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Academic Leadership and AI Adoption in Higher Education: A Systematic Review based on Solow's Growth Framework

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Abstract

The field of Higher education is undergoing major transformation due to Artificial Intelligence (AI) which is changing the nature of teaching, learning, research, governance, and institutional management. At the same time, the NEP 2020 states that technology-based learning, digital governance, innovation and the learning of multiple dimensions are important factors in the educational reform in India. Academic leaders are key stakeholders helping to drive these changes, whether through their strategic decision-making, technology use, or through organizational change management efforts. Although there is an increasing body of scholarship focusing on the topic of educational technology and leadership, little research has considered the academic leadership, AI adoption and institutional productivity in a single theoretical framework. This study is a systematic review of literature from 2015 to 2025, using a PRISMA approach, which investigates the connections between academic leadership, AI adoption, and higher education transformation. After a systematic screening and quality assessment process, 52 peer-reviewed studies were included. The results confirm four major themes: digital leadership capability, AI readiness and adoption, NEP-aligned institutional transformation and technology-driven educational productivity. In total, 1,284 records were identified in the databases (Scopus, Web of Science, ERIC, ScienceDirect, and Dimensions), following the PRISMA 2020 framework. One hundred and twenty-eight studies were screened and 52 were eligible for thematic synthesis. Four global themes stood out: digital leadership capability, readiness to embrace AI in education, institutional transformations aligned to NEP and technology-enabled educational productivity. The study builds on Solow's Growth Theory by introducing an AI adoption factor as a means to improve institutional productivity over other factors like human capital or digital infrastructure. The findings advance the academic leadership theory, AI adoption study, and higher education policy by offering the integrated model of academic leadership, AI adoption, implementation of NEP, and institutional performance.

Keywords: Academic Leadership, Artificial Intelligence, Higher Education, NEP 2020, Educational Productivity, Technology Adoption, Solow Growth Theory, Digital Transformation.

Introduction

Across the world, the higher education sector is undergoing unprecedented change due to newly emerging technologies. Institutions are adopting new technologies like Artificial Intelligence (AI), machine learning, predictive analytics, cloud Computing, blockchain, and Generative AI applications to transform the way they teach, research, run their institutions, and interact with stakeholders. Intelligent systems are becoming a vital tool for universities to enhance student learning experiences, administrative processes, faculty productivity, and institutional competitiveness.

AI has become a game-changer in higher education. With the help of AI-powered learning systems, education can be personalized, assessments can adapt to the learner, tutoring is intelligent, learning is automatically graded, academic advising is automated, and the learning system is able to make predictions. The arrival of the

enerative AI platforms, like ChatGPT, Gemini, Claude and Microsoft Copilot, has sparked conversation about educational innovation, academic integrity, curriculum redesign, and readiness for the jobs of the future.

The National Education Policy (NEP) 2020 is one of the most ambitious educational reform policies in India in recent decades. The policy highlights aspects of digital transformation, multi-disciplinary learning, research excellence, institutional autonomy and governance through technology. NEP 2020 aims to transform the education system into a future-ready one that meets the needs of the knowledge-driven economy through various initiatives, including the National Educational Technology Forum (NETF), Academic Bank of Credits, and online learning platforms.

But, technological means are not the only path to transformation. Effective leadership is an important component to the adoption and implementation of emerging technologies. Academic leaders, such as vice-chancellors, directors, principals, deans and heads of department are vital contributors to the culture, goals, innovation capabilities and digital readiness of their organizations. Their vision, support, and management of technological change will contribute to the degree to which institutions can harness the use of AI in education for improvement.

While there has been an increased amount of research around educational leadership, technology adoption, and integration of AI, there is considerable fragmentation. These constructs have been studied separately in the past, yielding a lack of understanding about how leadership affects technology adoption and how technology contributes to institutional productivity. Moreover, there is limited research that has delved into these relationships in the context of NEP 2020.

One useful theoretical tool to view these dynamics is Robert Solow's Growth Theory. Solow said that technology was a main contributor to productivity growth, in addition to the other two factors: labor and capital. When applied to higher education, the implications of AI use are that it could be a productivity-enhancing factor that can improve institutional performance if effectively supported by leadership and infrastructure.

In the end, this research aims to comprehensively draw on the available bodies of knowledge for academic leadership, AI use, and transformation in higher education and create a conceptual model based on Solow's model of technological growth.Hence, the purpose of this study is to systematically map the available bodies of knowledge on academic leadership, AI adoption, and transformation in higher education, and to develop a conceptual framework based on Solow's model of technological growth.

Research Gap

While there is a wealth of literature on educational leadership, technology adoption, and AI applications in higher education, there are four key gaps. Firstly, research on academic leadership does not focus on the unique leadership traits needed for digital transformation within the context of AI. Second, AI adoption research tends to center on faculty and student receptivity to AI, neglecting the part of the institutional leaders. Third, studies on NEP 2020 implementation tend to be descriptive and have an inadequate linkage with leadership and technology adaptation theories. Fourth, there has been only minimal research using economic growth theories to explain the components of educational productivity. To fill these gaps, this review proposes an integrated framework that connects academic leadership, the adoption of AI, the implementation of NEP, and institutional productivity, based on the perspective of technological growth by Solow.

Research Questions

The first research question is: What leadership qualities are needed for successful implementation of AI in HE institutions?

RQ2: What is the impact of the adoption of AI on institutional productivity and educational performance?

RQ3: How is the academic leadership involved in implementing NEP 2020 initiatives?

RQ4: How does Solow's Growth Theory account for technology's impact on the transformation of higher education?

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Literature Review

Creating Academic Leaders in Higher Education.

The leadership of the academic world has undergone a huge transformation in the past two decades. The typical administrative tasks have been extended to encompass innovation management, strategic planning, digital governance and organizational transformation. Academic leaders in the present age are expected to lead institutions in complex technological and social transformation, while keeping them academically superb.

The available research shows that transformational leadership has a positive impact on the technology adoption by promoting Innovation, Collaboration, and Organization Learning. Leaders who are considered digitally competent are more likely to foster experimentation, provide faculty development and establish institutionally engaging technology environments.

Artificial Intelligence in Higher Education

AI is still rapidly emerging in the education sector, especially at the higher education level. Key applications include:

- Intelligent tutoring systems
- Personalized learning environments
- Learning analytics
- Automated assessment systems
- Research analytics
- Student retention prediction
- Academic advising systems

Research consistently shows that the adoption of AI has positive effects, such as better learning outcomes, greater engagement, ease of administration, and greater efficiencies in the institution.

Incorporating Digital Transformation into NEP 2020.Digital Transformation in NEP 2020.

In NEP 2020, technology is identified as a key enabler of education reform. The key technology-related goals are:

- Digital education
- Virtual learning environments
- Online assessment systems
- Research innovation
- Academic flexibility
- Technology-enabled governance

In order to be successful, leadership is essential, infrastructure is needed, faculty staff needs to be ready, and the organization needs to be adaptable.

Adopting new technology and new approaches to academic leadership.

Successful technology implementation is always identified as the need for leadership support. Academic leaders shape the adoption of technology via strategic vision, allocation of resources, communication, policy development, and culture-building. Digital maturity and innovation readiness is seen to be higher in institutions with effective leadership.

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Theoretical Foundation

Growth Theory, by Robert Solow.The Growth Theory by Robert Solow.

Solvew's production function is given by:

$Y = AK^{\alpha}L^{\beta}$

Where:

Y = Output

A = Technology

K = Capital

L = Labor

The theory suggests that technological change plays an important role in productivity growth in addition to the role played by labor and capital.

At higher education, the model can be extended to:

$EP = A(HC)^{\alpha}(DI)^{\beta}(AL)^{\gamma}$

Where:

EP = Educational Productivity

A = Artificial Intelligence Adoption

HC = Human Capital

DI = Digital Infrastructure

AL = Academic Leadership

This paradigm places academic leadership in the space of making technology happen and of increasing institutional productivity.

The case of Higher Education: Extending Solow's Growth Theory.The case of Higher Education: Extending Solow's Growth Theory.

EP=A(HC)α(DI)β(AL)γEP=A(HC)^\alpha(DI)^\beta(AL)^\gammaEP=A(HC)α(DI)β(AL)γ

Where:

EP = Educational Productivity

Evaluation of Artificial Intelligence Adoption (A = Artificial Intelligence Adoption)

HC = Human Capital

DI = Digital Infrastructure

AL = Academic Leadership

AI adoption is the technological progress variable in this adaptation, similar to Solow's productivity factor. Academic leadership improves the utilization of human and digital resources. Institutions that effectively leverage AI with strategic leadership are likely to find increased institutional performance, research output and educational productivity.

Technology Acceptance Model (TAM)

The Technology Acceptance Model indicates that both perceived usefulness and perceived ease of use have an impact on technology adoption. Academic leaders have an impact on both aspects via awareness, training and technology implementation.

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Diffusion of Innovation Theory

Rogers believes that innovation adoption relies on communication, organizational culture and the influence of leadership. Academic leaders emerge as change agents that enable the spread of AI in learning institutions.

Dynamic Capabilities Theory

Dynamic Capabilities: Sensing opportunities, seizing innovations, and reconfigure resources are the three components of dynamic capabilities in an organization. Implementing AI creates greater institutional agility and competitiveness through improving knowledge generation, decision making, and innovation capability.

Table 1 Key Themes and Foundational Literature on Academic Leadership, AI Adoption, and Higher Education Transformation j

Theme	Key Authors	Main Findings
Academic Leadership	Bass & Avolio (1994); Avolio et al. (2001)	Leadership has an impact on the adoption of innovation
Digital Leadership	Antonopoulou et al. (2021)	Digital competencies enhance transformations.Transformation is enhanced by the use of digital competencies.
AI Adoption	Zawacki-Richter et al. (2019)	AI aids in governance and learning.AI improves learning and governance.
Technology Adoption	Davis (1989); Venkatesh et al. (2003)	The reason consumers adopt a technology is because they believe it is useful.
NEP 2020	Ministry of Education (2020)	Technology is a tool for educational change.Technology is a tool for educational change.

Source: Compiled by the authors from Leadership and Performance Beyond Expectations, Improving Organizational Effectiveness Through Transformational Leadership, Digital Leadership literature including Antonopoulou et al. (2021), Artificial Intelligence in Higher Education, Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, and the National Education Policy 2020.

Methodology

Research Design

The method used in this study is Systematic Literature Review (SLR) using PRISMA 2020 guidelines. The goal is to create a synthesis of empirical and conceptual knowledge on academic leadership and the use of AI in higher education and its role in the transformation of higher education.

This study employed a **Systematic Literature Review (SLR)** methodology guided by the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020)** framework. PRISMA provides a transparent and reproducible process for identifying, screening, evaluating, and synthesizing existing literature. The objective was to systematically examine research on academic leadership, artificial intelligence adoption, and higher education transformation, with particular emphasis on technology-enabled institutional productivity under the National Education Policy (NEP) 2020.

The review followed four stages:

1. Identification
2. Screening
3. Eligibility Assessment
4. Inclusion

Search Strategy

A comprehensive search was conducted between **January 2025 and March 2025** using five major academic databases:

- Scopus
- Web of Science
- ERIC
- ScienceDirect
- Dimensions

The search focused on studies published between **2015 and 2025**.

Search Keywords

The search strategy combined keywords relating to leadership, artificial intelligence, technology adoption, and higher education.

Search String

("Academic Leadership" OR "Educational Leadership"

OR "Digital Leadership")

AND

("Artificial Intelligence" OR "AI Adoption"

OR "Generative AI")

AND

("Higher Education" OR "University"

OR "Tertiary Education")

AND

("Technology Adoption"

OR "Digital Transformation")

AND

("NEP 2020"

OR "Educational Reform")

Data Sources

A literature search was carried out using:

Scopus

Web of Science

ERIC

ScienceDirect

Dimensions

Search Strategy

This search phrase was used:

(Academic Leadership OR Educational Leadership)

AND

Artificial Intelligence OR AI Adoption

AND

("Higher Education")

AND

We recorded the terms "Technology Adoption" or "Digital Transformation".We have captured the terms “Technology Adoption” or “Digital Transformation”.

The literature search was carried out from January to March 2025 from the Scopus, Web of Science, ERIC, ScienceDirect, and Dimensions databases. Combinations of the following were used as search strings; academic leadership, artificial intelligence, technology adoption, higher education, digital transformation and NEP 2020.

Table 2 Inclusion and Exclusion Criteria for the Systematic Literature Review

Criteria	**Inclusion**	**Exclusion**
Publication Type	Peer-reviewed journal articles	Conference papers, editorials
Language	English	Non-English
Publication Period	2015–2025	Before 2015
Context	Higher Education	School Education
Topic	AI, Leadership, Technology Adoption	Unrelated Technology Studies
Accessibility	Full-text available	Abstract only

Source: Developed by the authors based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and the objectives of the present study

Table 3 PRISMA Selection Process

Stage	Number of Records
Records Identified	1,284
Duplicate Records Removed	318
Records Screened	966
Records Excluded	752
Full-Text Articles Assessed	214
Full-Text Articles Excluded	162
Final Studies Included	52

Source: This paper was prepared by authors based on systematic literature search and screening process done in accordance to PRISMA guideline (2020). The numbers relate to the selection process followed for the study used in this review.

Quality Assessment

To guarantee methodological rigor the selected studies were assessed applying the Mixed Methods Appraisal Tool (MMAT 2018). The assessment considered:

- Research design appropriateness
- Data collection procedures
- Analytical rigor
- Validity and reliability
- Relevance to review objectives

Table 3 Quality Assessment of Included Studies

Quality Rating	Number of Studies
High Quality	**36**
Medium Quality	**14**
Low Quality	**2**
Total	**52**

Source: Authors' analysis using MMAT criteria.

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Data Analysis

Thematic synthesis was carried out using the following:

- Open Coding
- Axial Coding
- Selective Coding
- Four main themes arose.
- Results and Meta-Synthesis

FINDINGS

Table 3. Meta-Synthesis Results

Theme	Number of Studies	Percentage
Digital Leadership	35	67%
AI Adoption	31	60%
NEP Transformation	24	46%
Educational Productivity	29	56%

Source: Compiled and calculated by the authors from the thematic coding and qualitative meta-synthesis of 52 peer-reviewed studies included in the systematic review, following the PRISMA 2020 framework and predefined inclusion criteria.

The theme of digital leadership was most commonly identified in the reviewed studies (67%). As a result, it is argued that leadership competency is the key enabler for technology uptake and institutional change.

It is of course necessary to compare the present theory with existing theories.

TAM

In alignment with TAM, academic leadership boosts the perceived usefulness and ease of use of AI technologies.

UTAUT

The results validate the UTAUT, showing the need for facilitating conditions and performance expectancy.

DOI

Academic leaders are the catalysts for change and speed the diffusion of innovation in universities.

Solow Theory

The review builds upon Solow's technological progress proposition and provides evidence that the use of AI improves the productivity of education.

Theme 1: Digital Leadership Capability

Frequency: 35 studies (67%)

Academic leaders play a pivotal role in digital transformation with their strategic vision and innovation support, mobilization of resources and organizational culture development.

Key dimensions include:

- Digital literacy
- Strategic vision
- Change management
- Innovation orientation

Theme 2 – AI Adoption Readiness

Frequency: 31 studies (60%)

Some of the factors that affect the readiness of AI are:

- Faculty competence
- Infrastructure availability
- Organizational support
- Data governance
- The higher the readiness level, the more successful the implementation of AI was, as reported by institutions.

Theme 3: Institutional Change to Meet the NEP

Frequency: 24 studies (46%)

AI usage has a number of objectives that align with the NEP:

- Digital education
- Flexible learning pathways
- Research enhancement
- Academic governance
- Leadership commitment was identified as a key factor in the successful implementation of the policies.

Theme 4 explores the technological aspects of educational productivity.

Frequency: 29 studies (56%)

Reported outcomes include:

- Improved student performance
- Enhanced research productivity
- Increased administrative efficiency
- Better decision-making quality

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Table 4 : Meta-Synthesis Matrix

Theme	Number of Studies	Frequency
Digital Leadership	35	67%
AI Readiness	31	60%
NEP Transformation	24	46%
Educational Productivity	29	56%

Source: Derived from the authors' thematic analysis and meta-synthesis of 52 selected studies. Frequencies represent the proportion of reviewed articles addressing each theme within the systematic literature review.

Proposed Conceptual Framework

Academic Leadership
↓
Digital Leadership Capability
↓
Technology Readiness
↓
Artificial Intelligence Adoption
↓
NEP 2020 Implementation
↓
Institutional Innovation
↓
Educational Productivity
↓
Institutional Performance

Moderators:

- Organizational Culture
- Digital Infrastructure

Mediators:

- Technology Readiness
- AI Adoption

Discussion

The results highlight the role of academic leadership in driving institutional change by means of technology. As predicted by Diffusion of Innovation Theory, leaders make a difference in determining the rate of innovation adoption through setting up supportive environments, mitigating uncertainty, and promoting experimentation.

The results also corroborate the Technology Acceptance Model. The perceptions of their usefulness and ease of use can be generated by academic leaders, which then affects their intentions to adopt AI tools among faculty and staff members.

Most significantly, the findings can be extended to a Growth Theory for the Higher Education Sector, by Robert Solow. Solow contended that technological advancements are a major contributor to productivity growth. Likewise, the review shows that investments in AI can be very productive in education, in addition to investments in technology and staff.

The connection between AI use and institutional productivity seems especially evident in administrative automation, research assistance, student interaction, and tailoring learning experiences for individuals. The results highlight that AI is a strategic tool and not just a technological solution.The review also emphasises on the importance of NEP 2020 as an enabling policy framework. Institutions with high leadership and digital readiness showed higher correlation with the aim of the NEP and the better outcome of the implementation.

Theoretical Contributions

This study makes a unique contribution to the literature in four aspects.

- First, it brings together disparate bodies of literature on academic leadership, the use of AI and the transformation of education.
- Second, it brings the notion of technological factors from Solow's Growth Theory into the realm of higher education, viewing the use of AI as a productivity-enhancing technological factor.
- Third, it creates a thorough framework that connects leadership with technology use, policy and institutionalization, and institutional performance.
- Fourth, it offers a systematic review of the latest research on the transformation of higher education enabled by AI.

Policy Implications

Academic Leadership

↓

Digital Leadership Capability

↓

Technology Readiness

↓

AI Adoption

↓

NEP 2020 Implementation

↓

Institutional Innovation

↓

Educational Productivity

↓

Institutional Performance

Moderators:

- Organizational Culture
- Digital Infrastructure

Policy makers should:

- Develop National AI leadership competency frameworks.
- Enhance the capacity of digital infrastructure in universities.
- Provide assistance to academic administrators for AI literacy initiatives.
- Support technology driven governance systems.
- Ensure that the institutional AI strategy aligns with the NEP goals.

Managerial Implications

- University leaders should:
- Implement AI governance structures.
- Support faculty's digital competency.
- Encourage decision making based on data.
- Create institutional AI plans.
- Promote an innovation-oriented organizational culture.

Table 5 Future Research Agenda

Theme	**Gap**	**Future Research**
Academic Leadership	Limited longitudinal studies	Panel data research
AI Adoption	Faculty-centric focus	Leadership-focused studies
NEP Implementation	Limited empirical validation	Multi-institutional studies
Educational Productivity	Measurement challenges	SEM and PLS-SEM models
AI Governance	Emerging field	Comparative international studies

Source: Proposed by the authors.

Conclusion

The world of Higher Education is undergoing a dramatic transformation with the advent of Artificial Intelligence that is changing the way it works in education, in government and administration, and in research. This systematic review confirms that academic leadership is a key determinant in supporting the adoption of AI and promoting the transformation of institutions through the use of AI.

The results showed that the leadership ability has an impact on technology readiness, organizational culture, and the adoption of innovations that will further impact on the productivity of the institutions and educational performance. AI adoption is seen as a technological progress variable that can drive productivity gains in addition to conventional investments in infrastructure and human capital through an examination of the Growth Theory, as formulated by Robert Solow.The Growth Theory as developed by Robert Solow is used to examine AI adoption as a technological progress variable that can provide productivity gains in addition to infrastructure and human capital investments.

The study also emphasizes the need for implementing NEP 2020 to provide an enabling environment for digital transformation and educational innovations. Educational transformation will be more sustainable in universities which have developed a strong combination of leadership, technological readiness, and policy alignment.

The suggested framework serves as a stepping stone for future empirical research and as a tool for policy-makers, institutional leaders, and researchers to further develop AI-enabled higher education systems.

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