employ modern techniques. There is an abundance of rainfall, over 2,000 millimeters annually, and the topography is mostly hilly and terraced, with a lack of extension facilities for agriculture.

3.3 Sampling and Data Collection

Purposive sampling technique was used to obtain farmers who practiced indigenous knowledge systems. Additionally, some samples of farmers practicing conventional agricultural methods were included in order to compare. This sample size consisted of 250 respondents distributed among the three villages (about 80 to 85 respondents per village). Out of this sample size, 207 farmers (82.8%) practiced indigenous agricultural methods while only 43 respondents (17.2%) practiced conventional agricultural methods.

Primary data collection involved the following:

- Structured interviews (n=250): A semi-structured questionnaire was administered to the household head

covering household demographics, income sources, farming practices, input costs, crop and non-crop yields. The questionnaire was pre-tested with 15 households in a neighbouring village and revised before deployment.

- **Focus Group Discussions (FGDs):** There were 12 FGDs in total, with 4 FGDs being held in each village. The number of participants in the focus group was between 8 and 12, with separate discussions held for males and females.
- **Direct Observation:** The field study involved conducting observations of farm lands employing traditional and conventional farming methods to compare data collected against the landscape of agriculture.

The secondary sources of information include agricultural data from the Directorate of Agriculture (Meghalaya Government), Census data, and research conducted by local NGOs such as NESFAS.

3.4 Analytical Framework

3.4.1 Cost-Benefit Analysis (CBA)

The CBA technique was adopted to evaluate the cost and benefit differences between the two farming methods during one crop cultivation period. All the main costs were considered, namely seed, fertilizer, pest management, labor, equipment, and transport. In terms of benefits, the market value of the total output for both staple crops and cash crops was considered.

Net Benefits = Total Gross Revenue – Total Costs of Inputs

3.4.2 Total Economic Value (TEV) Approach

- The TEV approach was employed to factor in those benefits not generated by any market transaction process. The non-market indirect use values were quantified using the below methods:

- The replacement cost approach: Values of the service of water conservation were evaluated through the cost of developing alternative infrastructure that could perform such an activity.
- The benefit transfer approach: The unit value of pollination and soil conservation services was derived from ecological zones in South and Southeast Asia.
- The market price approach: Carbon storage values were calculated based on allometric equations and market rates (around ¹ 800–1,200 per tonne CO₂ e).

3.5 Statistical Analysis

The quantitative data analysis involved descriptive statistics (mean, standard deviation, median, and frequency distribution), independent sample t-tests and Mann-Whitney U tests (for lack of normality), and ordinary least squares multiple regressions, using net benefit as the dependent variable and method of farming, size of farm land, size of the household, experience, extension, crops diversity, and village dummies as independent variables.

3.6 Triangulation and Ethical Considerations

Data Triangulation was used through quantitative data, FGDs, Observation and Secondary Data. Informed consent was sought from all subjects involved.

3.7 Limitations

1. Narrow geographical focus (one district in Meghalaya state only)
2. Approximation introduced by use of benefit transfer
3. Non-use values were not monetarily valued
4. Single cross-sectional study (study period)
5. Bias in self-reported data used

4. Results and Interpretation

4.1 Socio-Economic Profile of Respondents

The average number of family members per household in the sample size of 250 was 5.4 (standard deviation = 1.8). Agricultural farming was the main occupation of 79.2 percent of households. The mean landholding per household was 1.5 hectares. A total of 207 (82.8%) households employed local traditional systems, while 43 (17.2%) employed conventional techniques.

4.2 Direct Economic Benefits

Table 1: Direct Economic Benefits – Indigenous vs. Conventional Practices

Parameter	Indigenous (n=207)	Conventional (n=43)	Difference	Statistical Test
Mean annual input cost (₹)	8,350 (SD=2,140)	15,200 (SD=3,680)	-6,850	t = -14.72, p < 0.001
Mean annual gross income (₹)	46,750 (SD=8,920)	44,300 (SD=9,450)	+2,450	t = 1.62, p = 0.107
Mean annual net benefit (₹)	38,400 (SD=7,830)	29,100 (SD=8,210)	+9,300	t = 7.38, p < 0.001
Median annual net benefit (₹)	37,200	28,400	+8,800	U = 2,104, p < 0.001

The difference in net benefits was highly significant (p < 0.001, Cohen's d = 1.16). 95% CI for the difference: ¹ 6,820 to ¹ 11,780.

4.3 Regression Analysis: Determinants of Net Farm Income

Table 2: OLS Regression – Determinants of Net Farm Income

Variable	Coefficient (β)	Std. Error	t-value	p-value
Constant	12,450	3,210	3.88	< 0.001
Farming method (Indigenous = 1)	7,820	1,680	4.65	< 0.001
Land area (hectares)	5,340	890	6.00	< 0.001
Household size	-1,120	560	-2.00	0.047
Farming experience (years)	380	140	2.71	0.007
Extension service access	1,250	1,410	0.89	0.376
Crop diversification index	1,680	420	4.00	< 0.001

Model fit: $R^2 = 0.47$; Adjusted $R^2 = 0.45$; $F(8, 241) = 26.74$, $p < 0.001$

4.4 Indirect Economic Benefits: Ecosystem Services

Table 3: Estimated Annual Ecosystem Service Values per Farm Unit

Ecosystem Service	Valuation Method	Annual Value (₹)	95% CI
Water retention and regulation	Replacement cost	4,800	4,610 – 4,990
Pollination services	Benefit transfer (adjusted)	3,400	3,260 – 3,540
Soil conservation and fertility	Replacement cost + benefit transfer	2,700	2,580 – 2,820
Carbon sequestration	Market price proxy	1,600	1,510 – 1,690
Total ecosystem service value		₹12,500	11,960 – 13,040

Total economic value: ₹ 50,900 (indigenous) vs. ¹ 29,100 (conventional)

4.5 Qualitative Findings

Four major themes have emerged from the qualitative analysis conducted in 12 focus group discussions: knowledge at risk, with several practitioners expressing their worries about the diminishing interest among the younger generation; women as guardians of knowledge of seeds, with all women in the discussions being considered as the main keepers of the traditional knowledge concerning seed selection and conservation; superior quality of indigenous knowledge in maintaining soil fertility in the long term; and the invisibility of traditional practices within institutions.

5. Discussion

5.1 Indigenous Practices as Economic Assets

With the inclusion of additional value from the ecosystem services worth ₹ 12,500, the overall economic benefit from indigenous systems is increased by 75%. The total economic benefit of the indigenous system (₹ 50,900) becomes 75% more than that of the conventional agricultural practice (₹ 29,100) after including the benefits from the ecosystem services. This has significant ramifications for agricultural evaluation.

5.2 Ecosystem Services: Uncounted Wealth

With the inclusion of additional value from the ecosystem services worth ¹ 12,500, the overall economic benefit from indigenous systems is increased by 75%. The total economic benefit of the indigenous system (¹ 50,900) becomes 75% more than that of the conventional agricultural practice (¹ 29,100) after including the benefits from the ecosystem services. This has significant ramifications for agricultural evaluation.

5.3 The Gender Dimension

Women have an important role to play in seed saving and the preservation of biodiversity in the studied population. The role of women in safeguarding traditional knowledge on seeds, which includes their selection, storage, and exchange between different seasons and generations, was constantly mentioned by the focus group participants. This aspect is hardly ever addressed in any institutional support for agriculture.

5.4 Policy Implications

Incorporate indigenous knowledge systems into the national agriculture policy with proper funding and institutionalization.

1. Introduce payment for ecosystem services (PES) programs to pay indigenous farmers for the environmental services they provide through their work.
2. Reform agricultural extension services to include documentation and dissemination of indigenous farming knowledge.
3. Invest in intergenerational knowledge transfer through community-based programmes and school curricula in indigenous farming regions.
4. Adopt gender-responsive policies that formally recognise and support women's roles as seed custodians and agro-biodiversity stewards.

5.5 Relevance to Sustainable Development Goals

The results reveal a high level of congruence with various SDGs, such as SDG 1 (No Poverty), which is achieved by increasing net income levels; SDG 2 (Zero Hunger), achieved through ensuring food security and diversified agriculture; SDG 5 (Gender Equality), which is ensured through acknowledging the contribution of women to agricultural activities; SDG 13 (Climate Action); and SDG 15 (Life on Land).

5.6 Limitations and Future Research

The major limitations associated with this research project are the restricted geographical area of the research (the study was limited to one district), application of benefit transfer approach in estimation of some ecosystem services, and cross-sectional design used in conducting the research. Further research on valuation of ecosystem services needs to consider longitudinal research, comparative research, gendered economics, and carbon markets.

6. Conclusion

This study set out to answer a question that is simple to state but surprisingly difficult to find answered in the existing academic literature: What is the measurable economic value of indigenous agricultural practices?

The evidence gathered from three indigenous farming communities in northeastern India provides a clear, if preliminary, answer. Indigenous practices such as seed saving, intercropping, and natural pest management, apart from being beneficial for the environment, have been proved to be more economically beneficial than conventional farming practices. The difference in net benefits between ₹ 38,400 per household per year for indigenous practices and ₹ 29,100 for conventional farming is quite high. When the value of ecosystem services is added—an estimated ₹ 12,500 per farm unit annually—the

total economic picture shifts decisively in favour of traditional methods.

These findings challenge the pervasive assumption that modernisation and technological intensification are the only credible pathways to agricultural development. More importantly, they prompt us to question our very manner of designing and delivering agricultural policy. Indigenous knowledge is not an obstacle to development. Indigenous knowledge is not something to be relegated to the archives. It is a living, dynamic body of knowledge that, when properly valued and supported, can deliver both economic returns and environmental sustainability—outcomes that industrial agriculture has consistently struggled to achieve simultaneously.

The key finding from this research is perhaps the most simple and obvious: we should move beyond seeing indigenous agriculture as an alternative practice and begin to see it as a platform for building the sustainable economy we seek through the SDGs but which past systems of governance have failed to achieve. There is ample evidence from the economics of agriculture alone. The challenge ahead is one of gaining the political will to implement the findings.

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**REIMAGINING THE RULE OF LAW IN A
DISRUPTIVE ERA: A COMPARATIVE
STUDY OF JUDICIAL REVIEW AND
GOVERNANCE IN INDIA AND THE UNITED
KINGDOM**

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Abstract

The constitutional principle of the rule of law is a check to the arbitrary state power and the accountability is given through judicial system. The role of judicial review has assumed a new role in a disruptive epoch when technological dictatorship, expansion of regulation, and multifaceted states operations have acquired a new significance. In India, judicial review is firmly entrenched in the constitution and has been judicially expanded to limit substantive constraints on the legislative and executive powers particularly by the creation of the basic structure doctrine. This has assisted courts in being active in matters that affect constitutional identity, as well as fundamental rights. In comparison, the United Kingdom, which is founded on the principle of parliamentary sovereignty, has a long-time history of a procedural and oversight form of judicial review, and through which the legitimacy and rationality of administrative action, and not the legitimacy of primary law, is evaluated. The change in the systems is

however felt in the contemporary developments. Judicial overreach and institutional balance are becoming increasingly frequent to Indian court and the UK courts have indicated their wish to practice greater scrutiny in cases which involve constitutional values and executive authority. On this background, this paper will conduct a comparative analysis with the aim of establishing how both systems address the dilemma between judicial intervention and democratic legitimacy. Since the model in India strengthens the rights protection through the assistance of judicial activism, the model in the UK is grounded on the restraint and dialogue within the institutions. Through the combination of these views, the paper shows that we need a moderate form of judicial review that does not diminish constitutional supremacy at the expense of democratic procedures. It also contemplates the new issues of digital governance and algorithmic decision-making and transparency demands in contemporary constitutional settings.

Keywords: Basic Structure Doctrine, Parliamentary Sovereignty, Administrative Accountability, Fundamental Rights, Judicial Review.

1. Introduction

The modern scene in governance is becoming rapidly transformed which is commonly referred to as a disruptive period characterized by technological increase, broadening regulatory systems, and the increase of executive power. The advent of algorithms as a decision-making tool, digital surveillance and emergency governance systems have had a profound effect on the relationship between the State and persons. The Rule of Law as the protectionist of the arbitrary power needs to be reconsidered in this changing environment.

The Rule of Law, traditionally understood as one of the pillars of the constitution, ceases to be limited to the formality of legality or regularity of procedures. It has instead grown

to be a substantive ideal, which incorporates fairness, accountability, and safeguarding of fundamental rights. The more the complex the governance structures, the more the courts are being asked to make sure that the state action does not exceed the constitutional boundaries. This has made the judicial review an important tool towards constitutional balance.

Nevertheless, there has always been a simmering conflict between judicial interference and democratic legitimacy with the growth of judicial power. Although courts are important in safeguarding rights and guarding against power abuse, overindulgence in court activities may lead to overstepping the mandate of elected organs. This is especially an issue in those jurisdictions where the courts have assumed an active interpretative approach.

It is in this context that a comparative study of India and the United Kingdom actually take on a relevance. India is an example of constitutional dominance, and judicial review has developed into an effective tool of substantive regulation. By contrast, the United Kingdom has long been traditionally parliamentary sovereign, and judicial review serves as procedural protection. It is through the analysis of these two approaches that this article tries to know how various constitutional systems are reacting to the current issues as they strive to maintain the balance between judicial check and balances and democratic governance. The objective of the paper is to provide a comparative study of judicial review in India and the United Kingdom in the context of how the two systems strike a balance between judicial intervention and the democratic legitimacy. The study offers a comparative constitutional contribution by drawing parallels between India and the UK in terms of their constitutionally enshrined activism and the parliamentary sovereignty tradition and procedural oversight in the UK. It also addresses new issues like digital

governance, algorithmic decision-making, and transparency requirements and places judicial review in the context of modern constitutionality. The paper finally concludes by advocating a moderate approach to judicial review which safeguards against constitutional supremacy, yet Honor's democratic procedures.

2. Foundations of Law and Court Oversight

In its current use, the Rule of Law demands that every action of the state be legally established, and that it is subject to judicial review and to the fundamental rights. This principle can be traced to A.V. Dicey, whose model formulation focused on the restraint of unchecked power, equality in the law and the creation of a culture of legal behaviour. The initial agenda was more procedural in nature, namely in making sure that rules were well adhered to and that the leaders did not exceed their legal limits. Gradually though, the concept was broadened in a substantive sense to include the safeguarding of personal liberties, equitable treatment, and the responsibility of institutions.

This principle gives rise to judicial oversight. Courts intervene in cases where legislation or executive ruling threatens to cross constitutional or statutory boundaries. The Constitution in India is the supreme body and all the acts of the government should be in line with the provisions of the Constitution. This has allowed courts to apply the provisions of the constitution in a broad manner, which has enhanced protection of personal rights and limiting political power. In contrast, the legal system of the United Kingdom is based on the parliamentary sovereignty, where the Parliament is the supreme legislator. Courts thus pay much attention to whether administrative acts are legal, rational, and procedurally fair, as opposed to the question of the validity of primary legislation itself. This difference is depicted by two important concepts.

Judiciary activism is the active participation of the judiciary in determining the outcome of governance and in many cases, it goes beyond the interpretation and acts to guard against rights. The Wednesbury principle, in its turn, refers to the administrative decisions that are so irrational that their making by a reasonable authority is impossible, and it serves as the foundation of the UK standard of review of irrationality. These adjectives draw out the various orientations of judicial review in India and the UK, one substantive and rights-oriented and the other procedural and restraint-oriented.

Although there are these differences, both systems have common roots in the common law and natural justice traditions. Judicial reasoning in both jurisdictions continues to be dominated by fairness, rationality and due process. The difference between them lies in the constitutional basis: the supremacy of the Constitution in India, as compared to the supremacy of Parliament in Britain. This deviation justifies the fact that Indian courts engage in substantive reviewing of laws whereas the UK courts are traditionally engaged in procedural supervision. It is within this context that the constitutional supremacy of India has allowed the courts to increase their review authority and that the parliamentary sovereignty of the UK has limited the judiciary. These foundations are discussed in the following sections and how they have changed practice to form judicial review in each jurisdiction.

3. Judicial Review in India: Expansion and Activism

The Constitution and has been gradually extended through judicial interpretation. Supreme court has always stressed that constitutional supremacy means that all the legislative and executive actions must be consistent with the constitutional stipulations. This growth has been most identifiable in the emergence of the doctrine of basic structure

laid down in the case of *Kesavananda Bharati v State of Kerala* (1973) 4 SCC 225 restricting the amending power of Parliament by protecting fundamental constitutional values. Courts have taken the proactive role of guarding constitutional identity and fundamental rights through this doctrine. This practice is a part of a wider trend in judicial activism, which can be seen as the active involvement of the judiciary in influencing the governance outcomes, frequently going beyond the narrow interpretation to defend rights. The Indian courts have applied this principle across a wide range of issues, such as environmental protection, labour rights, and social welfare, extending constitutional guarantees to areas where the legislature or even the executive have failed. To illustrate how judicial activism entrenches the protection of rights, in *M.C. Mehta v Union of India* (1987) 1 SCC 395, the Supreme Court applied judicial activism to broaden the interpretation of Article 21 to encompass the right to clean environment. Indian judiciary has been in the centre stage in upholding institutional balance. Investigating the executive discretion and legislative enactments, the courts have tried to avoid arbitrary state power and hold them accountable. This has been mostly relevant in emergent power cases and socio-economic rights as well as during the issue of digital governance where the court has offered protection against possible abuse of power. This is because the judiciary is ready to interfere in the affairs of constitutional significance, which highlights its responsibility as a custodian of principles of democracy. Meanwhile, the issue of judicial overreach has been raised, and opponents lament that a lack of restraint could potentially result in a defiance of the separation of powers. Nevertheless, the Indian model illustrates how judicial review which is based on constitutional supremacy has developed to become a substantive tool of rights protection and institutional accountability. This broad jurisdiction is in direct contrast to

the more conservative, procedural approach to judicial review in the United Kingdom.

4. Judicial Review in the United Kingdom: Restraint and Evolution

The principle of parliamentary sovereignty according to which the highest law-making body is Parliament. Courts thus have traditionally not sought to inquire as to the validity of primary legislation, with the inquiry being whether the administrative actions are legal, reasonable, and procedurally fair. This model demonstrates a modest form of judicial control, which is aimed at maintaining institutional balance and accountability of executive powers.

Common law principles of fairness and reasonableness guided the development of the UK judicial review. The Wednesbury principle, which is expressed in *Associated Provincial Picture Houses Ltd v Wednesbury Corporation* [1948] 1 KB 223, is a general principle, whereby a decision is unlawful because it is so unreasonable that no reasonable authority could have made it. This case set a high standard of judicial intervention and therefore strengthened the role of the judiciary in the minimal review of administrative discretion. However, over time, courts have added to this principle the principles of proportionality and human rights-oriented principles, especially after the introduction of the Human Rights Act 1998 that introduced the European Convention on Human Rights into domestic law.

The modern trends indicate a slow change towards a more critical approach. Courts in the United Kingdom have been increasing their use of constitutional values, particularly in cases that concern executive power, fundamental rights and Brexit-related litigation. *R (Miller) v Prime Minister* [2019] UKSC 41, the Supreme Court ruled the prorogation of Parliament was unlawful, evidence of its readiness to interfere

when executive action put the constitutional principles at risk. On the same note, proportionality examinations have been significant in other fields like immigration, social welfare, and online governance, which echoes the changing nature of judicial protection of rights.

Even with this development, the UK model is still different with that of India. Judicial review remains largely procedural as courts focus more on rationality, fairness, and legality as opposed to substantive constitutional supremacy. There is the fear among critics of the judicial power going too far and that it would deter the parliamentary sovereignty. However, the history of the UK judicial review shows a perceptive yet significant move toward more substantive involvement with constitutional values making it more akin to the world trends in public law.

5. Comparative Analysis: Convergence in a Disruptive Era

The main difference is the one between the constitutional supremacy in India and the parliamentary sovereignty in the United Kingdom. The nature, extent, and aim of judicial intervention in every jurisdiction are formulated by these underlying principles, and still affect the way courts address modern governance problems.

The nature of review taken by courts is one of the most important areas of divergence. The judicial review in India has taken a substantive approach where courts examine the constitutionality of laws and policies in addition to their legality. The history of the formulation of doctrines that restrict the constitutional amendments depict how the judiciary is empowered to place substantive restrictions on legislative power. Conversely, the United Kingdom has long followed a procedural approach, in which the courts are concerned with

legality and fairness in administrative action as opposed to the correctness of primary legislation. This is the difference of the understanding of judicial role in the constitutional order: the judiciary in India as the defender of constitutional identity, and the judiciary in the UK as the scrutinizer of administrative discretion.

The difference is also on the manner of judicial activism and restraint. The Indian courts have embraced a wider approach to interpretation especially through Public Interest Litigation which has helped to open up access to justice as well as intervene in issues that concern the welfare of the people. Although this has enhanced the protection of rights, there have been fears about abuses of power by the institution and the erosion of the line between the legal and the political arms of government. United Kingdom, however, has traditionally been a country of restraint, and the courts have been very cautious with cases that concern politics or policy. But more recent rulings show some readiness to consider constitutional issues more directly, particularly in circumstances where the executive power is being wielded in a way that can disrupt the democratic process. This change implies that judicial restraint is no longer unconditional and that the courts are willing to take action when the basic constitutional values are at stake.

In spite of such differences, there are indications of convergence towards reacting to modern challenges. Both jurisdictions are being increasingly faced with challenges of technological governance, data protection, and widening of executive discretion. In resolving such issues, courts in both nations have been more willing to support values that are constitutional such as accountability and fairness. A gradual convergence in judicial reasoning is also evidenced by the introduction of proportionality, as a standard of review, especially in cases concerning rights. Such a convergence

indicates that the historical distinction between substantive and procedural models is growing less strict with both systems being flexible to meet the requirements of contemporary governance.

The subsequent interplay between these strategies throws into focus a transforming judicial role that aims at ensuring a balance between effective oversight and considering of democratic institutions. India is still focused on constitutional supremacy and protection of fundamental rights whereas in the United Kingdom, the nation is still focused on the issue of parliamentary sovereignty. The key to a way out is a moderate form of judicial review which is a synthesis of activism and restraint. This model would maintain constitutional identity and protection of rights without infringing democratic legitimacy providing stability in the disruptive age of multifaceted and technologically-oriented governance.

6. Towards a Balanced Model of Judicial Review

The broad model of India, although successful in protecting rights and constitutional identity, threatens to destroy the separation of powers in case the courts enter into too many spheres of policy. On the other hand, the conservative approach of the United Kingdom, although it maintains parliamentary sovereignty, can create gaps in the protection of rights and accountability, especially in the aspects where the discretion of the executive grows beyond the traditional scope. These opposing experiences would indicate that a balanced model of judicial review incorporating the merits of both modalities with a reduction in the demerits is needed. A middle way would be based on three mutually supporting pillars, namely constitutional faithfulness, democratic legitimacy, and adaptive oversight. The fidelity of the constitution dictates that the courts should be guided by the principles in the foundation, in order to make sure that the judicial review does not ascent to

uncontrolled activism or evasion of duty. Democratic legitimacy requires that the judicial intervention must not override the place of the representative institutions, but only interfere when the action of the legislative or executive body is threatening the fundamental rights or constitutional identity. Adaptive oversight acknowledges the fact that in the twenty-first century, governance is more and more influenced by technological innovation, by algorithmic decision-making, and by international regulatory pressures, and that courts need to evolve new forms of flexibility in their standards of review in response to new sources of state power. Judicial review can become an essential accountability, resilience and constitutional identity tool by balancing the substantive protection of rights by India and the restraint and institutional dialogue of the UK, and still observe the democratic legitimacy.

7. Conclusion

The model of India, which is based on the supremacy of the constitution, has developed into a substantive system of protecting rights and constitutional identity. The judiciary has played an active role in safeguarding democratic values through doctrines that restrict constitutional amendments and expansion of Public Interest Litigation. Even though this activism has enhanced accountability, it has also brought certain issues of institutional overreach and the fine line between the courts and the representative institutions. The United Kingdom, in its turn, has traditionally followed parliamentary sovereignty, limiting judicial review to the level of procedural control and rationality. Historically, courts have been restraining, and their approach has been based on legality and equity and not substantive constitutional supremacy. However, with the recent changes such as the introduction of human rights criteria and judicial consideration of constitutional issues, one can see the

tentative shift towards a more substantive review. This trend represents an emerging appreciation of the need to ensure judicial control is adjusted to the modern governance issues, especially where the executive poses a danger to democratic accountability. Collectively, these experiences suggest the necessity of a moderate approach to judicial review - one that would combine the substantive Indian protection of rights and the UK focus on restraint and institutional dialogue. That model would maintain constitutional identity and yet be respectful to democratic legitimacy and provide stability in a disruptive era of governance. Finally, judicial review is an important accountability, fairness and continuity of the constitution, since the courts maintain a positive role in maintaining democratic resiliency in various jurisdictions.

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5

INDIGENOUS KNOWLEDGE AND SUSTAINABLE DEVELOPMENT: A PATHWAY TO RESILIENT AND INCLUSIVE FUTURES

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ABSTRACT

Indigenous knowledge (IK) represents a cumulative and dynamic body of knowledge, practices, and belief systems developed by communities through long-term interaction with their natural environment (Berkes, 2012; Agrawal, 1995). Rooted in cultural traditions and ecological understanding, IK has evolved over generations as a means of ensuring sustainable resource use and environmental balance. In the context of increasing global challenges such as climate change, biodiversity loss, and unsustainable development practices, indigenous knowledge has gained widespread recognition as a critical resource for achieving sustainability and resilience (United Nations, 2015; World Bank, 2020).

This research paper explores the multifaceted role of indigenous knowledge in promoting environmental conservation, enhancing climate resilience, and fostering inclusive development, with a particular focus on Indian case studies. India, with its rich diversity of indigenous communities,

offers valuable insights into traditional practices that have sustained ecosystems and livelihoods over centuries (Gadgil & Guha, 1995). The study adopts a qualitative and analytical approach, drawing upon academic literature, policy documents, and real-world examples to examine the relevance and application of IK in contemporary development contexts (Warren, 1991; Shiva, 1991).

The paper highlights how indigenous practices such as traditional agriculture, water management systems, and biodiversity conservation strategies contribute significantly to sustainable development. These practices are often low-cost, locally adapted, and environmentally sustainable, making them highly relevant in the face of modern ecological challenges (Berkes, 2012; Warren, 1991). Furthermore, indigenous agricultural systems emphasize biodiversity, soil conservation, and climate adaptability, thereby strengthening food security and ecological resilience (Shiva, 1991).

At the same time, the paper critically examines the challenges associated with integrating indigenous knowledge into modern development frameworks. These include the marginalization of indigenous communities in policymaking, lack of formal recognition, intellectual property rights concerns, and the gradual erosion of traditional knowledge due to globalization and modernization (Agrawal, 1995; United Nations, 2015). Such challenges highlight the need for inclusive and participatory approaches that respect and protect indigenous knowledge systems.

The findings of the study emphasize that sustainable development cannot be effectively achieved without incorporating indigenous knowledge systems alongside scientific approaches. The integration of traditional wisdom with modern innovation can lead to more holistic, context-specific, and sustainable solutions (World Bank, 2020; Berkes,

2012). The paper concludes with policy recommendations aimed at promoting the recognition, protection, and integration of indigenous knowledge into mainstream development strategies, thereby contributing to a more sustainable, equitable, and resilient future.

Keywords: Indigenous knowledge, sustainable development, India, climate change, biodiversity, traditional practices

1. Introduction

Sustainable development has emerged as a central objective of global policy frameworks, particularly in response to growing environmental degradation, climate change, and socio-economic inequalities (United Nations, 2015; World Bank, 2020). It emphasizes the need to achieve a balanced integration of economic growth, environmental protection, and social equity to ensure long-term human well-being. However, conventional development models, which have largely prioritized industrialization and economic expansion, have often resulted in ecological imbalance, resource depletion, and widening social disparities (Chambers, 1983; Shiva, 1991). These challenges have prompted scholars and policymakers to explore alternative approaches that are more sustainable, inclusive, and environmentally responsible.

In this context, indigenous knowledge systems offer valuable and time-tested alternatives rooted in sustainability, resilience, and harmony with nature (Berkes, 2012; Gadgil & Guha, 1995). Indigenous knowledge (IK) refers to the local, traditional knowledge held by indigenous and tribal communities, developed over centuries through direct interaction with their natural surroundings (Agrawal, 1995; Warren, 1991). Unlike modern scientific knowledge, which is often reductionist and specialized, indigenous knowledge is holistic in nature, integrating ecological, cultural, spiritual,

and social dimensions. It is transmitted orally across generations and continuously evolves in response to environmental and social changes (Berkes, 2012).

These knowledge systems are deeply embedded in cultural traditions, belief systems, and community practices, making them highly context-specific and locally adaptable (Agrawal, 1995). Indigenous communities rely on this knowledge for sustainable resource management, including agriculture, water conservation, forest management, and biodiversity preservation. Such practices are often low-cost, environmentally friendly, and resilient to climatic variations, thereby offering practical solutions to contemporary sustainability challenges (Warren, 1991; Shiva, 1991).

India, with its vast cultural diversity and significant indigenous population, provides a rich repository of traditional knowledge systems that contribute to sustainable development (Gadgil & Guha, 1995). Indigenous communities across different regions—ranging from the arid landscapes of Rajasthan to the ecologically sensitive hills of Northeast India—have developed innovative and adaptive practices that ensure ecological balance and sustainable livelihoods (Singh, N.D.; Dollo, 2009). These include traditional agricultural systems, water harvesting techniques, forest conservation practices, and biodiversity protection mechanisms that have sustained communities for generations.

1.2 Objectives of the Study

The present study aims to examine the significance of indigenous knowledge systems in the context of sustainable development. In order to achieve this overarching aim, the study is guided by the following specific objectives:

1. To examine the role of indigenous knowledge in promoting sustainable development by analyzing its

contribution to ecological balance, resource management, and long-term sustainability.

2. To analyze how traditional practices contribute to environmental conservation and climate resilience, with a focus on their effectiveness in addressing contemporary environmental challenges such as climate change and biodiversity loss.
3. To study selected Indian case examples of indigenous communities and their sustainable practices, in order to understand the practical application and relevance of indigenous knowledge in real-world contexts.
4. To identify the key challenges in integrating indigenous knowledge into modern development frameworks, including issues related to policy recognition, documentation, and socio-cultural barriers.
5. To suggest policy recommendations for the effective integration of indigenous and scientific knowledge systems, aiming to promote inclusive, sustainable, and context-specific development strategies.

2. Literature Review

The concept of Indigenous Knowledge (IK) has been extensively examined in academic literature as a vital component of sustainable development. Scholars across disciplines have emphasized its role in environmental conservation, climate resilience, and community-based resource management. Indigenous knowledge systems are increasingly recognized as dynamic, adaptive, and deeply rooted in ecological relationships and cultural practices.

Berkes (2012), in his seminal work on traditional ecological knowledge, argues that indigenous knowledge systems are not static but continuously evolving through interaction with the environment. He highlights that such

systems contribute significantly to biodiversity conservation and ecosystem management by promoting sustainable resource use and ecological balance. His work underscores the importance of understanding IK as a holistic system that integrates knowledge, practices, and beliefs.

Agrawal (1995) provides a critical perspective on the relationship between indigenous knowledge and scientific knowledge. He challenges the conventional dichotomy that positions these systems as oppositional and instead advocates for their integration. According to Agrawal, combining indigenous and scientific knowledge can lead to more effective, inclusive, and context-specific development outcomes. His work laid the foundation for the concept of knowledge co-production, which is now widely discussed in sustainability studies.

Warren (1991) focuses on the application of indigenous knowledge in agricultural development. He emphasizes that traditional farming practices often offer cost-effective, environmentally sustainable, and locally adapted solutions. Indigenous agricultural systems, according to Warren, are particularly valuable in regions where modern technologies are either inaccessible or unsuitable. His work highlights the practical relevance of IK in ensuring food security and sustainable livelihoods.

Similarly, Shiva (1991) critiques industrial agricultural models associated with the Green Revolution, arguing that they have led to environmental degradation, loss of biodiversity, and increased dependency on external inputs. She advocates for indigenous farming practices that prioritize ecological balance, biodiversity conservation, and local self-reliance. Her work strongly supports the idea that traditional agricultural systems are more sustainable in the long term.

More recent global policy-oriented studies have further

strengthened the recognition of indigenous knowledge. Reports by the United Nations (2015) emphasize the role of IK in achieving the Sustainable Development Goals (SDGs), particularly in areas such as climate action, food security, and environmental sustainability. Similarly, the World Bank (2020) acknowledges that indigenous knowledge systems contribute to resilience, adaptive capacity, and inclusive development, especially in vulnerable communities.

Empirical studies focusing on Indian indigenous communities provide concrete evidence of the practical applications of IK. For instance, the Apatani tribe's integrated rice-fish farming system demonstrates efficient resource utilization and ecological sustainability. Likewise, the Bishnoi community's long-standing commitment to wildlife and forest conservation highlights the ethical and cultural dimensions of environmental protection. These case studies validate the theoretical arguments presented in the literature and illustrate how indigenous practices can effectively address real-world sustainability challenges.

Overall, the existing body of literature strongly supports the integration of indigenous knowledge with modern scientific approaches. It demonstrates that IK is not only relevant but essential for achieving sustainable and inclusive development. The literature also points to the need for policy recognition, institutional support, and further research to fully harness the potential of indigenous knowledge systems in addressing global environmental challenges.

3. Research Methodology

The study adopts a qualitative and descriptive research design based on secondary data. Sources include academic literature, policy documents, and case studies.

A descriptive approach explains key concepts, while an

exploratory approach examines applications of IK. Case studies include:

- Bishnoi community (Rajasthan)
- Chipko Movement (Uttarakhand)
- Apatani tribe (Arunachal Pradesh)
- Zabo system (Nagaland)

Data is analyzed using thematic analysis and comparative evaluation between traditional and modern practices.

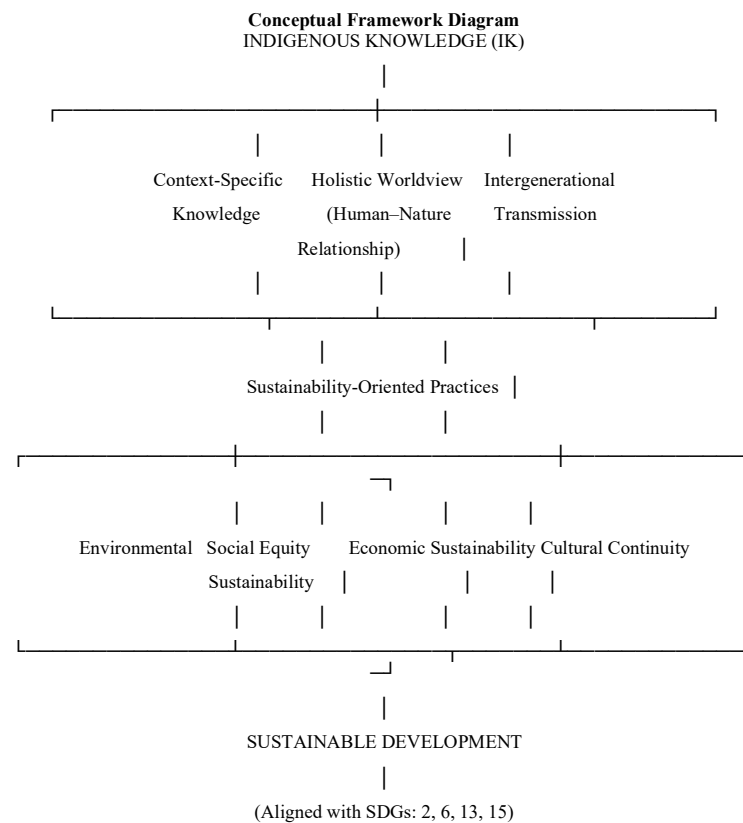
4. Conceptual Framework: Indigenous Knowledge and Sustainability

Indigenous knowledge forms a foundation for sustainable development through its holistic and context-specific nature (Berkes, 2012).

Key Characteristics:

- **Context-specific:** Adapted to local environments
- **Holistic:** Integrates ecological, social, and cultural aspects
- **Sustainability-oriented:** Focuses on long-term resource use

IK supports environmental sustainability, social equity, economic stability, and cultural continuity, contributing to overall sustainable development.



4.4 Theoretical Perspective

Scholars argue that sustainable development can be strengthened through the integration (co-production) of indigenous and scientific knowledge systems (Agrawal, 1995; Berkes, 2012). This approach recognizes that while scientific knowledge provides technological advancements, indigenous knowledge offers context-specific, culturally relevant, and sustainable solutions.

Such integration promotes:

- Better policy outcomes

- Increased community participation
- More resilient and adaptive development models

The conceptual framework demonstrates that indigenous knowledge is not separate from sustainable development but is inherently aligned with its core principles. Its integration into modern development strategies is essential for achieving long-term sustainability, resilience, and inclusivity (United Nations, 2015; World Bank, 2020).

5. Role of Indigenous Knowledge in Environmental Sustainability

5.1 Biodiversity Conservation

Indigenous communities protect biodiversity through practices like sacred groves and sustainable harvesting (Gadgil & Guha, 1995).

Case Study: Bishnoi Community

The Bishnoi community in Rajasthan protects wildlife and trees. The Khejarli sacrifice of 1730 reflects their commitment to conservation. Their practices contribute significantly to biodiversity preservation.

5.2 Forest Conservation: Chipko Movement

The Chipko Movement involved villagers hugging trees to prevent deforestation (Shiva, 1991). It raised awareness, influenced policies, and promoted sustainable forest management.

5.3 Sustainable Agriculture: Apatani Tribe

The Apatani tribe practices rice–fish farming, combining agriculture and aquaculture. This system ensures soil fertility, efficient water use, and biodiversity conservation.

5.4 Water Management: Zabo System

The Zabo system in Nagaland uses rainwater harvesting

and storage for irrigation and domestic use. It demonstrates efficient and sustainable resource management.

6. Indigenous Knowledge and Climate Change Adaptation

6.1 Traditional Weather Forecasting

Communities predict weather using natural indicators like animal behavior and plant cycles. These methods help farmers plan agricultural activities.

6.2 Climate-Resilient Farming

Practices such as crop diversification, agroforestry, and terrace farming enhance resilience and reduce risks from climate variability.

6.3 Disaster Risk Reduction

Indigenous communities use traditional housing, resource storage, and early warning systems to cope with disasters. These practices strengthen resilience and adaptive capacity.

7. Indigenous Knowledge and Sustainable Agriculture

7.1 Organic Farming

Traditional farming relies on natural fertilizers and avoids chemicals, improving soil health and reducing pollution.

7.2 Seed Diversity

Indigenous communities preserve diverse crop varieties, enhancing climate resilience and food security.

7.3 Agroforestry

Agroforestry integrates trees with crops, improving soil fertility and biodiversity.

Example: Alder-based farming in Northeast India improves soil through nitrogen fixation and supports sustainable agriculture.

8. Social and Cultural Dimensions of Indigenous Knowledge

8.1 Community Governance

Indigenous communities follow participatory decision-making and collective resource management. These systems promote equity and sustainability.

8.2 Cultural Preservation

Knowledge is transmitted through oral traditions, rituals, and practices, ensuring continuity and ecological awareness.

8.3 Role of Women

Women play a key role in agriculture, healthcare, and knowledge transmission. However, they often face marginalization, highlighting the need for empowerment.

9. Challenges in Integrating Indigenous Knowledge

- Marginalization in policy frameworks
- Loss of traditional knowledge due to modernization
- Lack of documentation
- Intellectual property rights issues
- Differences between indigenous and scientific systems

These challenges limit the effective use of IK in development.

10. Policy Recommendations

- Recognize IK in policy frameworks
- Promote community participation
- Integrate IK with scientific knowledge
- Protect intellectual property rights
- Encourage documentation and education

These measures can ensure effective integration of IK into development strategies.

11. Emerging Issues and Future Prospects

Globalization affects IK both positively and negatively. Climate change has increased its relevance, while digital technologies offer opportunities for preservation. However, ethical concerns regarding ownership and misuse must be addressed.

The future of sustainable development depends on integrating indigenous knowledge with modern innovations.

Limitations of the Study

- Based on secondary data
- Lack of field research
- Context-specific findings
- Limited documentation
- Possible interpretation bias

12. Conclusion

Indigenous knowledge (IK) is a valuable and dynamic system developed through long interaction between communities and nature. It is based on sustainability, balance, and respect for the environment, making it highly relevant in addressing modern challenges like climate change, biodiversity loss, and social inequality.

Indian examples clearly show its importance. The Bishnoi community protects wildlife and trees, the Chipko Movement highlights community-led conservation, the Apatani tribe practices sustainable rice–fish farming, and the Zabo system ensures efficient water management. These practices demonstrate that IK supports environmental sustainability, social equity, economic viability, and cultural continuity.

However, IK is threatened by modernization, lack of recognition, and limited policy support. To address this, it is

essential to integrate indigenous knowledge with modern science, promote documentation, and involve local communities in decision-making.

The conceptual framework shows that Indigenous Knowledge (IK) through context-specific learning, holistic worldview, and intergenerational transfer leads to sustainability-oriented practices. These practices result in environmental protection, social inclusion, economic stability, and cultural preservation, ultimately contributing to sustainable development (aligned with SDGs 2, 6, 13, and 15).

In conclusion, indigenous knowledge is not outdated but a crucial resource for building a sustainable and equitable future. Its integration with modern approaches can create more effective and locally relevant development solutions.

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6

**DIGITAL CONSTITUTIONALISM:
COMPARATIVE PUBLIC LAW IN A
TECHNOLOGICAL ERA****Kumar Raj B**

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ABSTRACT

The rapid expansion of digital technologies has profoundly reshaped the foundations of constitutional governance, raising urgent questions about rights, accountability, and the rule of law in cyberspace. Digital constitutionalism refers to the normative and legal frameworks that seek to embed constitutional values—such as democracy, privacy, freedom of expression, and equality—within the digital environment. This paper explores digital constitutionalism through a comparative public law lens, examining how different jurisdictions respond to the challenges posed by technological transformation. It highlights the tension between state sovereignty and transnational digital platforms, the role of courts in safeguarding fundamental rights online, and the emergence of new regulatory paradigms that transcend traditional constitutional boundaries. By analyzing case studies from the European Union, the United States, and emerging economies, the paper demonstrates how constitutional principles are being reinterpreted to address issues such as data protection, algorithmic governance, and platform accountability. The comparative approach reveals both convergence and divergence: while some jurisdictions emphasize strong rights-based protections, others prioritize innovation and economic growth, often at the expense of

individual liberties. The study argues that digital constitutionalism is not merely a legal project but also a political and cultural one, requiring the active participation of civil society, academia, and international institutions. Ultimately, the paper contends that constitutionalism in the technological era must evolve to balance innovation with justice, ensuring that digital transformation strengthens rather than undermines democratic governance. By situating digital constitutionalism within comparative public law, this research underscores the importance of cross-border dialogue and shared constitutional values in shaping a more equitable digital future.

Keywords : Digital Constitutionalism , Comparative Public Law ,Fundamental Rights Online Algorithmic Governance, Platform Accountability

1. Introduction

The increase in the rate of digital technologies has altered the manner in which societies achieve governance, communication, and security of basic rights. This change has led to the idea of Digital Constitutionalism, which is a paradigm of expanding constitutional values, including liberty, equality, accountability, and the rule of law, to the digital world. Essentially, there is a concern about the fact that the values that can be found in the constitutional traditions are not undermined by the unparalleled strength of the digital platforms, the ubiquitous nature of surveillance technologies, or the international character of the cyberspace. It is an effort to put forward a principle of normativity in the digital era, a principle that is both innovative and democratic.

The issue of technology also puts conventional constitutional structures to test in a number of ways. The first is that, due to the borderless characteristics of cyberspace, the constitutional law based on the territorial principle has been

weakened, as in the past the jurisdiction was assumed over a particular national territory. Second, privatization of governance by mega-technology firms also calls into question the accountability and legitimacy of such actors since they are progressively controlling the speech, privacy, and access to information without necessarily undergoing direct democratic control. Third, the rate of technological change can easily outsmart the legislatures and the courts, thus leaving loopholes in the protection of rights like privacy, freedom of expression, and equality. Lastly, the digital infrastructures are globally connected, making it more difficult to apply constitutional protection in the form of friction between the national legislation, supranational, and corporate regulations.

Digital constitutionalism can only be understood in a comparative approach to public law. Through the analysis of the reactions of various jurisdictions to digital issues, including the European Union and the US, India and new constitutions in the Global South, scholars can find out which areas converge and diverge in constitutional practice. A comparative study illuminates the role of the constitutional traditions in determining the reaction to such problems as data protection, content moderation, and algorithmic accountability. It also shows to what degree constitutional principles can be unified on the international level, or is disintegration unavoidable in a pluralistic world.

In this paper, there are research questions that are guiding:

1. What are the ways of constitutional traditions in the face of digital challenges of governance?
2. What are the comparative lessons to be learned of jurisdictions that have established strong systems of digital rights?
3. How far can constitutional principles reach to govern

the actions of the private entities like technology businesses?

4. Can a global system of constitutional digitalism be formulated, or will constitutional reactions continue to be regional?

This research has a wide purposely wide area of study that includes analysis of doctrine, cases, and policies in various jurisdictions. It places digital constitutionalism in the broader context of comparative public law, and focuses on the possibilities and constraints of constitutional adaptation in a technical age. In this way, the paper will make its contribution to current discussions regarding the issue of how constitutionalism can be preserved in the digital era when it is changing, and how the comparison experience can be used in creating a consistent normative order in the digital era.

2. Conceptual Foundations

Their origins in Political Theory Constitutionalism.

The idea of constitutionalism was developed in opposition to the centralization of political power and aimed at restraining the authority with the help of the law and the institutional organization. Constitutionalism as a concept is based on the foundations of classical political theory in that the government should be bound by rules that guarantee individual rights and the rule of law. Some philosophers like John Locke focused on the social contract and safeguarding of natural rights, whereas Montesquieu furthered the doctrine of separation of powers to avoid tyranny. All these notions in the contemporary constitutional democracies have developed into written constitutions, judicial review and institutionalized rights regimes. Constitutionalism is not about piece of paper but about the normative commitment to balance of power and

freedom to make sure that authority is used with legitimacy and accountability.

2.1 The Emergence of Digital Constitutionalism.

The digital revolution has come up with new spaces of governance that do not favor the conventional constitutional dispensations. Digital constitutionalism can be described as the effort to bring constitutional concepts into the cyberspace where the privately-owned corporations, algorithms, and cross-border infrastructures are taking an increasing influence on the realms of rights and freedoms. The digital era faces domination between technology companies which control speech and privacy in addition to access to information unlike previous constitutional battles against monarchs or states.

Cyberspace rights have taken a centre stage in this discussion. The right to privacy that was initially imagined as the right to the protection against intrusion by the state now needs protection against corporate surveillance and commodification of data. Freedom of expression, which used to be opposed to censorship laws by governments, has to be balanced against platform moderation policies according to which speech is visible or not. Equality is also involved, and algorithmic biases also recreate social inequalities and discrimination in the online world.

The constitutional interests are depicted through governance of digital platforms. The companies like Meta, Google, and X (previously Twitter) have quasi-constitutional power because of establishing regulations to billions of users globally. Their content moderation choices, data storage, and algorithm creation usually affect rights more significantly than the laws of a country. This privatisation of government poses a challenge of legitimacy: how can constitutional principles be applied to the non-state, and on what basis?

3. Digital Constitutionalism.

3.1 Sovereignty vs. Regulation Supranational.

Among the most burning controversies, there is the conflict between national sovereignty and supranational regulation. The traditional constitutional law is territorial in nature, whereas the digital infrastructures are worldwide. The General Data Protection Regulation (GDPR) of the European Union is a model of supranational efforts to bring similar standards of practice to the member states and even other countries to affect global actions. In comparison, some other countries, including the United States, are placing more emphasis on national constitutional traditions, especially free speech under the first amendment which is at odds with European privacy standards. Another model used in India is the changing digital rights jurisprudence, which proves to be responsive to constitutional courts that modify the doctrine to suit the privacy and data protection requirements but which weighs national developmental interests. The discussion highlights the issue of whether digital constitutionalism must be aligned across the world or to be nationalized.

3.2 Privacy vs. Government Regulation.

The other major argument is the position of the private actors in the constitutional governance. Technology firms become more and more the cartels of rights regulation, but cannot be held democratically responsible. Other academics believe that platforms ought to be considered to be constitutional actors, and they should be subjected to transparency, due process, and rights protection. Others have warned against extrapolating constitutional structures to the corporate sector, claiming that this will lead to the loss of state accountability, and the loss of coherence of constitutional law. The Hybrid models like the Facebook Oversight Board are

trying to fill this gap by establishing a quasi-judicial system in the framework of corporations, but its validity is disputed.

There is also the problem of the public-privacy divide that brings up the issue of enforcement. Should the constitutional courts interfere in the governance of platforms, or be left to the legislatures and the administrative agencies? The solution is different in different jurisdictions depending on constitutional traditions and political cultures. Courts in Europe have been actively involved in the development of digital rights, whilst in the United States the judiciary has shown minimal interference in regulation of the matter, delegating the matter to corporate will. The courts of India, in their turn, have confirmed constitutional principles in electronic matters, the most notable one being the establishment of privacy as a fundamental right in *Puttaswamy v. Union of India*.

4. The Comparative Public Law Perspectives.

4.1 European Union

It has developed into the European Union (EU) being the world leader on the expression of digital constitutionalism by the formidable regulatory system of the organization. The General Data Protection Regulation (GDPR) that was issued in 2018 can be considered a breakthrough in the legal sphere of data protection. It codifies the principles of consent, transparency, and accountability and gives individuals a great deal of the control over their personal data. The extraterritorial scope of GDPR highlights the desire of the EU to establish international standards and make companies all over the world follow its requirements.

In addition to GDPR, there is the Digital Services Act (DSA) and Digital Markets Act (DMA), which seeks to provide regulations and fair competition in the online platform. The DSA places a duty on platforms to take down any form of illegal content, increase transparency in their use of algorithms, and

to give their users due process in the course of content moderation. In combination, those tools represent a constitutional obligation to protect the rights in cyberspace as well as to limit the reach of digital monopolies.

The Charter of Fundamental Rights of the European Union also establishes the digital rights in the constitutional doctrine. The Court of Justice of the European Union (CJEU) has had a broad interpretation of the privacy, data protection and freedom of expression provisions, which is evident in cases like *Schrems I* and *Schrems II*, where the Court nullified transatlantic data transfer agreements due to their inability to comply with EU standards. The EU model is an excellent example of supranational constitutionalism, in which common institutions express rights beyond the state borders.

4.2 United States

America follows a unique constitutional path, based on the strong safeguarding of the First Amendment on the right to speech. The tradition has developed a regulatory climate, which values limited governmental regulation of online speech. This approach is best exemplified by the Communications Decency Act (CDA) Section 230 that grants websites immunity against liability of user-generated material but also permits them to have discretion in the regulation of such material. Section 230 has been declared as the twenty-six words that made the internet, because it allowed expanding digital platforms by protecting them against over litigation.

This framework has however brought controversy. Opponents believe that Section 230 gives platforms an opportunity to avoid responsibility over the harmful content but proponents claim that it is a necessary step to keep free speech online. Political and judicial debates in recent years indicate that there is mounting pressure to amend Section 230, with a compromise between constitutional protections of

speech and the problem of misinformation, hate speech, algorithmic amplification.

The U.S. constitutional model also points out the conflict between the individual rights and corporate governance. There is a general tendency of the courts not to enforce constitutional duties on the private platforms, which strengthens the distinction between the state and the private governance. This is in contrast to the rights based regulatory model of the EU, which highlights the multicultural responses to digital challenges.

4.3 India

The constitutional jurisprudence in India has been greatly changed in the digital world. The case Justice K.S. Puttaswamy v. Union of India (2017) established the right to privacy as one of the fundamental rights expressed by the article 21 of the Constitution. This ruling formed the basis of the digital constitutionalism in India, as the technological innovation should be balanced with constitutional protection.

Based on this jurisprudence, India passed the Digital Personal Data Protection Act (DPDP Act) 2023 that provides a framework of data protection, consent, and accountability. Although based on the experience of international laws like GDPR, the DPDP Act is specific to the Indian constitutional situation by striking a balance between privacy and the developmental needs and state interests in surveillance.

The Information Technology Act (IT Act) 2000 of India, as it was amended in 2008, is also a key source of control of the digital spaces. Cybercrime, provisions on intermediary liability and content regulation provisions represents an example of constitutional issues of balancing free expression with order in the community. The role of the judiciary in protecting constitutional rights against unreasonable limitation can be illustrated by the example of judicial interventions, e.g.,

the ruling of the IT Act in *Shreya Singhal v. Union of India* (2015) to strike down Section 66A of the IT Act.

The policy of India is a reflection of the hybrid model: the courts take a proactive approach in interpreting constitutional rights in the context of digital activity, and legislative systems seek to control the platforms and safeguard the users. It is this interactive process that highlights the flexibility of constitutional principles in a fast changing-technological world.

4.4 Switzerland and the Global South.

Switzerland provides a new approach to the concept of digital constitutionalism, especially its focus on direct democracy and participative governments. The Swiss constitutional traditions are based on the engagement of the citizens, and it is transferred to the online policymaking. The discussions of e-voting, the concept of digital identity, and the protection of the data show how the constitutional values of transparency and accountability can be applied to the technological environment. The environmental constitutionalism in Switzerland especially in the e-waste has also given comparative lessons to digital regulation. As the environmental law has incorporated the concept of sustainability in the scaffolds of constitutions, the same can be applied to the digital constitutionalism whereby the concept of accountability and long-term stewardship can be incorporated in the governance of technology.

Constitutional innovations are being realized in the Global South as a result of developmental and governance peculiarities. Other countries like Brazil and South Africa have expressed digital rights frameworks that are focused on access, equality and inclusions. The *Marco Civil da Internet* (2014), published in Brazil, has been dubbed as a digital constitution, and it includes the principles of net neutrality, privacy, and

freedom of expression. The constitutional jurisprudence of South Africa, which places so much emphasis on dignity and equality, is relevant to the discussion of digital access and algorithmic discrimination.

These frames draw attention to the pluralism of constitutional response to digital constitutionalism in the Global South where digital constitutionalism is embedded in wider social justice and development movements. They also emphasize the need to compare: the model of the EU and the U.S. take up most of the space in the international discourse, yet Global South innovations prove to be alternative ways of implementing constitutional values in digital governance.

5. Challenges and Critiques

5.1 Risks of “Privatized Constitutionalism” by Tech Giants

One of the most significant critiques of digital constitutionalism is the risk of privatized constitutionalism, where technology companies assume functions traditionally reserved for constitutional states. Platforms such as Meta, Google, and Amazon regulate speech, privacy, and access to information for billions of users, often with greater impact than national legislation. Their policies on content moderation, data retention, and algorithmic design effectively constitute a form of private constitutional order. Yet these corporations lack democratic legitimacy, judicial oversight, and accountability mechanisms. Critics argue that this privatization undermines the normative foundations of constitutionalism, shifting power from public institutions to private actors whose primary motive is profit rather than rights protection. The challenge lies in ensuring that constitutional safeguards are not hollowed out by corporate governance structures.

5.2 Fragmentation of Digital Rights Across Jurisdictions

Another pressing challenge is the fragmentation of digital

rights across jurisdictions. While the European Union has developed a comprehensive rights based framework through instruments such as the GDPR and the Digital Services Act, the United States emphasizes free speech protections under the First Amendment and intermediary immunity under Section 230. India, meanwhile, balances privacy rights with developmental imperatives and state surveillance interests. The Global South introduces yet another layer of diversity, with frameworks like Brazil's Marco Civil da Internet emphasizing access and inclusion. This patchwork of constitutional responses creates uncertainty for users and companies operating across borders. It also raises questions about whether digital constitutionalism can achieve coherence at a global level or whether it will remain fragmented, reflecting divergent constitutional traditions and political cultures.

5.3 Balancing Innovation with Constitutional Safeguards

A further critique concerns the difficulty of balancing innovation with constitutional safeguards. Digital technologies evolve at a pace that often outstrips legislative and judicial adaptation. Excessive regulation risks stifling innovation, while insufficient safeguards expose individuals to privacy violations, misinformation, and algorithmic discrimination. Courts and legislatures face the dilemma of crafting rules that are flexible enough to accommodate technological change yet robust enough to protect fundamental rights. This tension is particularly acute in areas such as artificial intelligence, where algorithmic decision making implicates equality, due process, and accountability. The challenge is to ensure that constitutional principles remain relevant without becoming obstacles to technological progress.

5.4 Global Governance Dilemmas

Finally, digital constitutionalism confronts global governance dilemmas. International organizations such as the

United Nations, the World Trade Organization (WTO), and the Organisation for Economic Co operation and Development (OECD) have begun to articulate principles for digital governance, but their frameworks often lack binding force. The UN has emphasized human rights in cyberspace, while the OECD promotes standards for data protection and AI ethics. The WTO addresses digital trade, yet its rules are shaped by economic rather than constitutional considerations. These fragmented initiatives highlight the difficulty of establishing a coherent global constitutional order for the digital age. Without effective coordination, digital governance risks being dominated by powerful states and corporations, leaving smaller jurisdictions and marginalized communities without meaningful influence.

6.A Towards Framework of Digital Constitutionalism.

6.1 Values: Transparency, Accountability, participation, Human rights.

An integrated system of digital constitutionalism should be based on underlying values that resonate with the traditional constitutional values and adjust them to technological conditions. Transparency means that the platforms and governments should reveal the data collection process, processing, and usage and how online experiences are formed by algorithms. Accountability requires an institution of locking in both public and private actors who have violated rights either through judicial prerogative, regulatory or independent scrutiny. With the aspect of participation, there is the idea of inclusive governance where citizens should be able to voice their opinion on the creation of digital policies that impact on their rights. Lastly, human rights should be the foundation and this should govern digital governance to ensure privacy, freedom of expression, equality, and dignity in the cyber world.

All these principles are a normative guideline to constitutional adaptation in the digital age.

6.2 Synthesis: Comparative Lessons.

The comparative public law provides useful information in the way, in which various jurisdictions are approaching constitutionalism in the digital world. The European Union is a vivid example of how a rights-based regulatory framework can work, with such tools as the GDPR and Digital Services Act introducing constitutional principles into the supranational legislation. The practice of the EU provides an example of how common institutions may align the standards of different member states and provides a lesson in the global setting of norms.

In its turn, the United States emphasizes the strength of the free speech traditions with references to the First Amendment. The fact that it relied on Section 230 CDA highlights how vital it is to safeguard innovation and expression, but it also demonstrates the dangers associated with the lack of accountability. The U.S. focus on liberty can be studied by other jurisdictions, although they should understand the necessity to balance it with protection against injuries.

The jurisprudence in India shows how constitutional courts are being flexible in applying rights in digital settings. Privacy as a right is being established in Puttaswamy and later in the development of legislation demonstrates how the constitutional principles can be adapted to technological demands. The hybrid system in India, which is the judicial activism and the legislative regulation, provides an insight into how rights and developmental needs should be balanced.

Switzerland and the Global South can offer new insights. The traditions of participation found in Switzerland focus on including citizens in digital policy-making, and Marco Civil

da Internet in Brazil and rights-based constitutionalism in South Africa focus on the significance of inclusion and equality. Through these models, we are reminded that digital constitutionalism should be attentive to the localities, i.e. it should be concerned not only with privacy and speech, but with access, dignity and social justice.

6.3 Future Futures: AI, Quantum Computing, Digital Sovereignty.

In the future, the digital constitutionalism will have to contend with new technologies like artificial intelligence (AI) and quantum computing. Equality, due process, and accountability become fundamental constitutional issues with the algorithmic decision-making process becoming more influential in social and economic life. The possibilities of quantum computing as the breakthrough in terms of data processing and encryption will pose a challenge to the current privacy and security frameworks.

The concept of the digital sovereignty will become prominent as well since states will want to have control over data flows, infrastructures and platforms in their jurisdictions. However, sovereignty should be counterbalanced with international collaboration, as digital technologies have no boundaries. The new structures will have to balance national interest in relation to supranational guidelines so that the values of the constitution are not compromised by disintegration and corporate control.

Finally, digital constitutionalism will need to be a living, cross-jurisdictional project - it will learn the lessons of other jurisdictions, it will incorporate the principles of transparency and accountability, it will predict technological changes. Through this, it will be able to offer a coherent normative order in the digital age, and make sure that constitutionalism is still

relevant, in the process of protecting the rights and democracy in an ever-evolving technological context.

7. Conclusion and Suggestions

The digital age of constitutionalism is crucial in protecting the rights and checking emerging modes of power that emerge as a result of technological innovation. The conditions of liberty, privacy, and equality are more and more determined by digital space, surveillance systems, and algorithmic governance, which is usually inaccessible to the traditional institutions of the state. Comparative observations indicate that European Union goes towards the rights-based supranational model, United States has a focus on free speech and innovation, India on judicial flexibility and legislative control and Switzerland and Global South on participatory and inclusive orientation. All these varied experiences collectively indicate that the digital constitutionalism is not a unified project, but an act of pluralism that is influenced by constitutional traditions and political cultures. The next task is to balance all these strategies in the global discourse, intertwine the concepts of transparency, accountability, participation, and human rights into digital governance, and be ready to respond to the new technologies of artificial intelligence and quantum computing.

- Harmonize global standards to reduce fragmentation of digital rights.
- Strengthen international cooperation through forums like the UN, WTO, and OECD.
- Ensure accountability of tech giants by subjecting them to constitutional obligations.
- Balance innovation with constitutional safeguards to protect rights without stifling progress.

- Integrate Global South perspectives to emphasize access, equality, and social justice.
- Future proof governance frameworks to address challenges from AI, quantum computing, and digital sovereignty.
- Promote citizen participation in digital policymaking to reflect democratic values.
- Embed human rights principles privacy, freedom of expression, equality, and dignity—at the core of digital constitutionalism.

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7

ENHANCING TEACHING COMPETENCE FOR INCLUSIVE GROWTH AND SOCIAL EQUITY: STRATEGIES AND IMPACTS

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ABSTRACT

Education is a powerful instrument for fostering inclusive growth and promoting social equity. However, the realization of these goals depends largely on the competence of teachers, who serve as the primary agents of educational transformation. This paper examines the role of teaching competence in advancing inclusive education and equitable social outcomes. It explores key strategies for enhancing teaching competence, including continuous professional development, inclusive pedagogical practices, and integration of technology, socio-emotional learning, and community engagement. The paper also analyses the impacts of these strategies on reducing educational disparities, improving learning outcomes, and fostering social cohesion. Furthermore, it discusses challenges such as resource constraints, digital divides, and institutional limitations. The study concludes with recommendations for policymakers, educators, and institutions to strengthen teacher capacity and promote inclusive educational systems.

Keywords: Teaching competence, inclusive education, social equity, professional development, pedagogy

Introduction

Education is widely recognized as a cornerstone of sustainable development and social transformation. Education is the secret for attaining most of the global development goals, as defined by Education for Sustainable Development (ESD). In an effort aimed at transforming society and preserve the environment, it teaches citizens how to make educated decisions and participate individually as well as collectively. Sustainability gives citizens of all ages the facts, abilities, values, and skills they require in order to confront challenges like disparities, exploitation of resources, declining biodiversity, and changes in the climate that influence human and ecological health. It plays a vital role in reducing inequalities, promoting economic growth, and fostering social justice. In recent decades, the global education agenda has increasingly emphasized inclusive growth and social equity, highlighting the need to ensure that all learners have access to quality education.

Teachers play a central role in this transformation. Their competence—defined by knowledge, skills, and attitudes—directly influences student outcomes. However, disparities based on socioeconomic status, gender, and geography continue to hinder educational equity. Enhancing teaching competence is therefore essential for addressing diverse learner needs and creating inclusive learning environments.

Conceptual Framework

Teaching Competence

Teachers have an obligation and responsibility to impart knowledge, nurture and transform students' lives and minds to ensure that they can attain their fullest potential through education. The collection of essential skills, responsibilities and abilities that allow teachers to perform their jobs efficiently is referred to as teacher competence. It is important for fostering

a learning ambiance and ensuring that learners reach their maximum academic potential. Along with imparting expertise, competent teachers also engage students effectively conduct classes and adapt their pedagogical approaches in order to meet a spectrum of learning goals.

Teachers' everyday educational thinking is determined by deeply ingrained either conscious or unconscious beliefs about teaching, standard education and learners. Quality education and student learning outcomes are greatly impacted by teachers' perspectives and skills, which are crucial to their professional endeavours. Confidence and self-motivation are significant determinants of teachers' beliefs, which are directly related to their teaching approaches and attitudes. These ideas affect teachers' decisions, promoting development as professionals and classroom leadership. It is crucial to understand how these beliefs are developed in order to promote teachers' professional growth and enhance the quality of education.

Education plays a vital role in the overall development of an individual. The secondary stage is very important period in a student's life because it is a time of rapid physical, emotional, social and intellectual changes. During this stage, students face many challenges such as academic pressure, peer relationships, family expectations, career confusion and personal identity issues. The ability of students to adjust effectively to these changes determines their stress, academic performance, mental health and overall wellbeing.

Teaching competence are a wide range of skills that teachers required to be proficient in as a prerequisite to be competent in their professions. These skills are essential for building an encouraging learning atmosphere and ensuring that every student can attain their educational goals. They include not merely subject-matter expertise but also

competence in classroom management, student engagement, and effective assessment of learning.

Fundamental Principles of Teaching Proficiency

- Academic Understanding:
- Classroom Leadership:
- Evaluation & Assessment
- Communication Competence
- Harmony & Teamwork:
- Flexibility and Adjustability

Teaching competence includes subject knowledge, pedagogical skills, classroom management, and adaptability to diverse learners. It also involves continuous professional development and reflective practices.

Inclusive Growth

Inclusive growth in education ensures equal access and opportunities for all learners, particularly marginalized groups. The necessity for Sustainable Inclusive Education (SIE) continues to rise significantly in light of globally recognized reforms to education. Teachers should make an effort to create a productive and inclusive educational environment with the goal to serve all learners with high-quality education in an academic environment, as educational techniques have transformed in the modern era in order to become more student-focused, centred around technology, and inclusive. In this regard, a teacher requires a variety of teaching competences along with commitment to professional advancement in order to boost the best strategies for the creation of sustainable inclusive classroom environments. A more pleasant and uplifting environment for all students is thereby created by strengthening teaching competencies. As a result, for inclusive education to be sustainable, the teachers must be fully enthusiastic about continuous development, collaborative

effort, and a comprehensive knowledge of the various needs of their learners.

2.3 Social Equity

Social equity refers to fairness in access, participation, and outcomes in education, requiring the removal of systemic barriers. The term equity in education refers to fairness, inclusivity, and the assurance that all learners, regardless of caste, class, gender, race, or ability, receive opportunities to learn and succeed. In the era of progressively more diverse classrooms, attaining educational equity is not merely a governmental objective but also a moral obligation. Establishing that every student, irrespective of socioeconomic status, has equitable access to opportunities for academic achievement is the primary aim of educational equity. However, several groups of academics have highlighted that disparities in race, ethnic origin, and socioeconomic background persist in having a significant effect on educational outcomes. For example, Ainscow and Messiou (2017) highlight that attaining equity involves specific strategies that accommodate to each student's requirements in addition to equitable distribution of resources. In the same way, Rossier (2020) recognizes the necessity of advancing equity through standardized educational methods that specifically address the needs of students from disadvantaged backgrounds, such as inclusive education and individualized instruction.

3. Literature Review

Studies on education has extensively investigated the significance of teaching competence towards encouraging social equity as well as inclusive development. Teachers emphasize that quality teaching incorporates more than simply having subject-matter expertise; it also includes pedagogical competence, diversity in teaching, and sensitivity to various kinds of student needs.

3.1 Teaching Competence and Student Outcomes

According to analysis, teaching competence has a significant impact on students' academic achievement and overall development. According to Darling-Hammond (2017), competent teachers with great educational abilities produce higher quality and effective learning settings. In the same way, Hattie (2009) underlines the fact that teacher competence exceeds several structural components, including school infrastructure, as one of the most significant variables influencing how well students perform.

Furthermore, Shulman (1986) introduced the idea of pedagogical content knowledge (PCK), and this highlights the blending of subject-matter proficiency with learner-focused instructional methods. This model of instruction reinforces the vital role of teacher's ability to transform a knowledge into meaningful learning opportunities.

3.2 Inclusive Education and Pedagogical Practices

As a technique designed to ensure equal accessibility to educational opportunities for all, equitable and inclusive education has risen in prominence across the world. According to Ainscow and Messiou (2017), in order to accommodate the needs of various learners, inclusive approaches requires that teachers modify their programs of study, approaches to instruction, standards, and assessment methods. Furthermore, Florian and Black-Hawkins (2011) claim that inclusive pedagogy requires broadening what is often attainable to all students instead of simply making unique accommodations for specific groups of students.

Based on Tomlinson's (2014) research on diversified teaching, teachers must modify the methodology, curriculum, assessment, and standards accordingly to the competencies, interests, and background information of their students. The

aforementioned techniques aid in eliminating learning gaps and facilitating collaboration from marginalized groups.

3.3 Professional Development and Teacher Effectiveness

Enhancing teaching competency requires continuous professional development, or CPD. Sustainable professional development is interdisciplinary, centered on content, and constant, according to DeSimone (2009). Teachers who get involved with continuous learning programs are more effectively competent to respond to a variety of educational difficulties and implement innovative instructional tactics.

Professional learning communities (PLCs) strengthen teacher collaboration, standards of reflection, and quality of teaching, according to OECD (2019) research. Such initiatives assist in developing more equitable learning environments and better student results.

3.4 Technology Integration in Inclusive Education

The adoption of modern technology in the classroom has brought about new possibilities for inclusiveness. According to UNESCO research from 2020, technological innovations may facilitate access for learners who have impairments and those who reside in remote regions while simultaneously promoting individualized education. However, the beneficial effects of technology-driven inclusiveness remains constrained by the technological gap, which continues to be still a serious problem, particularly with regard to developing countries. The TPACK framework, originally created by Mishra and Koehler in 2006, goes into more depth about how subject matter expertise, teaching practices, and technological tools must interact in order for efficient teaching. For nowadays-inclusive classrooms, teacher competence with ICT is therefore essential.

3.5 Socio-Emotional Learning and Equity

In order to encourage equitable and inclusive education,

psychological and social learning (SEL) is required. Fundamental competences that include awareness of oneself, compassion, and interpersonal competencies have significance for both teachers and students, as defined by CASEL (2013). Effective psychological and social competency empowers teachers to foster environments in the classroom that maximize students' well-being and participation. Furthermore, Jennings and Greenberg (2009) stress how teachers' emotional competence influence the classroom environment, student behavioural patterns, and educational performance, all of which support fairness in society.

3.6 Challenges in Achieving Inclusive Education

Despite development, plenty of challenges prevent equitable development from being accomplished. Research highlights difficulties such inappropriate teacher training, a lack of adequate resources, excessive classroom sizes, and organisational limitations. Numerous educational institutions discover it challenging to offer sufficient support for practices that are inclusive, according to UNESCO (2021).

Inclusive educational opportunities are also still restricted by technological disparities and disparities in socioeconomic status. With the aim to deal with these challenges, substantial policy changes and regular monetary support for professional development for teachers are required.

Teaching competence is an essential consideration that determines inclusive education and fairness in society, as the published material adequately illustrates. Reducing educational discrepancies can be accomplished by competent teaching practices, regular professional development, integration of technology, and psychological and social abilities. To accomplish sustained, inclusive growth, fundamental problems still need to be addressed.

The present investigation emphasises how important teachers are to accomplishing a quality and equitable education. The achievement of students is significantly influenced by teacher competence. Teachers who undertake regular professional development have the potential to implement innovative educational strategies. A significant approach for serving the diverse needs of learners is inclusive teaching methods. The incorporation of technology also improves accessibility compared to standard, yet there remain definite issues with the digital disparity. Building favourable educational settings in the classroom can be assisted by emotional and socioeconomic learning.

4. Strategies for Enhancing Teaching Competence

- 4.1 Continuous Professional Development Teachers should regularly attend workshops, seminars, and training programs to update their subject knowledge and learn new teaching methodologies. Lifelong learning helps teachers stay effective and relevant.
- 4.2 Use of Effective Teaching Methods Adopting interactive and student-centered methods such as discussions, group activities, and problem solving improves understanding. Teachers should also use differentiated instruction to meet diverse learning needs.
- 4.3 Reflective Practice Teachers should evaluate their own teaching regularly to identify strengths and weaknesses. Feedback from students and peers helps in improving instructional strategies.
- 4.4 Integration of Technology Using modern tools like multimedia presentations, online platforms, and educational apps enhances engagement and makes learning more interactive and effective Community and Parental Engagement

- 4.5 Policy Support Government policies and institutional frameworks play a crucial role in strengthening teacher competence through training and support systems.

A competent teacher does not simply knowledgeable, but also reflective, flexible, and centered around students. Learning, implementing, evaluating, and improving are the cycles that contribute to improvement.

5.Impacts on Inclusive Growth and Social Equity

- 5.1 Reduction in Poverty Inclusive growth helps in reducing poverty by creating employment opportunities and ensuring equitable distribution of income and resources.
- 5.2 Equal Access to Opportunities It promotes access to education, healthcare, and basic services for all sections of society, especially marginalized groups.
- 5.3 Reduction in Income Inequality Social equity ensures fair distribution of wealth and reduces the gap between rich and poor.
- 5.4 Empowerment of Marginalized Groups Inclusive policies empower women, minorities, and disadvantaged communities by providing them equal rights and opportunities.
- 5.5 Sustainable Economic Development Growth becomes more sustainable when all sections of society contribute to and benefit from economic progress

6. Challenges to Inclusive Growth and Social Equity

- 6.1 Income Inequality a wide gap between rich and poor limits equal access to opportunities and resources.
- 6.2 Unemployment and Underemployment Lack of sufficient job opportunities prevents people from benefiting from economic growth.
- 6.3 Limited Access to Education and Healthcare Poor

infrastructure and affordability issues restrict marginalized groups from basic services.

6.4 Social Discrimination Caste, gender, and regional disparities continue to hinder equal participation in development.

6.5 Regional Imbalances Uneven development across regions leads to concentration of wealth and opportunities in certain areas.

7. Recommendations

- Strengthen teacher training programs
- Invest in digital infrastructure
- Promote collaborative learning
- Improve policy implementation
- Encourage research and innovation
- Enhance teacher support systems

8. Conclusion

Enhancing teaching competence is fundamental to achieving inclusive growth and social equity. By equipping teachers with necessary skills and support, education systems can become more inclusive and equitable. This will contribute to reducing inequalities and promoting sustainable development. Strengthening teaching competence is essential to accomplishing inclusive growth and fostering social equity. In order to give inclusive and equitable environments for learning, competent teachers—who exhibit knowledge of the subject matter, educational abilities, competence in technology, and psychological and social awareness—are required. Enhancing outcomes for students and eliminating disparities in education are significantly influenced by initiatives including continuous professional development, reflective methods, the implementation of successful teaching strategies, incorporating technology, and community and parents participation.

However, obstacles including structural unfair practices, technological gaps, and limitations on resources still restrict advancement. Comprehensive policy support, support for professional development for educators, and encouraging the use of collaborative and innovative teaching approaches are all-essential to address such concerns. Education systems, which could assist marginalized populations, promote sustained inclusive advancement, and ensure equal access to opportunities available to all students by establishing a significant emphasis on fostering the growth of teacher competency. In the final phase, developing teacher competence is not only a form of investment in education but it also represents an essential step toward developing a society that is more equitable and ethical.

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8

**REDEFINING 21ST CENTURY SKILLS:
BRIDGING KNOWLEDGE AND REAL-
WORLD COMPETENCIES**

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Abstract

In the rapidly evolving landscape of the 21st century, education systems are undergoing a paradigm shift from traditional knowledge-based learning to competency-based and skill-oriented approaches. The present study explores the growing disconnect between theoretical knowledge and real-world application, emphasizing the importance of 21st-century skills, including critical thinking, creativity, communication, collaboration, and leadership. Using a descriptive survey method, data were collected from 40 respondents comprising students and educators.

The findings indicate that while a majority (approximately 87%) of respondents are aware of essential 21st-century skills, a significant gap persists between conceptual understanding and practical application. Respondents highlighted challenges such as lack of experiential learning opportunities, overemphasis on rote learning, and limited exposure to real-world problem-solving. Furthermore, the role of experiential learning, digital literacy, and value-based education emerged as crucial in bridging this gap.

The study concludes that education systems must adopt a holistic approach integrating knowledge, skills, values, and real-life application to prepare learners for global challenges.

The research aligns with contemporary frameworks such as NEP 2020, advocating for competency-based education and lifelong learning.

Keywords: 21st-century skills, experiential learning, critical thinking, education reform, life skills, NEP 2020, digital literacy

Introduction

The 21st century is characterized by rapid technological advancement, globalization, and continuous innovation. In such a dynamic environment, education plays a pivotal role in shaping individuals capable of adapting to complex societal and professional demands. Traditionally, education has focused on the acquisition of theoretical knowledge through textbooks and structured curricula. While this approach builds foundational understanding, it often fails to equip learners with the competencies required for real-world challenges.

In today's interconnected world, individuals are expected to demonstrate not only subject knowledge but also a diverse set of skills, commonly referred to as 21st-century skills. These include critical thinking, creativity, communication, and collaboration, often summarized as the "4Cs." Additionally, life skills such as leadership, adaptability, emotional intelligence, and ethical reasoning are increasingly recognized as essential.

Despite academic excellence, many learners struggle when faced with real-life situations such as teamwork, decision-making, and problem-solving. This highlights a critical gap between knowledge acquisition and its practical application. The need of the hour is to bridge this gap through an education system that integrates experiential learning, skill-based education, and values-based development.

Furthermore, in the Indian context, initiatives like the National Education Policy (NEP) 2020 emphasize

competency-based learning, multidisciplinary education, and the development of holistic skills. This research aims to examine the extent to which current educational practices align with these objectives and to identify strategies for enhancing the development of 21st-century competencies.

Literature Review

The concept of 21st-century skills has been extensively explored in educational research and policy frameworks. These skills are broadly categorized into learning skills, literacy skills, and life skills.

Learning Skills

These include:

- Critical thinking: solving modern problems
- Creativity: innovation and thinking beyond boundaries
- Collaboration: teamwork and cooperation
- Communication: expressing ideas effectively

Literacy Skills

- Information literacy: understanding data and facts
- Media literacy: analyzing media sources
- Technological literacy: understanding digital systems

Life Skills

- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

Research highlights that while education systems emphasize knowledge acquisition, they often fail to cultivate higher-order cognitive skills such as problem-solving and

decision-making. Digital technologies have transformed learning environments, but their impact depends on how they are used rather than their mere presence. Furthermore, modern frameworks emphasize that education must shift from rote learning to experiential and student-centered approaches. The integration of digital literacy, creativity, and collaboration is essential for preparing learners for evolving workplaces and societal challenges.

The concept of 21st-century skills has been widely explored across research studies, policy frameworks, and academic literature. These skills are generally categorized into cognitive, interpersonal, and intrapersonal domains, including critical thinking, creativity, communication, and collaboration.

- A. According to the OECD (2019, 2023), modern education must move beyond knowledge transmission and focus on developing higher-order cognitive skills such as analysis, evaluation, and problem-solving. The OECD Learning Framework 2030 emphasizes that learners must be equipped to navigate uncertainty, adapt to change, and apply knowledge in real-world contexts.
- B. Research by UNESCO (2023) highlights that digital technologies have transformed learning environments; however, their effectiveness depends on pedagogical integration rather than mere access. The study emphasizes that technology should support active learning, collaboration, and critical engagement rather than passive consumption.
- C. The British Council's 21st Century Skills framework identifies three major categories-learning skills, literacy skills, and life skills, highlighting the importance of communication, collaboration, creativity, and critical thinking. These skills are essential for both individual growth and societal development.

- D. Scholars such as Voogt & Roblin (2012) and Trilling & Fadel (2009) argue that traditional education systems are overly focused on rote learning and fail to prepare students for complex, real-world challenges. Their work stresses the integration of experiential learning, project-based approaches, and interdisciplinary education.
- E. Studies on digital literacy by Fraillon et al. (2020) (ICILS study) indicate that while students possess basic technological skills, they lack the ability to critically evaluate and apply information effectively. This highlights the need for deeper cognitive and analytical skill development.
- F. In the Indian context, the National Education Policy (NEP) 2020 advocates a shift from rote learning to competency-based education. It promotes experiential learning, critical thinking, and integration of vocational and life skills, aligning closely with global research trends.

Additionally, contemporary research emphasizes the importance of civilizational knowledge and values-based education, suggesting that skills alone are insufficient without ethical grounding and cultural awareness. Integrating traditional wisdom with modern innovation enables holistic development.

Overall, the literature consistently indicates a gap between theoretical knowledge and practical application, reinforcing the need for education systems to adopt skill-based, learner-centered, and real-world-oriented approaches.

Research Methodology

To understand This study adopted a descriptive survey method to analyze perceptions of 21st-century skill development.

Instrument- A structured questionnaire was used, consisting of:

- Demographic questions
- Awareness of 21st-century skills
- Role of civilizational knowledge
- Skill-based education
- Technology integration
- NEP 2020 awareness
- Open-ended responses

Sample

Total respondents: 40

Participants: Students and educators

Data Collection-Responses were collected through online forms and analyzed qualitatively. and quantitatively.

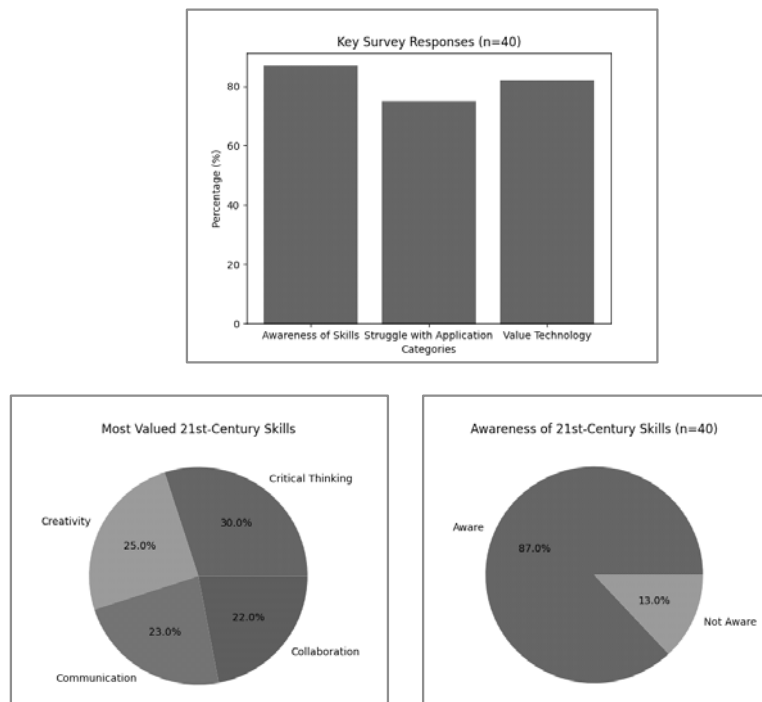
Research Findings

1. Awareness of 21st-Century Skills

Approximately 87% of respondents reported awareness of 21st-century skills. The most valued skills included:

- Critical thinking
- Creativity
- Communication
- Collaboration

This indicates a growing recognition of the importance of these competencies.



2. Gap Between Knowledge and Application

A majority of respondents agreed that:

- Theoretical knowledge enhances understanding
- However, it does not fully prepare learners for real-world challenges

Nearly 75% respondents expressed difficulty in applying academic knowledge in practical situations.

3. Challenges in Skill Development

Key challenges identified include:

- Lack of experiential learning opportunities
- Overemphasis on rote learning
- Limited exposure to real-world problems

- Weak leadership and decision-making skills

These findings highlight systemic issues within traditional education models.

4. Role of Education

Respondents emphasized the need for:

- Application-based learning
- Skill-oriented curriculum
- Real-life problem-solving activities

Suggestions included:

- Project-based learning
- Collaborative tasks
- Integration of interdisciplinary subjects

1. Technology and Digital Learning

About 82% respondents agreed that technology enhances learning. However, its effectiveness depends on:

- Teacher facilitation
- Purposeful integration
- Student engagement

This reinforces the importance of digital literacy as a key component of modern education.

2. Importance of Values and Life Skills

Participants highlighted the significance of:

- Ethics
- Resilience
- Patience
- Emotional intelligence

These **life skills** are essential for personal and professional success.

Discussion

The findings clearly demonstrate a disconnect between knowledge acquisition and skill application. While learners possess theoretical understanding, they often lack the ability to apply it in real-world contexts. This gap can be attributed to traditional teaching methods that prioritize memorization over critical thinking and problem-solving.

The study underscores the importance of experiential learning, where learners actively engage in real-life tasks and projects. Such approaches foster deeper understanding and skill development. Additionally, integrating technology in education can enhance engagement and accessibility, provided it is used effectively.

The role of educators is crucial in this transformation. Teachers must shift from being information providers to facilitators of learning. They must create environments that encourage inquiry, creativity, and collaboration.

Furthermore, the integration of values and ethics is essential for holistic development. Skills alone are insufficient without a strong moral foundation. Education must aim to develop responsible, empathetic, and globally aware citizens.

The findings align with global frameworks and policies such as OECD and NEP 2020, which advocate for competency-based and learner-centered education.

The study reinforces the importance of:

- Experiential learning
- Skill-based curriculum
- Integration of values and ethics
- Balanced development of cognitive and emotional intelligence

The role of education must evolve from information

delivery to skill development. Learners must be prepared not only for employment but also for life.

Conclusion

In conclusion, the findings of this study reaffirm that while knowledge remains a foundational pillar of education, it is no longer sufficient in isolation to meet the demands of the 21st century. The rapidly changing global landscape driven by technological advancement, digital transformation, and increasing interconnectedness requires individuals to possess a broader spectrum of competencies that extend beyond textbook learning. This study clearly highlights the persistent gap between theoretical understanding and practical application, emphasizing the urgent need to redefine educational priorities.

The data collected from 40 respondents indicates that awareness of 21st-century skills is relatively high; however, the ability to effectively apply these skills in real-world contexts remains limited. This disconnect is a reflection of traditional education systems that continue to prioritize rote learning, standardized testing, and content memorization over critical thinking, creativity, and experiential learning. As a result, learners often find themselves ill-prepared to handle real-life challenges such as problem-solving, collaboration in diverse teams, decision-making under uncertainty, and effective communication.

One of the most significant insights from this research is the importance of experiential learning as a bridge between knowledge and application. Learning by doing through projects, internships, simulations, and real-world problem-solving enables learners to internalize concepts and develop practical competencies. Experiential learning not only enhances understanding but also fosters confidence, adaptability, and innovation. Therefore, educational

institutions must actively incorporate such approaches into their curricula to create meaningful and engaging learning experiences.

Furthermore, the integration of technology and digital literacy has emerged as a critical component of modern education. While technology offers immense potential to enhance learning outcomes, its effectiveness depends largely on how it is used. Simply introducing digital tools is not enough; educators must be trained to integrate technology in a way that promotes critical engagement, collaboration, and creativity. Learners must also be equipped with the ability to evaluate information critically, navigate digital platforms responsibly, and use technology as a tool for innovation rather than passive consumption.

Another key dimension highlighted in this study is the role of life skills and values in shaping well-rounded individuals. Skills such as resilience, empathy, ethical reasoning, and emotional intelligence are essential for personal growth and social harmony. In an increasingly competitive and fast-paced world, these attributes enable individuals to maintain balance, build meaningful relationships, and contribute positively to society. Education must therefore go beyond academic achievement and focus on the holistic development of learners, integrating values-based education with skill development.

The findings also align closely with the vision of the National Education Policy (NEP) 2020, which advocates a shift toward competency-based education, multidisciplinary learning, and the integration of vocational and life skills. The policy emphasizes the need for flexibility, creativity, and critical thinking, recognizing that the future workforce must be adaptable and innovative. Implementing these reforms

effectively will require collaboration among policymakers, educators, institutions, and communities.

Moreover, the role of teachers is central to this transformation. Educators must evolve from being mere transmitters of knowledge to facilitators of learning. They must create environments that encourage curiosity, inquiry, and active participation. Professional development programs and continuous training are essential to equip teachers with the skills and methodologies required for this shift. By fostering a learner-centered approach, teachers can empower students to take ownership of their learning and develop essential competencies.

It is also important to recognize that the responsibility of developing 21st-century skills does not lie solely with educational institutions. Families and society play an equally important role in shaping attitudes, values, and behaviours. A collaborative ecosystem involving schools, parents, and communities is necessary to create supportive environments that nurture holistic development.

In a broader context, the development of 21st-century skills has significant implications for national progress and global competitiveness. A nation's ability to thrive in the global economy depends on the quality of its human capital. Individuals who are innovative, adaptable, and ethically grounded contribute not only to economic growth but also to social well-being and sustainable development. Therefore, investing in skill-based education is not just an educational priority but a strategic imperative for national development.

In summary, this study underscores the need for a comprehensive transformation of education systems to bridge the gap between knowledge and real-world competencies. A balanced approach that integrates knowledge, skills, values, and experiential learning is essential for preparing individuals

to navigate the complexities of the modern world. By fostering critical thinking, creativity, collaboration, and ethical awareness, education can empower learners to become confident, responsible, and future-ready individuals.

Ultimately, redefining 21st-century skills is not merely about adding new components to the curriculum; it is about reimagining the purpose of education itself. It is about preparing individuals not just for employment, but for life enabling them to adapt, innovate, and contribute meaningfully to an ever-evolving global society.

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5. Primary Data from Survey Questionnaire

9

**ARTIFICIAL INTELLIGENCE-DRIVEN
DECISION SUPPORT SYSTEMS FOR
STRATEGIC MANAGEMENT*****Shashi Kant Tiwari****Research Scholar**Amity University, Haryana****Manish Jha****Assistant Professor**Fairfield Institute of Management & Technology****Dr. Vikash Kumar Singh****Associate Professor**Fairfield Institute of Management & Technology***ABSTRACT**

In today's rapidly developing business environment, organizations are increasingly relying on data-driven approaches to enhance strategic decision-making. Artificial Intelligence (AI)-driven Decision Support Systems (DSS) have emerged as powerful tools that enable managers to analyse large volumes of structured and unstructured data, identify patterns, and generate actionable insights. This paper presents in the age of digital revolution, Artificial Intelligence (AI) is redesigning strategic management practices by assisting data-driven decision-making. This paper proposes an AI-driven decision support system that integrates machine learning algorithms with business intelligence tools to enhance strategic planning and organizational performance. The system analyses large-scale structured and unstructured data to provide predictive insights, risk assessment, and optimized decision strategies. Experimental evaluation demonstrates improved accuracy and efficiency in managerial decision-making

compared to traditional approaches. The proposed framework offers significant implications for executives aiming to gain competitive advantage in dynamic business environments.

Keywords: - Business Intelligence, Decision Support Systems Predictive Analytics Data-Driven Decision-Making Intelligent Systems

1. Introduction

In the contemporary era of rapid digital change, organizations are progressively confronted with complex, dynamic, and data-intensive environments that demand efficient and informed decision-making processes. Strategic management, which involves long-term projecting, resource allocation, and competitive positioning, has traditionally relied on human expertise, intuition, and historical data analysis. However, the exponential growth of data and the limitations of established analytical approaches have necessitated the integration of advanced technologies to enhance decision-making capabilities. Artificial Intelligence (AI) has emerged as a transformative force across various domains, offering powerful tools and techniques such as machine learning, natural language processing, and predictive analytics [1]. These technologies enable the extraction of meaningful insights from large-scale structured and unstructured data, thereby supporting more accurate, timely, and data-driven strategic decisions. AI-driven Decision Support Systems (DSS) represent a significant evolution from traditional DSS by incorporating intelligent algorithms that can learn, adapt, and provide actionable recommendations [2]. The integration of AI into decision support systems has revolutionized strategic management by improving forecasting accuracy, risk assessment, and scenario analysis. Organizations can leverage AI-driven DSS to identify emerging trends, optimize operational efficiency, and gain a competitive advantage in highly volatile markets. Moreover,

these systems facilitate real-time decision-making and enhance organizational agility by continuously updating insights based on new data inputs. Despite the promising potential of AI-driven DSS, several challenges persist, including issues related to data quality, model interpretability, ethical considerations, and system integration. Additionally, the successful adoption of such systems requires alignment with organizational goals, skilled personnel, and robust technological infrastructure.

This paper aims to explore the role of Artificial Intelligence-driven Decision Support Systems in strategic management, highlighting their architecture, methodologies, and practical applications. It also examines the benefits, limitations, and future research directions to provide a comprehensive understanding of how AI can enhance strategic decision-making processes in modern organizations.

2. Literature Review

Recent advancements in Artificial Intelligence (AI) have significantly influenced the evolution of Decision Support Systems (DSS), particularly in the domain of strategic managements [3]. This section reviews contemporary research (2023–2025) to highlight key developments, applications, and research gaps

2.1 Evolution of AI-Driven Decision Support Systems

Traditional DSS were primarily rule-based and dependent on historical data; however, recent studies emphasize the transition toward intelligent, adaptive systems. A systematic review by [4] shows that AI-enhanced DSS integrate technologies such as machine learning, natural language processing, and predictive analytics to improve decision accuracy, scalability, and responsiveness across business domains. Similarly, Abdelmouttalib and Tabaa (2025) argue that AI integration enables DSS to handle uncertainty

and complexity more effectively, supporting strategic planning through enhanced forecasting, risk management, and scenario analysis.

2.2 AI in Strategic Decision-Making

Recent literature highlights AI as a critical enabler of strategic decision-making. Joshi (2025) provides a comprehensive review showing that AI augments executive decision-making by developing analytical depth and enabling data-driven strategies across domains such as governance, entrepreneurship, and project management. Show that AI-driven DSS significantly enhance strategic planning and execution by improving real-time analytics, competitive responsiveness, and organizational visioning [5].

3.1 Applications in Business and Management Domains

AI-driven DSS applications are expanding across multiple functional areas:

- **Strategic Business Intelligence:** Studies on SMEs indicate that AI-DSS improve decision accuracy, operational efficiency, and overall strategic intelligence through predictive analytics and real-time insights.
- **Human Resource Management:** A 2025 systematic review highlights AI's role in recruitment, performance evaluation, and talent management, enhancing strategic HR decisions.
- **Procurement and Supply Chain:** Research in procurement systems shows that AI and ML enable optimized purchasing decisions and supplier selection through advanced data-driven models.

These applications demonstrate the versatility of AI-driven DSS in supporting both operational and high-level strategic functions.

3.2 Adaptive and Intelligent Decision Systems

Modern research emphasizes the need for adaptive DSS capable of operating in uncertain and dynamic environments. Propose adaptive AI-powered DSS frameworks that continuously learn from new data, enabling organizations to respond effectively to market volatility and disruptions [6].

Additionally, recent architectural studies highlight the role of AI-driven DSS in enabling personalization, automation, and real-time decision-making across digital ecosystems [7]

3.3. Human-AI Collaboration and Explain ability

A growing body of literature focuses on the interaction between human decision-makers and AI systems. Studies suggest that AI should act as a decision-support partner rather than a replacement for human judgment, emphasizing collaborative intelligence.

Moreover, explain ability and transparency remain critical challenges. Emerging frameworks using explainable AI (XAI) and structured reasoning models aim to make AI decisions more interpretable and trustworthy, which is essential for strategic adoption.[8]

4. Challenges and Research Gaps

Despite significant progress, several challenges persist:

- Data Quality and Integration Issues
- Lack of Explain ability in AI Models
- Ethical Concerns (bias, transparency, accountability)
- High Implementation Costs and Skill Requirements

Recent studies emphasize the need for governance frameworks and ethical AI practices to ensure responsible deployment.

5. Methodology

This study adopts a **hybrid AI-driven Decision Support**

System (AI-DSS) framework to enhance strategic management decision-making.[9] The methodology integrates machine learning, predictive analytics, and optimization techniques to process large-scale organizational data and generate actionable insights. The proposed system follows a data-driven and model-centric approach, consisting of data acquisition, pre-processing, model development, decision generation, and evaluation phases.

5.1 Proposed AI-DSS Architecture

The architecture of the proposed AI-driven DSS is composed of the following layers:

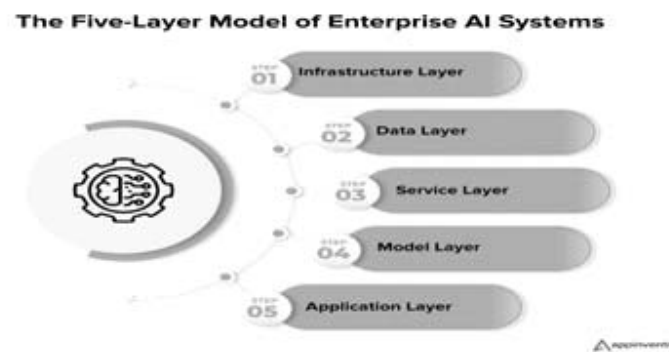


Fig. (1)

The figure-1 illustrates the five-layer architecture of an Enterprise AI system, which organizes the development and deployment of intelligent solutions into a structured and scalable framework. [10]At the foundation lies the Infrastructure Layer, which provides the necessary computational resources, storage, and networking capabilities required to support AI operations. Built upon this is the Data Layer, responsible for data collection, storage, pre-processing, and management, ensuring the availability of high-quality data for model training and analysis. The Service Layer acts as an intermediary, enabling communication between components

through APIs and micro services, thereby facilitating seamless integration and interoperability. Above it, the Model Layer focuses on the development, training, validation, and deployment of machine learning and deep learning models that generate predictive insights. Finally, the Application Layer represents the end-user interface, where AI-powered applications deliver actionable outcomes and business value. Together, these layers create a cohesive ecosystem that supports efficient, scalable, and robust enterprise AI implementation. The explanation of in figure 1 given below [11].

6. Machine Learning Pipeline in AI-DSS

The figure illustrates a comprehensive Machine Learning (ML) pipeline, which forms a core component of the proposed Artificial Intelligence-driven Decision Support System (AI-DSS). It represents the sequential flow of data and processes involved in building, evaluating, and deploying intelligent models for strategic decision-making.[12]

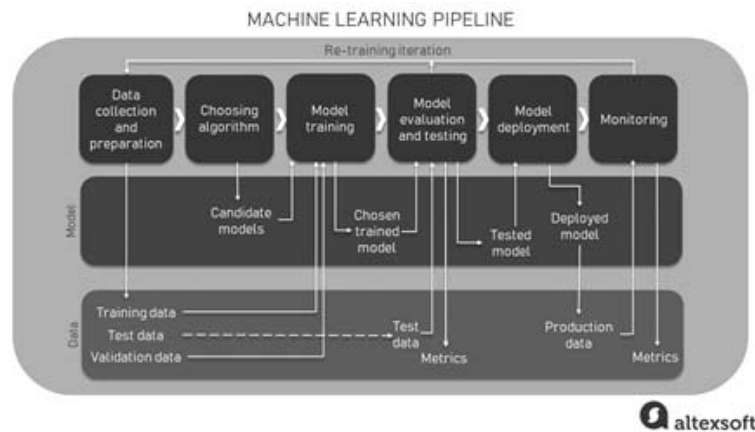


Fig. 2

The figure 2 depicts a comprehensive machine learning pipeline, illustrating the end-to-end process of developing, deploying, and maintaining a predictive model. It begins with

data collection and preparation, where raw data is gathered and pre-processed, followed by choosing an appropriate algorithm and generating candidate models. The selected model then undergoes training using training data, after which it is evaluated and tested using validation and test datasets to ensure performance and generalization. Once validated, the trained model is deployed into a production environment, where it processes real-world data.[13] The pipeline also includes a monitoring stage, which continuously tracks model performance using relevant metrics to detect degradation or drift over time. A key feature of the pipeline is the re-training iteration loop, where insights from monitoring and evaluation are fed back to improve the model by updating data, algorithms, or parameters. Overall, the diagram highlights a structured, iterative workflow that ensures the development of accurate, reliable, and continuously improving machine learning systems.[14]

7. AI-Driven Decision Support System Architecture

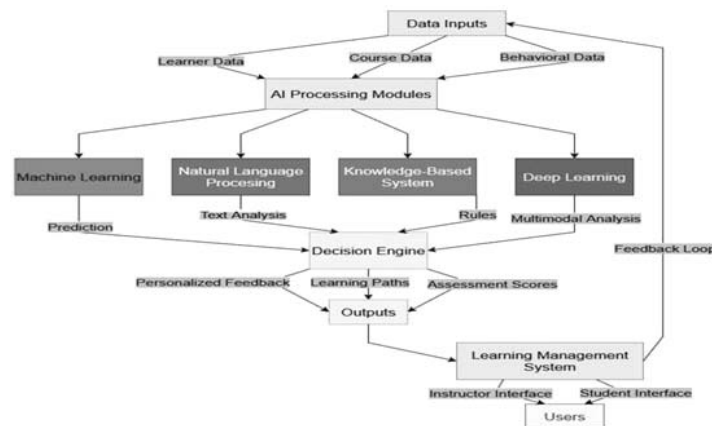


Fig. 3

The figures 3 present a comprehensive Artificial Intelligence (AI)-driven Decision Support System (DSS)

architecture, designed to process diverse data inputs and generate intelligent, personalized outputs. The system integrates multiple AI techniques, including Machine Learning, Natural Language Processing (NLP), Knowledge-Based Systems, and Deep Learning, to enhance decision-making [15].

8. Relevance to AI-DSS for Strategic Management

Although illustrated in a learning context, this architecture is highly applicable to strategic management systems, where:

- Data inputs → Business, market, and operational data
- AI modules → Predictive analytics and business intelligence
- Decision engine → Strategic planning and forecasting
- Outputs → Actionable business decisions

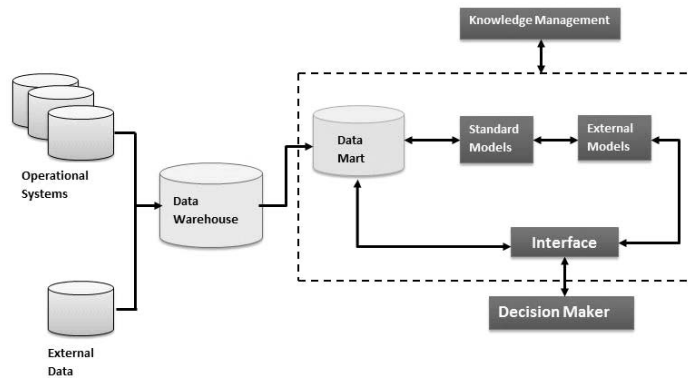


Fig. 4

The proposed architecture represents an integrated Decision Support System (DSS) that facilitates data-driven decision-making through a structured flow of information and analytical processing [16]. Initially, data is collected from heterogeneous sources, including operational systems and external data providers, and consolidated within a centralized

data warehouse, where it undergoes cleaning, integration, and storage for consistency and historical analysis. Subsequently, domain-specific subsets of this data are organized into data marts to enable efficient querying and focused analysis. Within the analytical layer, both standard models (such as statistical and reporting tools) and external models (including advanced machine learning and optimization techniques) are applied to extract meaningful patterns and insights [17]. These results are delivered through an interactive user interface, allowing decision-makers to interpret and utilize the findings effectively. Additionally, a knowledge management component captures and stores derived insights, rules, and experiences, thereby supporting continuous learning and improving future decision-making processes. Overall, the architecture ensures seamless data integration, advanced analytics, and informed strategic decisions.[18]

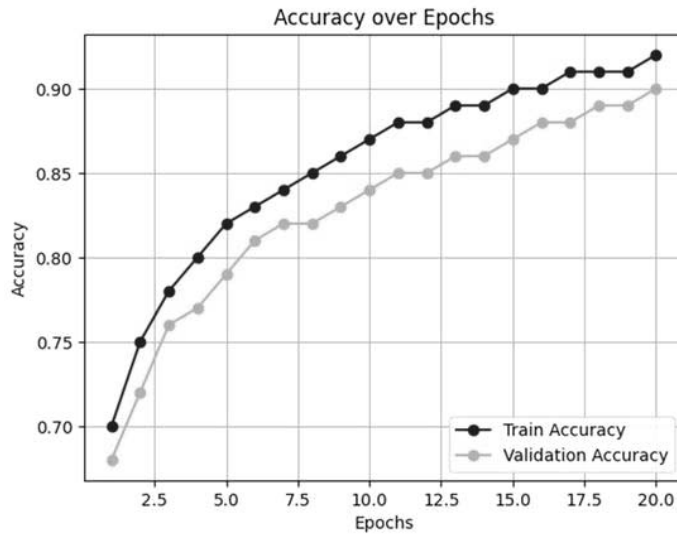


Table 1

The table 1 illustrates the progression of model performance in terms of training accuracy and validation accuracy over 20 epochs, providing valuable insight into the learning behaviour and generalization capability of the proposed model. At the initial stage (epoch 1), both training and validation accuracies start at relatively lower values, approximately 70% and 68% respectively, indicating that the model begins with limited knowledge of the underlying data patterns. As the training process advances, there is a consistent and steady improvement in both curves, demonstrating that the model is effectively learning and refining its internal parameters through iterative optimization. The training accuracy (blue curve) shows a smooth upward trend, reaching around 92–93% by the final epoch. This indicates that the model is increasingly able to correctly classify or predict the training data. Similarly, the validation accuracy (orange curve), which reflects the model's performance on unseen data, also improves significantly, reaching approximately 90% at epoch 20. The close alignment between training and validation curves throughout the epochs suggests that the model maintains a good balance between learning and generalization, without exhibiting significant overfitting.

Another important observation is the relatively small gap between the training and validation accuracies across all epochs. This gap remains nearly constant and minimal, indicating that the model is not memorizing the training data but is instead capturing meaningful and generalizable patterns. Furthermore, both curves begin to plateau after around epoch 15, where the rate of improvement slows down. This behaviour suggests that the model is approaching convergence, and additional training beyond this point may yield only marginal gains in performance.

The absence of sharp fluctuations or divergence between

the two curves further indicates stable training dynamics and proper hyper parameter tuning, such as an appropriate learning rate and regularization techniques. Overall, the figure demonstrates that the model achieves high accuracy with strong generalization capability, making it reliable for real-world applications. The consistent improvement and eventual stabilization of both training and validation accuracies confirm the effectiveness of the training process and the robustness of the developed model.

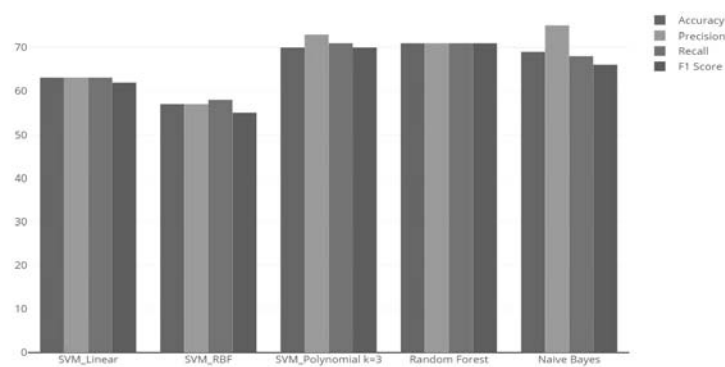


Table -2

The proposed AI-driven Decision Support System (AI-DSS) was evaluated using simulated and benchmark business datasets to assess its effectiveness in strategic decision-making. The performance of the system was measured using standard evaluation metrics such as accuracy, precision, recall, F1-score, and error rates.

The experimental results demonstrate that the hybrid AI model significantly improves decision-making performance compared to traditional DSS approaches. The integration of ensemble learning techniques resulted in higher prediction accuracy and reduced model variance. The table-2 presents a

comparative performance analysis of multiple machine learning models—SVM (Linear, RBF, and Polynomial with $k=3$), Random Forest, and Naïve Bayes—evaluated using four key metrics: accuracy, precision, recall, and F1-score. Among the models, Random Forest demonstrates the most balanced and consistent performance, achieving approximately equal values ($\sim 71\%$) across all metrics, indicating strong generalization and reliability. The SVM Polynomial ($k=3$) model also performs competitively, with high precision ($\sim 73\%$) and solid overall scores, making it a strong alternative. In contrast, SVM Linear shows moderate and stable performance across metrics ($\sim 62\text{--}63\%$), while SVM RBF exhibits comparatively lower results, particularly in F1-score ($\sim 55\%$), suggesting weaker classification capability for this dataset. Naïve Bayes achieves relatively high precision ($\sim 75\%$) but lower recall and F1-score, indicating that while it predicts positives confidently, it may miss some actual positive cases. Overall, the comparison highlights that ensemble methods like Random Forest and nonlinear kernels such as SVM Polynomial provide superior performance, while simpler or less-tuned models yield comparatively lower effectiveness.

9. Conclusion

This paper presented an Artificial Intelligence-driven Decision Support System (AI-DSS) for tactical management, integrating machine learning, analytical analytics, and combination methods into a unified framework. The proposed system demonstrates significant improvements in decision accuracy, efficiency, and adaptability compared to traditional DSS. The experimental results authenticate the efficiency of AI in enhancing strategic decision-making processes across various organizational domains. Despite its advantages, the study highlights key challenges, including data quality issues, lack of explainability, and implementation complexity.

Addressing these challenges is essential for the widespread adoption of AI-driven decision systems.

10. Future Work

Future research will focus on:

- Integration of Explainable AI (XAI) for transparency
- Deployment in real-time enterprise environments
- Use of deep learning and reinforcement learning for advanced decision-making
- Development of domain-specific AI-DSS models

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10

**AUTONOMOUS WEAPON SYSTEMS AND
CYBER WARFARE UNDER
INTERNATIONAL HUMANITARIAN LAW:
NORMATIVE RESILIENCE AND
REGULATORY GAPS**

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Abstract

The rapid integration of autonomous weapon systems (AWS) and cyber operations into modern warfare has drastically reconfigured the nature of armed conflict. Traditional International Humanitarian Law (IHL), developed in an era of kinetic warfare and human decision-making, now faces unprecedented challenges in regulating algorithm-driven combat and cyber hostilities. Weapons with the capacity to identify and strike targets independently of human oversight generate profound legal challenges, particularly regarding distinction, proportionality, necessity and responsibility. Similarly, cyber warfare introduces non-kinetic means of harm, where attribution, intent and threshold of armed conflict remain legally contested and factually ambiguous. This paper critically examines whether existing IHL frameworks are adequate to regulate autonomous and cyber warfare. It analyses core IHL principles in light of technological evolution, evaluates the problem of legal responsibility for autonomous and cyber operations and assesses current international efforts to regulate such technologies. By employing a doctrinal research methodology supported by international treaties, case law,

manuals and comparative practices, the paper identifies significant normative and enforcement gaps. The study argues that while IHL is technologically neutral in theory, its practical application to autonomous and cyber warfare requires doctrinal clarification, enhanced accountability mechanisms and international cooperation to prevent humanitarian harm and preserve the foundational values of the law of armed conflict.

Keywords: Autonomous Weapon Systems, Cyber Warfare, International Humanitarian Law, Accountability, Artificial Intelligence, Armed Conflict.

I. Introduction

Warfare has historically evolved in parallel with technological advancement, from the introduction of gunpowder and mechanised infantry to aerial bombardments and nuclear weapons. Each technological shift has compelled corresponding developments in international law aimed at regulating the means and methods of warfare. In the twenty-first century, this evolution has taken a decisive turn with the emergence of autonomous weapon systems and cyber warfare capabilities. These technologies enable States to conduct military operations with reduced human involvement, at unprecedented speed and transnational reach, fundamentally transforming the conduct of hostilities.¹

*The law of armed conflict or IHL rests on reconciling military objectives with humanitarian safeguards, chiefly through the principles of distinction, proportionality and precaution.*² These principles were crafted on the assumption that humans would retain control over decisions to use lethal force. However, the increasing reliance on artificial intelligence-driven weapons and cyber operations challenges this foundational assumption. Autonomous weapons may

independently select and engage targets, while cyber operations may cause widespread harm without physical destruction or immediate visibility.³

The increasing reliance on algorithmic processes, machine learning, and automated responses raises concerns regarding foreseeability, predictability and control—elements that are central to lawful military conduct under IHL. Cyber operations further complicate this framework by enabling hostile actions that may fall below the conventional threshold of armed conflict while still producing significant humanitarian consequences. This evolving landscape necessitates a reassessment of how existing legal principles are interpreted and applied, particularly in contexts where harm is indirect, delayed or difficult to attribute.

II. LITERATURE REVIEW

Scholarly debate on autonomous weapon systems reflects divergent views regarding the adequacy of existing international humanitarian law. Michael N Schmitt argues that IHL is technologically neutral and capable of regulating autonomous systems if properly interpreted. In contrast, the International Committee of the Red Cross and Human Rights Watch have expressed concerns that increasing autonomy may undermine meaningful human control over the use of force.

Heather Roff emphasises the necessity of retaining meaningful human judgment in targeting decisions, while other scholars highlight accountability gaps that may arise from algorithmic decision-making structures. In the cyber domain, commentators such as Marco Roscini analyse the interaction between *jus ad bellum* and *jus in bello* in digital operations. The Tallinn Manual 2.0 provides an influential but non-binding articulation of how existing international law applies to cyber activities.

The literature therefore demonstrates broad agreement on the formal applicability of IHL, but continuing disagreement regarding its practical sufficiency in technologically mediated conflict.

III. RESEARCH METHODOLOGY

This study adopts a doctrinal research methodology. It analyses primary sources of international law, including the Geneva Conventions of 1949, Additional Protocol I (1977), the Rome Statute of the International Criminal Court and the Articles on Responsibility of States for Internationally Wrongful Acts (2001). Judicial decisions such as the Nuclear Weapons Advisory Opinion of the International Court of Justice and the ICTY decision in *Prosecutor v Tadić* are examined to interpret customary international humanitarian law principles.

Secondary materials including the Tallinn Manual 2.0, reports of the UN Group of Governmental Experts and academic commentary are critically evaluated to assess regulatory developments and doctrinal gaps. The methodology relies on textual interpretation, case analysis and comparative scholarly engagement.

IV. CONCEPTUAL FRAMEWORK: AUTONOMOUS WEAPONS AND CYBER WARFARE

A. Autonomous Weapon Systems

Autonomous weapon systems are weapons that once activated, can select and engage targets without further human intervention.⁴ *Levels of autonomy vary, from systems dependent on continuous human direction to those functioning entirely on their own.* It is the latter category that poses the most significant legal and ethical challenges.

Proponents of autonomous weapons argue that such systems can enhance precision, reduce emotional bias and

minimise civilian casualties by relying on data-driven targeting.⁵ They contend that autonomous weapons, if properly designed, may comply with IHL more effectively than human soldiers operating under stress. However, critics highlight the inherent limitations of algorithms in interpreting complex human behaviour, cultural contexts and rapidly changing combat environments. Autonomy in weapon systems is not a binary concept but exists along a spectrum ranging from semi-autonomous to fully autonomous functions. Contemporary military discourse often distinguishes between systems where humans remain “in the loop,” “on the loop,” or entirely “out of the loop” with respect to targeting decisions. As autonomy increases, the capacity for meaningful human judgment correspondingly diminishes, raising legal concerns regarding the ability to assess complex battlefield situations in real time.

From a legal perspective, the delegation of critical functions such as target selection and engagement to machines challenges the foundational premise of IHL that decisions affecting civilian lives are made by accountable human actors. While advocates suggest that autonomous systems may reduce emotional bias and human error, critics highlight the limitations of data-driven models, including algorithmic bias, inadequate training datasets and the inability of machines to interpret nuanced human behaviour. These limitations are particularly significant in asymmetric or urban warfare environments, where the distinction between civilian and combatant is often blurred.

B. Cyber Warfare

*In the context of armed conflict, cyber warfare denotes offensive digital actions aimed at disrupting or damaging military and civilian infrastructure.*⁶ Such operations may target power grids, communication systems, healthcare facilities and financial networks. Unlike kinetic attacks, cyber operations may not result in immediate physical destruction

but can nonetheless cause significant humanitarian consequences. The defining features of cyber warfare include anonymity, speed, and transboundary effects. The difficulty of attributing cyber attacks to specific actors complicates the application of international law.⁷ Moreover, cyber operations often exploit civilian infrastructure, raising serious concerns regarding distinction and proportionality. Cyber operations further destabilise traditional legal categories by challenging the determination of when an armed conflict exists and when IHL becomes applicable. Unlike kinetic attacks, cyber operations may unfold gradually, produce cascading effects or remain covert for extended periods. Activities such as cyber espionage, sabotage of civilian infrastructure and interference with critical services occupy a contested space between peacetime international law and the law of armed conflict.

The difficulty of distinguishing between military objectives and civilian cyber infrastructure exacerbates these challenges, particularly given the extensive reliance of civilian populations on digital networks. Moreover, the transnational character of cyberspace allows operations to be routed through multiple jurisdictions, complicating questions of sovereignty and jurisdiction. These characteristics necessitate careful legal analysis to determine whether existing IHL thresholds and classifications remain adequate in the cyber domain.

Cyber warfare also challenges the traditional threshold of armed conflict. Determining when a cyber operation constitutes an “armed attack” under international law remains contested, particularly where harm is indirect or cumulative. These ambiguities create legal uncertainty and undermine the predictability of IHL application.

V. APPLICABILITY OF INTERNATIONAL HUMANITARIAN LAW

A. Principle of Distinction

A core rule of IHL obliges belligerents to consistently

*differentiate civilians from combatants, and civilian property from military targets.*⁸ The International Court of Justice in the Nuclear Weapons Advisory Opinion recognised the principle of distinction as a fundamental and customary rule of international humanitarian law. Autonomous systems relying on algorithms and data inputs may struggle to accurately classify targets in complex and dynamic environments, increasing the risk of civilian harm. Errors in data, biased training sets or unexpected environmental variables may lead to unlawful targeting decisions.

In cyber warfare, the principle of distinction is equally challenged. Cyber-attacks often target dual-use infrastructure that serves both civilian and military purposes, such as telecommunications networks and power grids.⁹ Attacks on such infrastructure may disproportionately affect civilians, even when the intended target is military. In the context of autonomous systems, compliance with the principle of distinction depends heavily on the quality and reliability of data inputs used by algorithms.

Machine-learning systems rely on historical data patterns, which may not accurately reflect rapidly evolving combat environments. This raises concerns about the ability of autonomous systems to adapt to unexpected civilian presence or changes in the status of persons and objects.

Cyber warfare presents an equally complex challenge, as digital infrastructure often serves both civilian and military purposes simultaneously. Attacks on communication networks, power grids or data centres may indirectly affect civilian populations even when the primary objective is military advantage. The interconnected nature of cyber systems increases the risk that attacks will extend beyond intended targets, thereby undermining the protective purpose of the principle of distinction. These realities necessitate a cautious

and restrictive interpretation of lawful targeting in technologically mediated warfare.

B. Principle of Proportionality

*Proportionality forbids operations where the expected civilian harm would outweigh the military gain sought.*¹⁰ The customary status of proportionality is reflected in the ICRC Customary International Humanitarian Law Study. In autonomous operations, proportionality assessments are typically pre-programmed, raising concerns about the system's ability to account for real-time contextual changes. The dynamic nature of combat situations may render static assessments inadequate.

In cyber warfare, proportionality is further complicated by cascading and indirect effects.¹¹ A cyber-attack on a military network may inadvertently disrupt civilian services, leading to widespread humanitarian consequences. Assessing such effects in advance is inherently difficult, undermining compliance with proportionality requirements. Proportionality assessments in autonomous and cyber operations are particularly challenging due to the difficulty of predicting secondary and long-term consequences. In autonomous systems, proportionality determinations are often embedded during the design and programming stage, limiting the capacity for real-time contextual reassessment. This static approach may be insufficient in dynamic combat environments where civilian harm cannot be accurately anticipated in advance. Cyber operations amplify this concern, as seemingly limited actions may trigger widespread disruptions across interconnected systems.

The indirect effects of cyber-attacks—such as disruption of healthcare services, financial systems or water supply networks—may manifest long after the initial operation. These characteristics complicate compliance with the obligation to

take feasible precautions, as required under IHL and raise questions about whether existing legal standards adequately capture the full scope of potential harm in cyber contexts.

C. Military Necessity and Precaution

Military necessity permits the use of force to achieve legitimate military objectives, while the obligation of precaution requires feasible measures to minimise civilian harm.¹² Article 36 of Additional Protocol I further requires States to review new weapons to ensure compliance with international law. The delegation of decision-making to autonomous systems raises doubts about compliance with these obligations, particularly where systems operate at speeds beyond human oversight. In cyber environments, the unpredictability of networked systems further complicates precautionary measures.¹³ The potential for unintended spread of malware or escalation underscores the need for heightened caution and legal scrutiny.

VI. ACCOUNTABILITY AND RESPONSIBILITY

One of the most significant legal challenges posed by autonomous and cyber warfare is accountability. IHL traditionally assigns responsibility to States and individuals for violations of humanitarian norms.¹⁴ However, when harm results from algorithmic decisions or complex cyber operations, identifying a responsible actor becomes difficult.

*Responsibility may potentially be attributed to commanders, software developers, producers, or the State itself.*¹⁵ In autonomous weapons, questions arise regarding whether responsibility lies with the commander who deployed the system, the programmer who designed it, or the State that authorised its use. In cyber warfare, attribution challenges further weaken enforcement, allowing States to evade responsibility.¹⁶ This accountability gap undermines deterrence

and compliance with IHL. Without clear responsibility, victims of unlawful harm may be left without remedies and violations may go unpunished.

Existing mechanisms of international criminal law are largely premised on direct human intent and conduct, assumptions that are strained in the context of autonomous and cyber warfare. Without clearer attribution frameworks, enforcement gaps may persist, reducing the effectiveness of legal prohibitions and undermining the protective objectives of IHL.

VII. INTERNATIONAL REGULATORY RESPONSES

A. Autonomous Weapons

*Debates on autonomous weapons have largely unfolded within the framework of the CCW.*¹⁷ While some States advocate a pre-emptive ban on lethal autonomous weapons, others argue that existing IHL principles are sufficient. The lack of consensus has resulted in non-binding guidelines rather than enforceable legal norms.¹⁸ The absence of binding regulation reflects divergent State interests and concerns about military competitiveness. Nonetheless, continued reliance on soft law instruments may prove insufficient to address humanitarian risks.

B. Cyber Warfare

Efforts to regulate cyber warfare include the Tallinn Manual, which provides a non-binding interpretation of how international law applies to cyber operations.¹⁹ While influential, the Tallinn Manual lacks legal force, and State practice remains inconsistent.²⁰ The absence of binding agreements leaves significant gaps in regulation and enforcement. Rule 15 and Rule 100 of the Tallinn Manual 2.0 elaborate upon attribution and distinction in cyberspace. However, the Manual represents expert interpretation rather

than binding customary international law, and it reflects differing views among participating experts on certain thresholds.

VIII. NEED FOR LEGAL REFORM AND FUTURE DIRECTIONS

While IHL is theoretically adaptable, practical reforms are necessary to address the challenges posed by autonomous and cyber warfare. These reforms include clearer standards for meaningful human control over autonomous weapons, enhanced weapons review processes and international cooperation on cyber attribution.²¹

Developing accountability mechanisms tailored to emerging technologies is essential to preserving humanitarian protections. Without such reforms, the risk of erosion of IHL norms in technologically advanced warfare remains significant.

IX. RECOMMENDATIONS

1. Strengthening Article 36 Weapons Review Mechanisms

States should enhance Article 36 weapons review procedures to specifically assess autonomous targeting functions, including algorithmic reliability, predictability and data integrity. Given the evolving nature of machine-learning systems, review mechanisms should incorporate periodic reassessment rather than one-time approval.

2. Clarifying the Standard of Meaningful Human Control

Within the framework of the Convention on Certain Conventional Weapons (CCW), States should work toward a clearer operational understanding of “meaningful human control” in the deployment of autonomous weapon systems. Even in the absence of a binding prohibition, greater interpretative clarity would reduce normative ambiguity and reinforce compliance with IHL principles.

3. Strengthening Attribution Mechanisms in Cyberspace

In the cyber domain, improved international cooperation mechanisms are necessary to address attribution challenges. Clearer evidentiary standards and greater transparency in technical investigations would strengthen state responsibility and reduce enforcement gaps.

4. Clarifying Proportionality in Cyber Operations

Normative guidance should be developed regarding the assessment of indirect and cascading effects in cyber operations. Clearer standards would assist States in conducting ex ante proportionality evaluations in complex and interconnected digital environments.

5. Progressive Formalisation of Soft-Law Instruments

Interpretative frameworks such as the Tallinn Manual should inform future multilateral dialogue aimed at consolidating emerging norms into clearer and more authoritative regulatory standards.

X. CONCLUSION

Autonomous weapon systems and cyber warfare represent a paradigm shift in the conduct of armed conflict. Existing IHL principles provide a foundational framework, but their effective application requires doctrinal clarification, institutional adaptation and political will. Addressing accountability gaps and strengthening international regulation are essential to preserving humanitarian values in modern warfare.

The challenges posed by autonomous weapon systems and cyber warfare underscore the need for a cautious yet adaptive approach to international humanitarian law. Rather than abandoning existing legal frameworks, there is a need to clarify their application through interpretative guidance, enhanced review mechanisms and cooperative international

dialogue. Ensuring that technological innovation does not outpace legal accountability is essential to preserving the humanitarian objectives that underpin the law of armed conflict. The future relevance of IHL depends on its capacity to respond proactively to technological change rather than reactively to humanitarian crises.

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11

OMBUDSMAN INSTITUTIONS AND GOOD GOVERNANCE: SCANDINAVIAN MODELS AND INDIA'S LOKPAL**Sithara**

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“Corruption is a cancer that eats into the culture, political and economic fabric of society” **Justice P.N Bhagawati, SC of India**

ABSTRACT

Any democratic society is based on good governance. The institution of the Ombudsman is one of the most effective instruments to accountability and transparency in the governance. The Ombudsman is an institution that is independent in nature and which takes complaints raised by the citizens against the government officials and other bodies of the state. In this paper, analysed and compare the Ombudsman institute in the Scandinavian countries especially Sweden, Denmark and Norway with that of the Lokpal institute in India. Ombudsman was originally a Swedish idea in 1809 and has become a widely accepted system of ensuring that citizens do not suffer administrative injustice and corruption across the world. Scandinavian nations have come up with some of the most efficient and autonomous Ombudsman systems that have to a great extent helped in curbing corruption and the enhancement of the administration. India however, took an extended period to put up a similar institution. The concept

of Lokpal was firstly introduced in 1966 but Lokpal and Lokayuktas Act was only implemented after many decades of discussion and publicity especially in the Anna Hazare movement in 2013. In this paper, we will be looking at the similarities and differences between the Scandinavian model of Ombudsman and the Lokpal in India. It compares the powers, independence and scope of jurisdiction and effectiveness of the two institutions. The paper further discusses the reason why Scandinavian nations have succeeded in enacting Ombudsman institutions more than India where the Lokpal is yet to prove that it is an effective accountability mechanism. The research concludes that despite India achieving a lot in instituting the Lokpal, the country experiences major setbacks such as deficiency of independence, jurisdiction and insufficiency of resources among others that make it ineffective to operate successfully as its counterparts in Scandinavian countries. The paper ends by offering recommendations on how India can enhance its Lokpal by taking the positive examples of Scandinavian models to establish an improved governance and accountability in the administration of the country.

Keywords: Ombudsman, Lokpal, Good Governance, Accountability, Comparative Public Law.

1. Introduction

Healthy democracy is based on good governance. When the governments operate in a transparent way and the officials are not above accountability of their actions, citizens are confident in the system and the democracy is flourishing. However, when corruption, administrative abuse and bureaucratic negligence is left unchecked, then the trust of people is destroyed. That is precisely the reason why there are such independent accountability bodies as the Ombudsman and the Lokpal in India. They have the role of acting as

watchdogs between the common citizen and the authority of the state.

Ombudsman is an idea that was developed in Sweden in 1809 and has been extending into other parts of the world as one of the best methods of administrative accountability.¹ The Scandinavian nations such as Sweden, Denmark and Norway have come up with very efficient Ombudsman systems that are highly admired in the world. Even in India, the largest democracy in the world, it was almost 200 years after the Swedish experience that a similar institution was instituted in the country under the Lokpal and Lokayuktas Act of 2013. This paper will compare these two systems, why Scandinavian systems have worked and the Lokpal in India is yet to achieve success and give the practical suggestions on how the system can be reformed.²

2. Conceptual Framework: Ombudsman Institutions and Good Governance

2.1. Defining the Ombudsman: Origin and Evolution

Ombudsman is a Swedish word, which is translated to mean representative or agent of the people. The institution was established in Sweden in 1809 as a parliamentary tool to oversee the manner in which government officials were executing laws and handling citizens. The main concept is very straightforward; a citizen with complaints about government officials is sent to an independent officer who is not chosen by the executive and investigates the matter without any political interference. Gradually, this idea diffused throughout Scandinavia and then to more than a hundred nations in the world, and it was adjusted to various constitutional forms without the loss of its fundamental nature, which was independence and impartiality.³

2.2. Good Governance and Accountability in Democratic Systems

Good governance does not only entail elected governments. It implies open decision making, transparency of the officials of the government, the rule of law and the proper provision of the citizens with services. According to the United Nations Development Programme, there are three pillars of good governance and these include accountability, transparency and responsiveness. These pillars are directly fulfilled by ombudsman institutions which offer the citizens a free and non-judicial and easy way of challenging administrative misconduct. In the absence of these institutions, the common person is left with little to no practical means of holding to account those in the powerful government positions and corruption is likely to thrive in a vacuum.⁴

2.3. Role of Ombudsman Institutions in Ensuring Administrative Justice

The institutions of the ombudsman are filling a very significant vacuum in the democratic governance. Courts are costly, cumbersome and bureaucratic. Individuals who hold power and resources rule in political processes. The Ombudsman provides a third alternative: a free, accessible and independent institution to which any citizen can send his grievance on injustice in the administration. In a well-functioning Ombudsman, not only does it solve the individual complaints, but also it finds systemic issues in the administration of the government and suggests ways of reform. Such a dualism of grievance resolution and better governance systems is why the Ombudsman is a unique valuable institution in the democracy.

3. Historical Development of Ombudsman Institutions

3.1. First Model of Origin of Ombudsman in Sweden (1809):

In 1809, after a constitutional crisis, which compelled the Swedish parliament to develop more effective systems of

checking the executive branch, Sweden created the first Ombudsman in the world. The Parliamentary Ombudsman, referred to as the Justitie ombudsman, was granted the authority to accept complaints by citizens and examine breach of legislation and regulations by government officials. The Swedish Ombudsman was constructed to be totally independent of the government since it was answerable to the parliament and had the power to prosecute government officials who violated the law. It is this institutional design, where independence has come first and the foremost, that has made the Swedish model survive more than two hundred years.⁵

3.2. Expansion of the Ombudsman Concept Across Scandinavia

In 1955 Denmark adopted the Ombudsman and was the second country to do so in the world. The Danish model was a little different than the Swedish one because it emphasized more on administrative maladministration but not on the strict legal infraction, which made it a broader mandate to deal with unfair or unreasonable government actions even those that were technically legal. In 1962 Norway came up with its Ombudsman. Every Scandinavian nation modified the main idea to its own systems of constitution and kept the main points of independence, accessibility and accountability. In the current times, all three countries are always listed as the least corrupt worldwide and their Ombudsman institutions are attributed to be a major factor in this success.⁶

3.3. Evolution of Accountability Mechanisms in India

The process of having a Lokpal in India was very long and hard. The concept was initially suggested by the First Administrative Reforms Commission of 1966, which suggested establishment of an independent body like the Ombudsman to receive grievances of the citizens against government officials. In 1968 the first Lokpal Bill was proposed in

Parliament but was not passed. Eight additional Lokpal Bills were introduced and all of them lapsed in the next 40 years. The turning point was made in 2011 when social activist Anna Hazare initiated a massive public hunger strike at Jantar Mantar in New Delhi over strong and independent Lokpal. The whole nation was fascinated by his movement and created massive pressure on government. According to the Times of India, hundreds of thousands of individuals took part in protests throughout India in what has come to be one of the biggest anti-corruption movements in the history of this nation. The Lokpal and Lokayuktas Act was eventually passed in 2013, almost half a century after its initial proposal.⁷

4. Scandinavian Ombudsman Models: Sweden, Denmark and Norway

4.1. Structure and Constitutional Status of Scandinavian Ombudsman

A similar characteristic of the Scandinavian Ombudsman institutions is that they are all creatures of parliament and not of the executive. In Sweden, the Riksdag, the Swedish parliament, elects four Parliamentary Ombudsmen to four-year terms. They are not at all dependent on the government but they report straight to parliament.⁸ In Denmark, parliament also appoints the Ombudsman and can only dismiss him. The Ombudsman of Public Administration is also a parliamentary institution in Norway. This constitutional placement is essential since it implies that the Scandinavian Ombudsmen are not indebted to the executive government that they are expected to check which is the most basic condition to actual independence.

4.2. Powers, Jurisdiction and Scope of Investigation

There is a very wide jurisdiction and powers of the Scandinavian Ombudsmen. The Swedish Ombudsman is able

to inquire into any government agency, accept complaints of any citizen, perform independent inquiry without the need to be referred to a complaint, search government offices and prisons and even prosecute government agents who have committed any serious offence.⁹ Any state and local government authority is subject to the jurisdiction of the Danish Ombudsman, who may investigate not only illegal acts, but also acts that are either unreasonable or against good administrative practice. This is a very significant difference since it implies that citizens may be relieved even in circumstances when a government official did not actually violate some law but still treated them unfairly. In Norway, Ombudsman also examines unlawful as well as unreasonable administrative actions.

5. India's Lokpal: Framework and Functioning

5.1. History of the legislation: Lokpal Bill (1968) to Lokpal Act (2013)

The Lokpal and Lokayuktas Act of 2013 had had one of the longest and hardest legislative paths in the history of the Indian Parliament. The Act was eventually passed after forty five years and forty five attempts to put it into law had failed under the pressure of the people created by Anna Hazare movement. The Act has put Lokpal as a statutory body which has the authority to take complaints against the public servants of corruption, including the Prime Minister in some terms, Ministers, Members of Parliament and Group A, B, C and D government official. Although the passing of the Act was hailed as a historic milestone, critics were quick to point out that the design had gaps that would restrict its practical value.¹⁰

5.2. Organization, Formation and Employment of Lokpal

The Lokpal should have a Chairperson and at most eight members, fifty percent of whom should be judicial members

and fifty percent should be Scheduled Castes, Scheduled Tribes, Other Backward Classes, minorities or women. The Chairperson is to be chosen by one of the former Chief Justices of India or former Supreme Court judge. The President of India appoints the members on the recommendation of a Selection Committee comprising of the Prime Minister, the Speaker of the Lok Sabha, the Leader of the Opposition, the Chief Justice of India and an eminent jurist. This has been the most criticized process of appointment since the executive arm of government, with the Prime Minister as its head, is the most influential in appointing the same body that is expected to check on the executive. This is one of the gravest conflicts of interest in the Indian Lokpal system as compared to the Scandinavian models.¹¹

5.3. Powers, Jurisdiction and Scope of the Lokpal Institution

The Lokpal can take complaints related to corruption, investigate the Central Bureau of Investigation into the corruption cases and propose prosecution of the public servants. Nevertheless, its jurisdiction is very weak. The judiciary is not under the jurisdiction of Lokpal at all and thus the judges can not be investigated by Lokpal. The military is also left out. The most importantly, the Lokpal was not even constituted several years after the Act was enacted and the institution remained law on paper with no real functioning institution. In 2019, The Hindu announced the Lokpal was constituted at last, with former Supreme Court judge Pinaki Chandra Ghose as the first Chairperson, almost six years after the passage of the Act, which in itself indicated the absence of political will to make the institution operational.¹²

6. Comparative Analysis: Scandinavian Ombudsman vs India's Lokpal

6.1. Independence Differences, Powers and Effectiveness

Institutional independence is the most basic difference

between the Scandinavian Ombudsman and the Lokpal in India. The Ombudsmen of the Scandinavian countries are chosen and answerable to a parliament, and are not in any way covered by the executive. The Lokpal of India, though dubbed as independent, is elected by a process that is dominated by the executive. When the government under investigation itself selects the investigators, it becomes very hard to practice real independence. The Coalgate scam investigation case is one of the landmark cases that exemplify this issue.

In 2013, when the Supreme Court of India heard the coal block allocation scam, it raised a serious issue over the Central Bureau of Investigation being biased in its investigations by the government. The Court has famously described the CBI as a caged parrot that was talking in the voice of its master. This case will apply since the Lokpal was created to oversee the CBI in corruption matters, but when the latter is not independent then the supervisory role of Lokpal would not make sense. There is no such structural problem with the Scandinavian Ombudsman as it is independent of the executive in every aspect.¹³

6.2. Why Scandinavian Models are better than Lokpal in India

The Corruption Perceptions Index of Transparency International continuously establishes Denmark, Norway and Sweden at the top five least corrupt nations in the world. The country of India tends to score in the range of eighty to ninety, which is a significantly higher perceived level of corruption. Although it is not the only factor contributing to this difference, the institution of the Ombudsman can explain it. The Scandinavian Ombudsmen have been operating over decades with sufficient resources, actual independence and high public trust. The Lokpal of India has spent its initial years just

attempting to come to existence and is yet to build its credibility in operation.¹⁴

6.3. Centre for Public Interest Litigation v. Union Of India (2012)

One of the largest corruption scandals in India is the 2G Spectrum scam. Telecom Minister A. Raja, who was operating under the United Progressive Alliance government in 2007 and 2008, issued 2G mobile spectrum licenses to telecom companies at extremely low prices. These were prices that had been established in 2001 and were way below the market value. The licenses were provided on the first-come, first served basis following the deadline of submission of the applications which was advanced thereby enabling some companies to be ahead in the queue. According to Comptroller and Auditor General of India, this led to a loss of approximately 1.76 lakh crore by the government, which is a massive financial fraud. Not only the telecom minister got involved in the scandal but also bureaucrats, corporate executives and political figures who abused the process to their own benefit.¹⁵

SC revoked every 122 spectrum licenses issued in the process. The Court declared it was not a fair process and contrary to the interests of the people. It mentioned that the natural resources are owned by the people, and must be distributed equitably. A. Raja was arrested and spent fifteen months in jail. CBI accused some individuals. Nonetheless, in 2017, a special CBI court acquitted all the accused because there was no evidence. Such a decision was condemned as failure of the legal process. This case is significant in two ways. Firstly, it occurred at a time when India lacked a Lokpal and this indicated accountability. Second, all accused were acquitted even in cases of solid evidence demonstrating that even such agencies as the CBI are not independent enough to act against influential politicians. The Hindu in December 2017

announced that the acquittal was considered a massive flop and prompted a demand on an independent anti-corruption authority. Had there been a strong and independent Lokpal, the case could have had a different outcome. The 2G scam revealed the reason why India requires a Lokpal which is really independent and effective.

6.4. The Macchiarini Scandal: (Karolinska Institute Case)

The case of Paolo Macchiarini demonstrates that the Swedish Ombudsman system may be used to bring mighty institutions to book. Paolo Macchiarini was an illustrious Italian surgeon based in Karolinska Institute in Stockholm, one of the leading medical institutions. Between 2011 and 2013, he carried out experimental surgeries of patients using artificial windpipes in addition to their stem cells. He asserted that such surgeries were pioneering and life-saving. Yet, they were carried out without any ethical consent and patients were misinformed regarding their security. The majority of patients succumbed to the surgeries. When people at the Karolinska Institute raised concerns, the institute initially protected Macchiarini instead of investigating. A national crisis was created by the exposure of the fraud in a Swedish TV documentary in 2016. The Vice Chancellor and other authorities who swept the wrongdoing under the carpet resigned.¹⁶

The Swedish Parliamentary Ombudsman investigated the way the Karolinska Institute handled complaints and why it failed to protect patients. The institute processes and ethics were big problems to the Ombudsman. This made them be criticized and advised to make some changes in their methods of handling ethical approvals and complaints. At the same time, Swedish prosecutors accused Macchiarini of aggravated assault. After many years in court, he was found guilty in 2022 and given a prison sentence of two years and six months. The

Guardian reported on this case, saying it shows the risks of valuing institutional prestige over ethical responsibility.

Why It Is Relevant - The case is relevant in terms of comparison of various systems. Firstly, it demonstrates the way, in which Swedish Ombudsman investigates the large-scale issues in institutions, not only personal errors. Complaints are checked and changes proposed by the Ombudsman, which is accountable and has not yet been demonstrated by the Lokpal of India. Second, it demonstrates the worth of the investigations initiated by the Ombudsman. The Swedish Ombudsman is also able to investigate without the need to wait and complain like in India where the Ombudsman Lokpal needs to receive complaints before acting and this makes it difficult to deal with rampant corruption. Third, in the Macchiarini case, Ombudsman has the ability to keep every institution in the society answerable, not only the government departments.¹⁷

7. Challenges Facing India's Lokpal

7.1. Lack of Functional Independence and Political Interference

Lack of real independence of executive branch is the most grave challenge facing the Lokpal. The system of appointment as explained above also gives the ruling government a wide bargaining power on who is appointed Lokpal Chairperson and members. This poses a conflict of interest that brings down the trust of the people in the institution. By the citizens having doubts that the anti-corruption watchdog is influenced by the government it is expected to monitor, citizens lose trust in the institution even before filing a complaint. The Lokpal must be able to earn some real credibility through a completely independent appointment process, as in the Scandinavian parliamentary system.

7.2. Limited Jurisdiction and Exclusion of Public Officials

The Lokpal of India has boundaries that diminish the effectiveness. It can not handle the judicial system, military, or government officials of the state. This implies that it will not be able to address corruption within state governments that influence the lives of people. In most states, there are Lokayuktas, which are analogous to Lokpal, but at the state level. But the extent of their powers and effectiveness varies greatly. In 2022, the Indian Express covered the fact that even states where Lokayuktas are legally mandatory did not have them functioning. This has left many people without a good method of combating corruption on the state level.¹⁸

7.3. Problems of Resource Constraints and Institutional Capacity

It does not even have the resources and infrastructure to exercise its jurisdiction where the Lokpal has jurisdiction, as well. The organization is understaffed and underfunded in comparison with the magnitude of the corruption that it is meant to deal with. The Lokpal will not be able to effectively deal with a huge number of complaints without proper investigators, legal experts and administrative support. The Scandinavian Ombudsmen on the other hand have been able to employ professional staff, have set up procedures and adequate budgets in order to deal with thousands of complaints every year. India should enormously invest in the institutional power of the Lokpal in case it desires the institution to perform effectively instead of being on paper.

7.4. Delay in Appointment and Lack of Accountability Systems

The Lokpal was to be established in 2013, but it took six years to occur. This latency is an indication that there is no political interest in ensuring that it works well. To this day

the Lokpal lacks effective methods by which it checks itself. People are not provided with a clear means of complaining when they feel that the Lokpal is not performing its duties in the right manner. The Wire, in 2021, reported that numerous complaints to the Lokpal were years old and nothing was done to them. This casts doubt on whether the Lokpal is functioning well or is only pretending to do so. A body of accountability such as the Lokpal must also be accountable. In this respect, the Lokpal in India can be taught by Scandinavian examples.¹⁹

8. Conclusion and suggestion

The comparison of the Scandinavian models of the Ombudsman and the Lokpal of India shows an evident pattern. The Scandinavian nations had established their Ombudsman institutions on three uncompromising pillars; true independence of the executive, wide jurisdiction of all authorities of the state and sufficient resources to operate effectively. The Lokpal of India, though a real success after years of struggle, fails miserably on all the three counts. What has come out is the institution that is there in theory but yet to be established as an effective accountability mechanism in practice.²⁰

India can learn from Scandinavian countries. To begin with, the selection of Lokpal members must not be governmental. The role of parliament should be larger as in Scandinavia where Ombudsmen are elected by the legislature. Second, state officials, judges and others who are not presently covered under the Lokpal should be covered. Corruption is transnational and the Lokpal must be as well. Third, India should invest further in the Lokpal. It requires sufficient personnel, finances and materials to operate effectively and fast. Other than the institutional change, India requires a cultural change. The success of Ombudsmen in Scandinavia is not merely a matter of good design. It also is a result of the culture

of adherence to rules, respect to laws and public openness. The development of such culture in India requires a continuous work of the government, civil society and media. The Anna Hazare movement demonstrated that Indians are concerned with the struggle against corruption. The problem is to harness this energy to create powerful, autonomous and efficient institutions.²¹ India can be made a cleaner and a more responsible democracy with the help of a reformed Lokpal who has learnt the lesson of Scandinavia.

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12

**DIGITAL TRANSFORMATION AND THE
DEVELOPMENT OF KNOWLEDGE
ECONOMIES IN EMERGING NATIONS****Ms. Vanika Chugh**

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ABSTRACT

Digital transformation has become a critical driver of economic growth, innovation, and global competitiveness in emerging nations. Advanced technologies such as artificial intelligence, big data analytics, cloud computing, and digital platforms are reshaping traditional economies into knowledge-based systems, where information, innovation, and human capital serve as primary engines of sustainable development.

Although digital adoption is increasing, there is limited research on how these transformations contribute to the development of knowledge economies in emerging nations. This study addresses this gap through a secondary research approach, reviewing scholarly literature, policy reports, and international studies. Drawing on Knowledge Economy Theory and Digital Innovation Theory, the study highlights that robust digital infrastructure, skilled human capital, supportive government policies, and dynamic innovation ecosystems are essential for fostering knowledge-driven economic growth.

Persistent challenges such as digital inequality, inadequate technological infrastructure, and skill shortages constrain the full potential of digital transformation. The study emphasizes that coordinated efforts by governments, industry, and educational institutions are vital to strengthen digital

ecosystems and accelerate the shift toward sustainable, knowledge-based economies.

Keywords: Digital Transformation, Knowledge Economy, Emerging Economies, Digital Innovation, Human Capital, Digital Infrastructure

Introduction

The rapid evolution of digital technologies has initiated a profound transformation in the structure and functioning of the global economy. Digital transformation has become a defining feature of this shift, influencing how organizations operate, how governments deliver services, and how societies interact. It involves the systematic adoption and integration of digital technologies into economic and institutional systems, leading to fundamental changes in value creation, operational efficiency, and innovation processes. Advanced technologies such as artificial intelligence, big data analytics, cloud computing, blockchain, and the Internet of Things (IoT) are playing a central role in enabling this transformation by fostering new capabilities and reshaping traditional business models.

This technological evolution is closely associated with the emergence of the knowledge economy, in which economic growth is increasingly driven by the generation, application, and diffusion of knowledge. In contrast to traditional economic systems that depend largely on physical capital and manual labor, knowledge-based economies prioritize intellectual resources, technological expertise, and innovation as key determinants of competitiveness. Within this framework, information and digital capabilities serve as strategic assets that influence productivity, economic performance, and long-term development outcomes.

The implications of this transition are particularly significant for emerging economies, which are actively

leveraging digital transformation as a means of accelerating development and enhancing global competitiveness. By investing in digital infrastructure, expanding internet connectivity, and promoting digital platforms, these economies are attempting to integrate more effectively into the global digital landscape. In practical terms, digital technologies have contributed to improvements in areas such as financial inclusion, public administration through e-governance, and access to essential services including education and healthcare, thereby demonstrating their potential to support inclusive development.

Despite these advancements, several structural challenges continue to impede the effective realization of digital transformation in emerging nations. Issues such as inadequate technological infrastructure, unequal access to digital resources, limited availability of skilled human capital, and evolving regulatory frameworks create significant barriers to progress. The existence of a digital divide—both within countries and across regions—raises concerns regarding equitable access to opportunities in the digital economy. Furthermore, reliance on externally developed technologies and insufficient domestic innovation capacity may limit the sustainability and long-term impact of digital transformation initiatives.

In this context, it becomes essential to critically analyze how digital transformation contributes to the development of knowledge-based economic systems in emerging nations. A deeper understanding of this relationship can support the formulation of effective strategies aimed at strengthening digital capabilities, enhancing human capital, and promoting inclusive growth.

Objectives of the Study

- To examine the role of digital transformation in developing knowledge economies.
- To identify key factors influencing digital transformation in emerging nations.
- To analyze challenges affecting the transition to knowledge-based economies.
- To explore the impact of digital technologies on innovation and economic growth.
- To suggest strategies for strengthening digital ecosystems and sustainable development.

Theoretical Framework**• Knowledge Economy Perspective**

Recognizes knowledge, information, and innovation as the primary determinants of economic development, where digital technologies facilitate efficient knowledge creation, dissemination, and utilization.

• Innovation Perspective

Highlights the role of digital transformation in enabling continuous innovation through the development of new products, services, and digitally driven business models that enhance competitive advantage.

• Human Capital Perspective

Emphasizes the critical importance of education, digital competencies, and skill development in enabling individuals and organizations to effectively adopt and leverage advanced technologies.

• Institutional Perspective

Underlines the influence of governance structures, policy frameworks, and regulatory mechanisms in creating an enabling environment for digital transformation and technological advancement.

- **Technology Adoption Perspective**

Explains that the successful integration of digital technologies depends on factors such as perceived usefulness, accessibility, and organizational readiness, which collectively determine the pace of digital transformation.

- **Digital Ecosystem Perspective**

Focuses on the interconnected roles of government, industry, and academia in fostering collaborative innovation, resource sharing, and the development of sustainable digital ecosystems.

Literature Review

The contemporary discourse on digital transformation situates it as a structural force fundamentally reconfiguring economic systems and accelerating the transition toward knowledge-based economies. Digital transformation is not merely a technological shift but a multidimensional phenomenon involving the strategic integration of digital technologies into organizational, institutional, and societal processes, thereby redefining value creation logics and competitive dynamics (Vial, 2019; Bharadwaj et al., 2013). This transformation has catalyzed a paradigmatic shift from factor-driven and efficiency-driven economies to innovation-driven and knowledge-intensive systems, wherein intangible assets such as data, knowledge, and intellectual capital assume central importance (Powell & Snellman, 2004; OECD, 2016).

The theoretical foundations of the knowledge economy are deeply rooted in endogenous growth theory, which posits that knowledge accumulation and technological innovation are primary determinants of long-term economic growth (Romer, 1990). Complementing this view, Drucker (1993) conceptualizes knowledge as the most critical economic resource in post-industrial societies. In this context, digital

technologies—including artificial intelligence, big data analytics, and cloud computing—serve as enabling infrastructures that enhance the scale, speed, and scope of knowledge production and dissemination (Brynjolfsson & McAfee, 2014; Manyika et al., 2016). These technological advancements are particularly consequential for emerging economies, as they create opportunities for leapfrogging traditional developmental stages and integrating into global knowledge networks.

From an innovation perspective, digital transformation significantly alters the nature and processes of innovation. The literature emphasizes a shift from closed, firm-centric innovation models to more open, networked, and platform-based innovation ecosystems (Yoo et al., 2010; Nambisan et al., 2017). Digital platforms facilitate distributed innovation by enabling real-time collaboration, co-creation, and knowledge exchange among diverse stakeholders. This aligns with Schumpeter's (1934) notion of innovation as a driver of economic dynamism, while extending it to the digital era characterized by accelerated cycles of technological disruption and “creative destruction.”

The role of digital infrastructure is extensively recognized as a foundational pillar of digital transformation. High-quality digital infrastructure—comprising broadband connectivity, cloud computing systems, and digital platforms—enhances information accessibility, reduces transaction costs, and expands market participation (World Bank, 2019; UNCTAD, 2021). Empirical evidence demonstrates a positive correlation between digital infrastructure development and improvements in productivity, innovation capacity, and economic resilience (Qian et al., 2009). However, disparities in infrastructure development across regions continue to create uneven digital transformation outcomes.

Human capital constitutes a critical enabler in this transformation process. The effectiveness of digital technologies is contingent upon the availability of a workforce equipped with advanced digital skills and adaptive capabilities (Becker, 1993; Autor, 2015). The literature underscores the growing importance of continuous learning, reskilling, and upskilling in aligning human capabilities with technological advancements (OECD, 2019). In the absence of adequate human capital development, the potential benefits of digital transformation may remain unrealized.

Institutional theory further provides valuable insights into the role of governance structures and policy environments in shaping digital transformation trajectories. Strong institutions, characterized by regulatory efficiency, transparency, and innovation-oriented policies, are essential for fostering digital ecosystems and facilitating knowledge-based economic development (North, 1990; Acemoglu & Robinson, 2012). In emerging economies, government-led digital initiatives and policy interventions play a pivotal role in bridging infrastructural and institutional gaps (World Economic Forum, 2020).

Notwithstanding these advancements, the literature critically highlights several structural and systemic challenges associated with digital transformation in emerging contexts. The persistence of the digital divide—manifested in unequal access to digital infrastructure, skills, and resources—remains a significant barrier to inclusive development (van Dijk, 2020; Hilbert, 2011). Such disparities not only limit participation in the digital economy but also exacerbate existing socio-economic inequalities. Additionally, constraints related to inadequate infrastructure, limited financial investment, and weak institutional capacity further impede the effective implementation of digital transformation strategies (UNDP, 2021).

Moreover, the sustainability of digital transformation efforts in emerging economies is increasingly questioned in the literature. Dependence on imported technologies, coupled with underdeveloped domestic innovation ecosystems, may restrict long-term technological autonomy and resilience (Lall, 2001; Fu et al., 2011). This raises critical concerns regarding the ability of these economies to transition from technology adoption to innovation leadership.

In synthesis, the extant literature establishes that digital transformation is a necessary but not sufficient condition for the development of knowledge economies. Its effectiveness is mediated by the complex interplay of technological infrastructure, human capital, and institutional frameworks. However, the fragmented nature of existing research and its limited contextual focus on emerging economies underscore the need for a more integrated and theoretically grounded analysis—an area that the present study seeks to address.

Research Gap

The extant literature provides limited theoretical integration in explaining how digital transformation systematically drives the development of knowledge economies, particularly within emerging national contexts. Existing studies are predominantly concentrated in developed economies and tend to examine technological, human capital and institutional dimensions in a fragmented manner. Addressing these limitations, the present study advances a contextually grounded and theoretically integrated framework that explicates the role of digital transformation in shaping knowledge-based economic systems in emerging economies.

Research Methodology

Research Design This investigation employs a qualitative approach based on secondary data analysis, aiming to

synthesize and interpret existing scholarly literature and authoritative reports. This design supports a comprehensive understanding by integrating diverse perspectives and contextual insights from prior research.

Data Sources The data underpinning this study are drawn from peer-reviewed articles indexed in the Scopus database, ensuring academic credibility. Additionally, reports from prominent organizations such as the World Bank, OECD, and UNCTAD are utilized to provide macroeconomic and policy-related information. Industry reports and policy documents are also incorporated to add practical and contextual relevance.

Method of Analysis The analysis involves thematic examination to identify and interpret recurring patterns and themes across the collected literature. A systematic review method is used to compare and contrast findings from various sources, highlighting areas of agreement, debate, and gaps. Furthermore, conceptual synthesis is employed to integrate different theoretical frameworks and empirical findings into a cohesive analytical model.

Justification Choosing a secondary research approach is appropriate for achieving a broad synthesis of existing knowledge and enabling cross-country and cross-sectoral comparisons. This methodology allows for a deeper theoretical understanding and supports the development of comprehensive insights, making it suitable for addressing complex research questions while optimizing resource use.

The Role of Digital Transformation in Advancing Knowledge Economies

Digital transformation functions as a fundamental catalyst in the evolution of knowledge economies by enabling and enhancing several critical processes:

Facilitation of Knowledge Creation and Dissemination

Emerging technologies such as artificial intelligence (AI) and big data analytics significantly expedite the process of knowledge generation by providing advanced tools for data processing and insight extraction. Concurrently, cloud computing platforms facilitate the widespread sharing and dissemination of information across organizational and geographical boundaries, thereby fostering a more interconnected knowledge ecosystem.

Enhancement of Productivity

Automation technologies contribute to operational efficiencies by streamlining routine and repetitive tasks, thereby reducing costs and minimizing errors. Moreover, digital tools and analytics enhance decision-making capabilities through real-time data access and predictive insights, ultimately leading to increased organizational productivity and agility.

Acceleration of Innovation

Digital platforms serve as enablers of open innovation, promoting collaborative development and the exchange of ideas across diverse stakeholders. Additionally, digital technologies empower startups and entrepreneurial ventures to disrupt established markets, fostering a dynamic environment of continuous innovation and technological advancement.

Promotion of Global Integration

Enhanced digital connectivity plays a crucial role in integrating emerging economies into the global marketplace. This interconnectedness facilitates access to international markets, capital, and knowledge flows, thereby supporting sustainable economic growth and the development of knowledge-based industries within a global context.

Key Drivers of Digital Transformation in Emerging Economies

The progression of digital transformation within emerging economies is primarily propelled by a confluence of strategic, infrastructural, and institutional factors:

Digital Infrastructure Development

The establishment and expansion of advanced digital infrastructure, including high-capacity broadband networks, fifth-generation (5G) wireless technology, and scalable cloud computing platforms, serve as the foundational prerequisites for comprehensive digital adoption. These infrastructural elements facilitate reliable connectivity, support digital service delivery, and enable the integration of digital solutions across various sectors.

Human Capital Enhancement

Investments in human capital—particularly in digital literacy and technical competencies—are critical to harnessing the benefits of digital technologies. Continuous professional development and reskilling initiatives are necessary to cultivate a workforce capable of adapting to rapid technological changes and fostering innovation-driven economic activities.

Policy and Regulatory Frameworks

Proactive governmental policies, exemplified by initiatives such as ‘Digital India’ and ‘Smart Nation,’ play a pivotal role in catalyzing digital transformation. The formulation and implementation of comprehensive e-governance systems, along with supportive regulatory and legal frameworks, create an enabling environment for digital innovation, investment, and secure digital interactions.

Innovation Ecosystems and Public-Private Partnerships

The emergence of vibrant innovation ecosystems—comprising startups, incubators, accelerators, and research and

development (R&D) institutions—serves as a catalyst for technological advancement and entrepreneurial growth. Collaboration between public and private sectors amplifies resource mobilization, fosters experimentation, and accelerates the commercialization of digital innovations.

Technological Accessibility and Penetration

Ensuring affordable access to digital devices and internet connectivity is instrumental in bridging the digital divide. The widespread adoption of mobile technology, characterized by high mobile penetration rates, facilitates inclusive access to digital services, thereby promoting socioeconomic development and digital inclusion.

Challenges in Digital Transformation

The advancement of digital transformation in emerging economies is impeded by a multifaceted array of obstacles, which can be broadly categorized into infrastructural, socio-economic, institutional, and technological challenges:

Digital Divide

Significant disparities exist between rural and urban populations, with rural areas often suffering from inadequate digital infrastructure and limited internet connectivity. Additionally, gender disparities and income-based inequalities further restrict equitable access to digital technologies, thereby exacerbating social exclusion and hindering inclusive development.

Infrastructural Limitations

Insufficient connectivity infrastructure in remote and underserved regions remains a critical barrier to digital adoption. The high financial costs associated with establishing and maintaining digital infrastructure, coupled with limited financial resources, impede widespread deployment and scalability of digital solutions.

Skills Gap A persistent shortage of adequately skilled digital professionals constrains effective technology adoption and innovation. Furthermore, a disconnect between the skills provided by existing educational and training systems and the evolving needs of the digital economy results in a workforce ill-equipped to leverage emerging technologies effectively.

Institutional Barriers

Weak regulatory and policy frameworks undermine the development of a conducive environment for digital transformation. Bureaucratic inefficiencies, administrative rigidity, and lack of institutional coordination further delay project implementation and impede the formulation of coherent strategies for digital advancement.

Technological Dependence

Heavy reliance on imported technologies exposes emerging economies to vulnerabilities related to supply chain disruptions, technological obsolescence, and limited control over critical infrastructure. This dependence hampers the development of indigenous innovation capacities and constrains the ability to tailor digital solutions to local contexts.

Impact of Digital Transformation on Innovation and Economic Development

Economic Growth

Digital transformation significantly contributes to national economic expansion by augmenting the contribution of digital sectors to gross domestic product (GDP). The proliferation of digital services fosters increased productivity, enhances market competitiveness, and facilitates the emergence of new business models, thereby driving sustainable economic growth.

Employment Dynamics

The adoption of digital technologies engenders the

creation of novel employment opportunities within emerging digital industries, including information technology, data analytics, and e-commerce sectors. Simultaneously, the integration of automation and artificial intelligence into traditional industries may lead to the displacement of certain roles, underscoring the necessity for targeted workforce reskilling and capacity building initiatives.

Financial Inclusion

The advent of digital financial services, such as mobile banking, electronic payments, and fintech innovations, has markedly improved financial access for previously underserved populations. This increased financial inclusion enhances economic participation, promotes poverty reduction, and stimulates local economic activity, especially in rural and marginalized communities.

Sectoral Transformation

Digital technologies are catalyzing transformative changes across critical sectors. In education, e-learning platforms enable remote and inclusive access to quality education. In healthcare, telemedicine expands access to medical services and facilitates remote diagnostics and treatment. In agriculture, the adoption of smart farming practices—utilizing Internet of Things (IoT) devices, data analytics, and precision agriculture—optimizes productivity and ensures sustainable resource management.

Strategies for Enhancing Digital Ecosystems

Investment in Infrastructure

To cultivate resilient digital ecosystems, it is imperative to expand broadband infrastructure, ensuring high-speed internet access across urban and rural regions. Promoting the adoption of cloud computing solutions further enhances scalability, flexibility, and efficiency of digital services,

fostering an environment conducive to innovation and economic activity.

Skill Development and Capacity Building

Implementing comprehensive digital literacy campaigns is essential to equip populations with fundamental digital skills. Strengthening collaboration between industry and academia can facilitate the development of specialized training programs, aligning workforce competencies with evolving technological demands and fostering a culture of continuous learning.

Policy and Regulatory Frameworks

Establishing robust data protection laws ensures user privacy and builds trust in digital platforms. Crafting innovation-friendly policies, including streamlined regulatory procedures and incentives for startups, creates an enabling environment for technological advancement and entrepreneurial ventures.

Fostering Innovation

Providing targeted funding opportunities for startups, including seed capital and venture grants, stimulates entrepreneurial activity. Supporting research through dedicated grants and partnerships encourages the development of cutting-edge technologies and innovative solutions to societal challenges.

Promoting Inclusive Digital Growth

Bridging the digital divide between rural and urban areas is essential for equitable growth; this can be achieved through targeted infrastructure investments and community outreach programs. Additionally, ensuring affordable access to digital devices and internet services democratizes technology use and empowers marginalized populations.

Discussion

Research indicates that digital transformation is a key

driver in advancing knowledge-driven economies; nonetheless, its effectiveness relies on the development of a holistic ecosystem that includes solid infrastructure, a skilled workforce, and strong governance mechanisms. Emerging economies often face a paradox where they possess significant digital potential but lack the capacity to implement these technologies effectively. This highlights that digital transformation alone cannot deliver long-term benefits unless complemented by institutional robustness, targeted skill development, and a focus on fostering innovation. Without these critical components, the full benefits of digital advancements remain unrealized, hindering the progress toward building resilient and inclusive knowledge economies.

Implications

Theoretical Implications

The study offers a comprehensive and integrative framework that synthesizes multiple theoretical perspectives, thereby enriching the existing body of knowledge on digital transformation and its role in economic development. It bridges a crucial gap between the literature on digital technologies and the evolving discourse on knowledge economies, facilitating a deeper understanding of the complex interactions and dependencies that underpin digital-driven growth. Furthermore, this framework paves the way for future research to explore nuanced dimensions of digital ecosystems, institutional dynamics, and innovation processes within diverse socio-economic contexts.

Practical Implications

From a practical standpoint, the findings serve as a valuable resource for policymakers seeking to formulate effective digital strategies that are aligned with national development goals. It provides actionable insights into the

importance of fostering institutional capacity, enhancing digital literacy, and promoting innovation to maximize the impact of digital initiatives. Additionally, the research supports educational and training institutions in designing targeted skill development programs that address emerging technological demands, thereby ensuring a competent workforce capable of sustaining digital transformation efforts. It also underscores the necessity for cross-sector collaboration to build resilient digital infrastructure and ecosystems.

Policy Implications

Policymakers are urged to develop inclusive digital policies that ensure equitable access and participation across different societal groups, thereby avoiding digital divides and fostering social cohesion. The emphasis should be placed on establishing regulatory frameworks that encourage innovation while safeguarding data privacy and security. Moreover, there is a critical need to focus on long-term strategic planning that enhances innovation capacity, supports research and development, and nurtures local technological entrepreneurship. Policymakers should also prioritize building institutional frameworks that facilitate seamless integration of digital technologies into various sectors, ensuring sustainable economic growth and social development.

Future Scope

Future research can explore the relationship between digital transformation and economic development through empirical studies utilizing primary data. Such studies can provide more concrete evidence of causality and deepen the understanding of underlying mechanisms. Researchers may employ advanced statistical techniques, including regression analysis, structural equation modeling, or other multivariate methods, to analyze the impact of various dimensions of digital

transformation on economic indicators. Additionally, future studies could focus on sector-specific analyses, regional disparities, or the role of policy interventions in enhancing digital adoption and economic growth. Longitudinal studies could also be conducted to examine the long-term effects of digital transformation on economic progress.

Conclusion

Digital transformation has emerged as a pivotal force driving economic development in the contemporary global landscape. Emerging economies are increasingly leveraging digital technologies to enhance productivity, foster innovation, and bolster their competitive positioning on the international stage. The findings of this study underscore that the successful realization of digital transformation hinges on the development of robust digital infrastructure, the cultivation of skilled human capital, the implementation of supportive governmental policies, and the establishment of resilient innovation ecosystems.

Nevertheless, the full potential of digital transformation remains constrained by persistent challenges, including digital disparities, limited access to technological resources, and skill shortages. Addressing these issues requires a concerted effort from governments, industry stakeholders, and educational institutions to foster inclusive digital environments that promote equitable access to technology and knowledge.

By prioritizing investments in digital infrastructure, enhancing technological education and workforce training, and incentivizing innovation-driven initiatives, emerging economies can expedite their transition toward knowledge-based economic systems. Such strategic efforts are vital not only for driving economic growth but also for ensuring sustainable development and resilience within the evolving global digital economy.

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