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Research Article

Transforming Education with Industry 6.0: A Human-Centric Approach

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Abstract:

This study investigates how Industry 6.0 technologies, including Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), and the Internet of Things (IoT), can transform the Indian education system in alignment with the National Education Policy (NEP) 2020. It focuses on addressing systemic challenges such as inequity, accessibility, and outdated teaching methodologies through technological integration. A bibliometric analysis was conducted on 28 peer-reviewed articles sourced from the Scopus database (2000-2024). Co-authorship networks, keyword co-occurrence mapping, and publication trend analysis were used to identify leading contributors, emerging trends, and research gaps. The analysis specifically examines India's contributions to Industry 6.0 and its collaborative networks, particularly with the United States. The findings show that India leads in Industry 6.0 research, leveraging global partnerships to advance applications in education. Key technologies like AR and VR are found to enable immersive, interactive learning environments, while AI and IoT drive personalized and data-driven educational models. However, significant gaps remain, including limited empirical validation of outcomes, challenges in scaling technology to underserved regions, and persistent digital inequities. This study uniquely aligns Industry 6.0's capabilities with NEP 2020 goals, offering a roadmap for integrating advanced technologies into education to improve inclusivity, engagement, and learning outcomes. It provides actionable insights for educators, policymakers, and researchers to bridge identified gaps, positioning India as a global leader in educational innovation through Industry 6.0.

1. Introduction

The world is moving into Industry 6.0, a new era that blends cutting-edge technology with ideas that focus on people. This era has huge potential for revolutionary progress in many fields. Especially educational institutions are ready for such types of change. Using new technologies from Industry 6.0, India can improve its education system in line with the National Education Policy, 2020 (NEP). The Ministry of Human Resource Development says that this would make education easier, more effective, and more successful for all students [1].

Industry 6.0 builds on prior industrial revolutions, emphasising the collaboration between humans and cutting-edge technologies such as artificial intelligence (AI), the Internet of Things (IoT), and robotics [2]. This human-focused approach encourages sustainable growth, engagement, and personalized learning experiences, addressing the unique challenges of the Indian education system [3]. Reliance Jio's Chief Data Scientist, Dr. Shailesh Kumar, highlighted that over the next two decades, AI will facilitate the development of a customised educational system that is fundamentally distinct from the current model [4]. Industry 6.0 is centred on AI and ML, which provide customised learning experiences by analysing student work and study patterns. This allows for the provision of individualised educational materials, suggestions for useful resources, and immediate comments on those materials. Personalisation is an efficient way to fulfil various learning demands, which in turn improves engagement and academic achievement [5]. Industry 6.0 is advancing by incorporating advanced tools such as Augmented Reality (AR) and Virtual Reality (VR) to improve operational efficiency and innovation. AR overlays digital information onto the real world, enhancing real-time maintenance and training by presenting interactive data and visual aids directly in the user's field of vision. VR generates immersive digital environments for

simulation and training, enabling users to practice intricate procedures and visualize prototypes without physical limitations [6]. These technologies collectively drive Industry 6.0 forward by making industrial processes more interactive, efficient, and responsive, thus setting new standards in manufacturing and operational excellence.

The integration of Augmented Reality (AR) and Virtual Reality (VR) in Industry 6.0 is causing significant transformations across various sectors, leading to increased innovation and efficiency. Field operations are improved by AR, which offers real-time overlays of crucial information, aiding in tasks like equipment maintenance and repair. On the other hand, VR provides immersive environments for simulation-based training and design, enabling risk-free experimentation and accelerated development cycles [7]. These technologies are not only optimizing operational workflows but also fostering new levels of creativity and problem-solving across industries, making Industry 6.0 a catalyst for advanced industrial transformation.

Gaining insight into Industry 6.0 trends requires careful database selection and the use of rigorous analytical methodologies. Use of the Scopus database, with its extensive peer-reviewed articles and powerful data processing capabilities, guarantees the credibility of study. A comprehensive review of the relevant literature was carried out by concentrating on articles from 2000 to 2024 and using appropriate keywords. This approach focuses on promoting the advancement of Industry 6.0 by identifying the leading countries, academic publications, authors, and collaboration strategies in this field. Industry 6.0 technologies provide the capability to significantly enhance the abilities of educators, who serve as the fundamental support of the education system.

Educators serve as essential to the institution system, and the use of Industry 6.0 technologies may greatly boost their capacities. Automation decreases the number of administrative tasks, allowing instructors to focus more on teaching and interacting with students. AI-powered professional development systems provide customized training to ensure instructors stay up-to-date with the most current pedagogical techniques and topic knowledge [8]. The integration of IoT and smart technology revolutionizes conventional classrooms into vibrant and engaging learning spaces. Interactive whiteboards and virtual reality/augmented reality technologies make learning more interesting and approachable, which might increase student engagement and performance in the classroom [9].

The emphasis on inclusion in Industry 6.0 has the potential to address educational gaps in India. AI and ML technologies provide comprehensive resources to support students with impairments, guaranteeing that they get a top-notch education. Online learning programmes provide educational chances to pupils residing in distant and underprivileged regions. Data analytics, a fundamental element of Industry 6.0, has the potential to completely transform educational administration. Through the examination of data on student performance, attendance, and engagement, educators and administrators may make well-informed choices to improve teaching techniques, allocate resources efficiently, and boost institutional performance [10].

A student-centric education system cultivates innovation and creativity. Industry 6.0 technologies facilitate project-based learning, allowing students to address real-world issues by using advanced instruments. This interactive method fosters the development of analytical reasoning and the ability to solve complex problems, equipping students with the necessary abilities to succeed in future employment markets. India can revolutionise its education system by adopting the ideas and technology of Industry 6.0. This would help align the system with the goal of NEP 2020 and ensure that every student reaches their maximum potential [11].

2. Material and Methods

The process of sample selection has been divided into three separate phases. The initial phase is choosing a database from which to extract bibliometric data. Because of its extensive records and reputation for trustworthiness, the Scopus database was used for this investigation. In the second phase, suitable keywords are used to ascertain relevant material. The last phase rigorously examines each item to verify its relevance, removing publications that do not clearly address Industry 6.0. The created analytical framework encompasses well-defined goals and methodologies, which are concisely presented in table 1.

Research Resources at Scopus:

Having a reliable database is essential for gathering data that is both valid as well as accurate. To fulfil the objectives of the research, data were taken from the Scopus database. The Scopus database was selected for data gathering because of its comprehensive coverage of peer-reviewed research in the finance industry, its frequent update cycle, and its capabilities for processing information and problem solving.

Criteria for the Evaluation of Appropriate Studies:

This research examines the time frame from 2000 to 2024 to analyse the comprehensive trend in

Table 1. *Research Objectives and Methodologies for Industry 6.0 Studies.*

Type	Research Objective	Research Methodology
Bibliometric Analysis	To have an understanding of the development and progress of Industry 6.0.	Publication trend analysis
	To determine the most influential nations, significant publications, and notable writers concerning Industry 6.0.	Citation analysis
	To evaluate the structure and design of international cooperation between countries.	Analysis of nations' co-authorship
	To identify the conceptual structure of keywords.	Co-occurrence analysis
	To understand countries' literature coupling structures.	Bibliographic coupling of countries
Systematic Analysis	To analyse the critical analysis through the literature	Systematic review

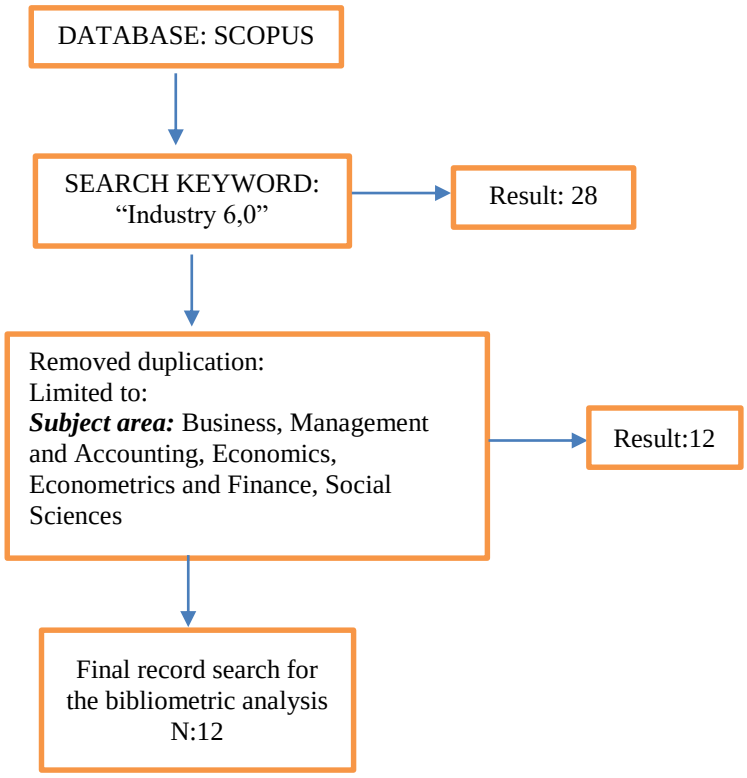

Figure 1. *Bibliometric Analysis Process on Industry 6.0*

Industrial 6.0. The term "Industry 6.0" was used to conduct a search for publications that were pertinent. Figure 1 illustrates the procedure of collecting relevant works on industry 6.0 for bibliometric analysis procedure. The dataset used in this research was obtained from the database maintained by Scopus on July 6, 2024. It is comprised of a total of 28 articles. Based on the exclusion criteria that were applied, a total of 16 items were removed. Hence, the set of documents used for bibliometric analysis included 12 publications. The use of bibliographic approaches included the utilization of R programming and Excel applications. The system mapping was generated using the R computer language, and further screening and tabulated were carried out in Spreadsheet.

Analysis of Bibliographies

A bibliometric analysis used a significant corpus of scholarly articles to identify the prevailing trends regarding research on Industry 6.0. The following part emphases on the results of bibliometric analytical methods.

Descriptive Analysis

The most recent trend in this field of research was identified via the use of descriptive analysis, which offers a systematic understanding of the trends of

outcomes for articles and citations related to industry 6.0. This assessment was conducted based on renowned writers, significant publications, and leading nations.

3. Results and Discussions

Annual Publication

A clear trend of growth and improvement has been seen in the annual scientific output of research publications related to Industry 6.0. From 2019 to 2024, there has been a consistent increase in the number of articles published on this topic. Figure 2 illustrates the increasing trend, highlighting the development of interest in Industry 6.0. From 2019 to 2021, there was a somewhat slow rate of publishing. Starting in 2022, there was a significant rise in the number of published articles, indicating a large increase in research efforts and interest for Industry 6.0. The rise continued and reached its maximum point in 2024, with the highest number of articles throughout this period. One possible reason for the increased rate of publication after 2022 might be the growing recognition of the transformative potential of Industry 6.0 technologies in many sectors such as manufacturing, healthcare, and education. As emerging technologies, such as artificial intelligence (AI), the Internet of Things (IoT), and robots, have progressed and shown substantial effects, the academic and research communities may have prioritized investigating their applications and consequences [12]. These technologies will enhance intelligent infrastructures. Augmented intelligence (AuI) emerged from the convergence of artificial intelligence (AI) and human intelligence (HI) prior to the advent of Industry 5.0 [13]. Moreover, the COVID-19 pandemic in 2020 emphasized the need for strong and adaptable systems, leading to increased investigation into the role of Industry 6.0 in establishing sturdy and flexible industrial structures. The recent global disruption has emphasized the significance of using modern technology to address future crises, which is expected to contribute to an increase in relevant publications [14]. In general, the yearly scientific output of Industry 6.0 papers demonstrates the increasing significance and pertinence of this topic in the academic and research spheres. The consistent increase in publications indicates a continuing and growing interest that is expected to endure in the future.

Leading Countries with Citation

Between 2000 and 2022, India has been in the forefront of Industry 6.0 research, publishing a total of 94 articles. China follows with 16 publications, while Sweden has contributed 11, and other countries have also made contributions. Figure 3 showcases the prominent nations and their corresponding citation numbers. China became the second-largest contributor with 16 scientific articles, while Sweden had 11 publications. Canada had a total of 6 publications, South Africa had a total of 4 publications, and Ireland had a total of 2 publications.

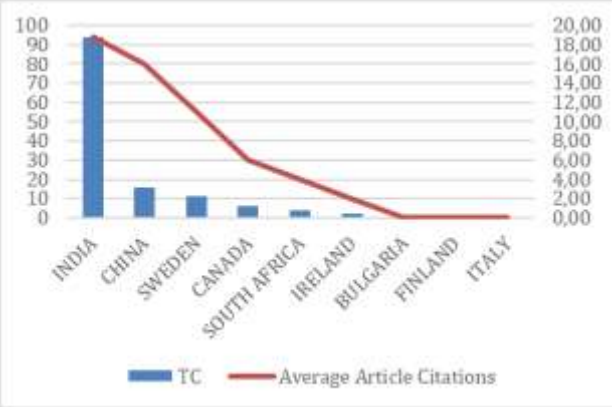

Figure 2. *Annual Scientific Production of Industry 6.0 Research (2000 2024)*

Source: Authors analyse data retrieved from Scopus to decode the information.

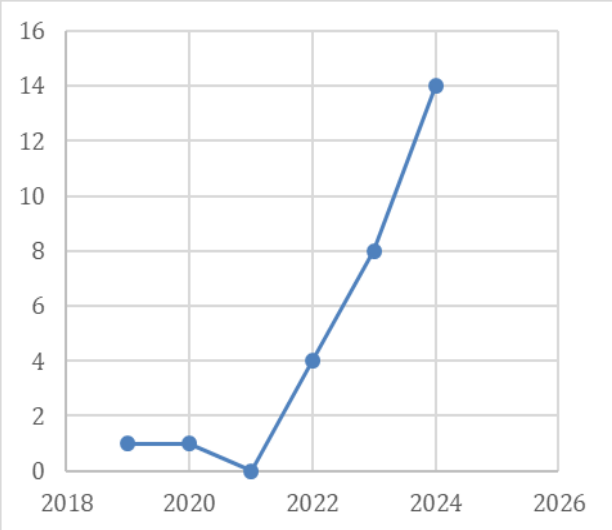

Figure 3. *Leading Countries in Industry 6.0 Research and Their Citation Counts*

Source: Authors analyse data retrieved from Scopus to decode the information.

Influential Authors

Table 2 presents the names of the top 10 distinguished scholars who have written research publications on industry 6.0. This may suggest the persons who have made the most noteworthy contributions to the research on Industry 6.0. Movahed Ab secured the top position with a cumulative count of 6 publications, while Nozari H obtained the second spot with 4 research articles [15].

Table 2. *Contributions of Leading Authors in Industry 6.0 Research*

S.No	Author	Publications
1	MOVAHED AB	6
2	NOZARI H [15]	4
3	CHOURASIA S [2]	2
4	HEILALA J	2
5	PANDEY SM	2
6	SINGH R	2
7	ABBAS MS	1
8	AL-AMRI JF	1
9	ALIAHMADI MH	1
10	ALMSSAD A	1

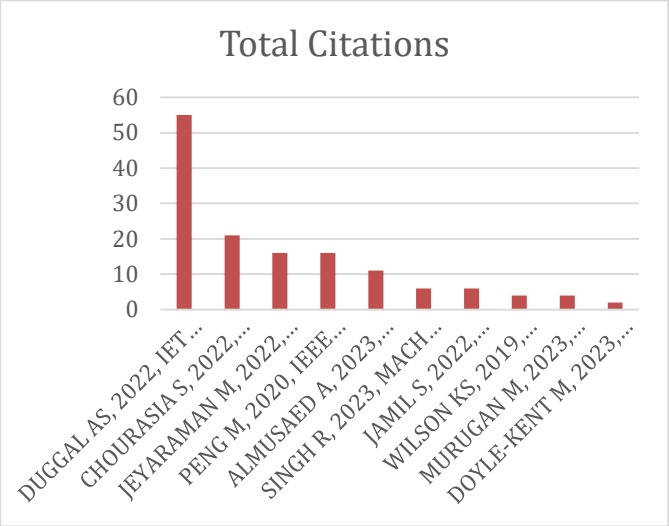

Figure 4. *Top 10 Journals Publishing Industry 6.0 Research (2013–2024)*
Source: Authors analyse data retrieved from Scopus to decode the information.

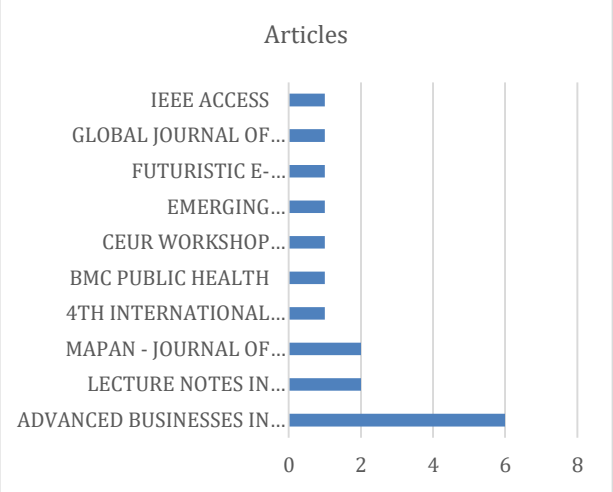

Figure 5. *Source Impact of Top Research Journals in Industry 6.0*
Source: Authors analyse data retrieved from Scopus to decode the information.

Impactful journal

Academic journals facilitate the dissemination of innovative and enlightening ideas and perspectives by academics and researchers. Researchers may identify the most influential journals in a certain field of study in order to choose the most relevant and exceptional publications to showcase their findings. Figure 4 displays the top 10 publications that have published research papers on Industry 6.0 between 2013 and 2024. Between 2023 and 2024, research papers were published in the 28 most prestigious journals. The Journal of IGI Global had the most influence, with 9 papers in this specific field of study. The Journal Institute of Electrical and Electronics Engineers Inc publishes research articles in all key fields of industrial 6.0. The Springer Journal has a total of 4 publications, as shown in figure 5, which includes 11 individual papers.

Research Journals with the Source Impact

Figure 6 displays the visual representation of the Bradford Law categorization of journals which emphasis the top research journals with the highest source impact, as determined by the h-index, g-index, m-index, number of citations, number of articles, and year of publication.

Bradford Law

A total of 28 research articles focusing on industry 6.0 were published during the years 2000 and 2024. The table 3 below presents the top 28 distinguished research journals classified according to the Bradford Law categorization, which separates research articles into two zones. Zone 1 journals only publish papers related to industrial 6.0. This area is often known as a nuclear zone because of its significant scientific impact. Out of the total of 28 research journals, 10 belong to Zone 1 and 7 belong to Zone 2.

Three - Field Plot

A three-field plot (Sankey diagram) was created for the 15 most studied journals. It shows the percentage of study participants from each nation and the current status of the publications that were referenced. The cited references were organized by journal, keyword, and country. Figure 7, Sankey diagram showing the relationship between journals, keywords, and countries in Industry 6.0 research. Topics such as industry 6.0, industry 5.0, addictive manufacturing, industry 4.0, artificial intelligence, and architecture, engineering, and construction are

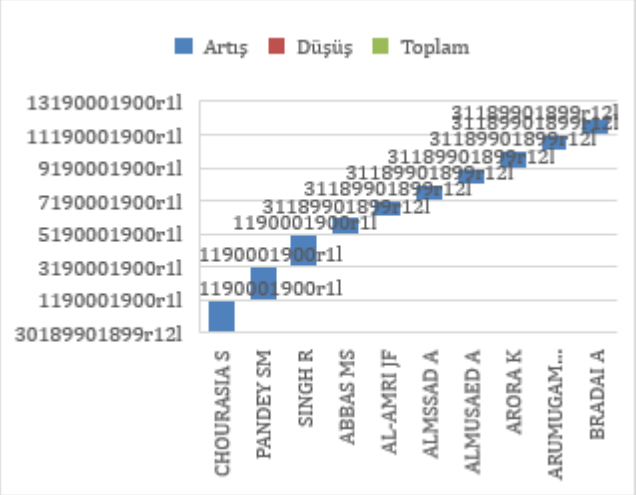

Figure 6. *Bradford Law Distribution of Industry 6.0 Journals*

Source: Authors analyse data retrieved from Scopus to decode the information.

Table 3. *Bradford Law Categorization of Industry 6.0 Journals*

Source	Rank	Freq	CumFreq	Zone
ADVANCED BUSINESSES IN INDUSTRY 6.0	1	6	6	Zone 1
LECTURE NOTES IN NETWORKS AND SYSTEMS	2	2	8	Zone 1
MAPAN - JOURNAL OF METROLOGY SOCIETY OF INDIA	3	2	10	Zone 1
4TH INTERNATIONAL CONFERENCE ON COMMUNICATION, COMPUTING AND INDUSTRY 6.0, C216 2023	4	1	11	Zone 2
BMC PUBLIC HEALTH	5	1	12	Zone 2
CEUR WORKSHOP PROCEEDINGS	6	1	13	Zone 2
EMERGING TECHNOLOGIES AND SECURITY IN CLOUD COMPUTING	7	1	14	Zone 2
FUTURISTIC E-GOVERNANCE SECURITY WITH DEEP LEARNING APPLICATIONS	8	1	15	Zone 2
GLOBAL JOURNAL OF FLEXIBLE SYSTEMS MANAGEMENT	9	1	16	Zone 2
IEEE ACCESS	10	1	17	Zone 2

the main emphasis of this publication. Bulgaria, India, and Italy are among the top countries contributing to this magazine and its keywords. It is worth noting that industrialized nations are home to most industry 6.0 research. Research on industry 6.0 should be expanded in developing nations.

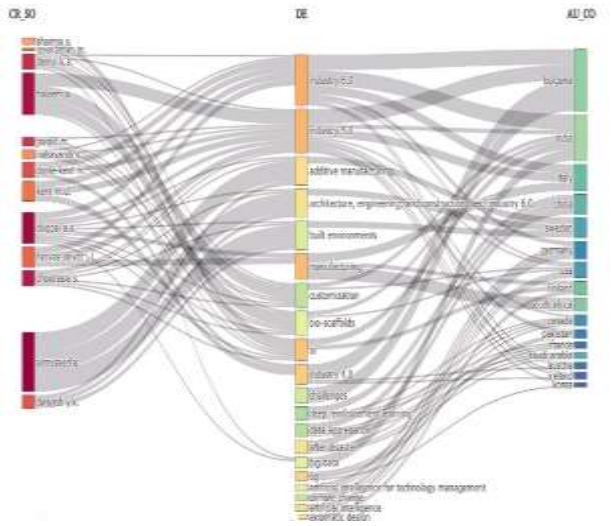

Figure 7. *Three-Field Plot Analysis of Industry 6.0 Research*

Source: Authors analyse data retrieved from Scopus to decode the information.

Co-occurrence of Network

The most common keywords in a group of articles' titles, abstracts, or keywords are shown in the co-occurrence of words network map. These networks are useful for showing the interconnections and overlaps across seemingly unrelated fields of study. Figure 8 displays the network map displaying the most frequently occurring keywords in Industry 6.0 research. According to figure 8, the most regularly used keywords are "Industry 6.0," "Industry 5.0," and "Industry 4.0".

World Collaboration Map

A global analysis of collaborative research through coauthorship was conducted to enhance our comprehension of countries' contributions to industry 6.0 studies. The analysis of coauthorship by nation assessed the extent of collaboration between different countries, providing academics with a more profound comprehension of the contributions and collaborative efforts of various nations in the respective field. Figure 9 map illustrating the extent of international collaboration in Industry 6.0 research, highlighting leading nations. According to the global collaboration map, the United States of America has the top position in terms ofinternational collaboration, namely in coauthorship with India. Furthermore, no other nation collaborated and contributed on the interconnected topic except from the United States and India.

Systematic review

A thorough analysis of frequently cited and associated papers on Industry 6.0 in the industry

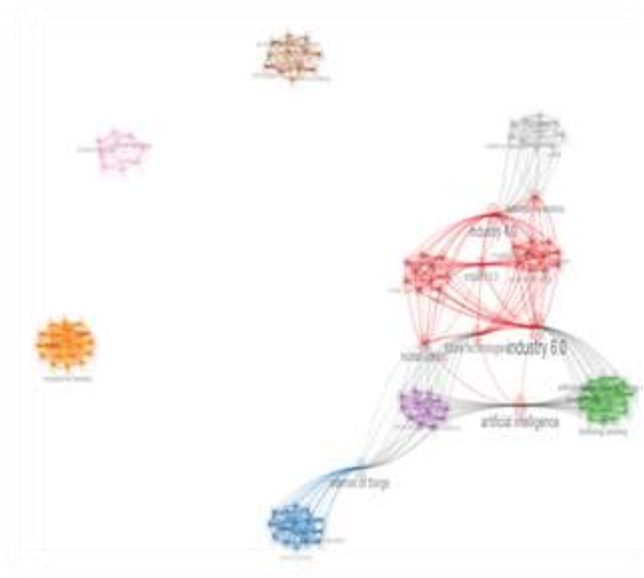

Figure 8. *Co-Occurrence Network of Frequently Used Keywords in Industry 6.0*
Source: Authors analyse data retrieved from Scopus to decode the information.

Figure 9. *Global Collaboration Map in Industry 6.0 Research*
Source: Authors analyse data retrieved from Scopus to decode the information.

sector was carried out in this section. This could help researchers fill a gap in the literature and make a substantial contribution by providing them with a wide overview of current trends in this field of study (table 4).

Critical Analysis

A systematic review of Industry 6.0 research reveals its transformative potential across various sectors, underlining advanced technologies' role in driving innovation and addressing global challenges. This section synthesizes key contributions from diverse studies, offering critical insights into their implications and limitations. Andrés Fernández-Miguel et al. [16] present a systemic sustainability index tailored for the ceramic industry, emphasizing resilience and flexibility. While the study provides actionable insights, its narrow industrial scope limits generalizability. Supporting this, Dijkman et al. [24] highlight the need for sustainability indices applicable across diverse industries to achieve holistic environmental objectives. Mohammad Hadi Aliahmadi et al. [15] explore the Hospital 6.0 framework, emphasizing trust, specialization, and interactive engagement to improve well-being.
However, the study does not adequately address barriers to adoption, such as cost implications and user acceptance. Melnyk et al. [25] corroborate this, identifying training and economic challenges as significant obstacles to adopting advanced healthcare technologies. Aminmasoud Bakhshi Movahed et al. [17] examine Marketing 6.0, focusing on enhancing consumer experiences through advanced technologies. Despite its forward-looking approach, concerns over data privacy and the digital divide remain largely unaddressed, as noted by Batra & Keller [26]. Similarly, Vetrivel et al. [20] emphasize customer-centric strategies but identify data management complexities as significant adoption hurdles. Davenport et al. [27] reinforces this view, highlighting the operational challenges in big data integration. Oskounejad and Nozari [18] propose a comprehensive framework for transitioning to Industry 6.0, emphasizing sustainability and value-driven approaches. However, their study would benefit from real-world case studies to validate the framework's applicability. McLean and Borén [28] stress the importance of such case studies in overcoming practical implementation barriers. Ali Bakhshi Movahed et al. [17] focus on enhancing financial systems' security to counter emerging cyber threats. While timely, their analysis lacks consideration of economic constraints faced by smaller institutions. Kshetri [29] highlights the prohibitive costs of implementing cybersecurity measures, underscoring the need for scalable solutions. Manjit and Rajinder [21] investigate AI's role in transforming influencer marketing. Their study underscores the benefits of cost-effective and personalized strategies but overlooks ethical and regulatory challenges. Osasona et al. [30] emphasize the ethical implications of AI in decision-making processes, particularly in marketing and advertising. Digvijay et al. [22] highlights AI and machine learning's contributions to optimizing supply chains, calling for more case studies to illustrate successful implementations. Chae [31] supports this perspective, advocating for empirical research to

Table 4. *Systematic Review*

Authors	Title	Journal	Key Research Outline	Major Findings
[16]	"Exploring Systemic Sustainability in Manufacturing: Geoanthropology's Strategic Lens Shaping Industry 6.0"	Global Journal of Flexible Systems Management	Introduces a systemic sustainability index informed by geoanthropological perspectives, tailored for the ceramic industry.	Provides actionable insights for managers in industrial districts, highlighting strategies to enhance flexibility and resilience.
[15]	"Hospital 6.0 Components and Dimensions"	Advanced Businesses in Industry 6.0	Examines the vision for future health systems, emphasizing the importance of trust, specialization, and interactive engagement.	Shows that advancements in healthcare environments can significantly improve both physical and mental well-being in society.
[17]	"Marketing 6.0 Conceptualization"	Advanced Businesses in Industry 6.0	Explores the evolution of marketing practices within Industry 6.0, focusing on the integration of modern technologies.	Highlights how Marketing 6.0 enhances consumer experience, facilitating easier and more efficient transactions.
[18]	"Advanced Businesses in Industry 6.0"	Advanced Businesses in Industry 6.0	Discusses the shift to Industry 6.0, with an emphasis on sustainability, resilience, and value-driven business models.	Provides a framework for understanding the opportunities and challenges of transitioning to an ultra-smart industrial environment.
[19]	"Security Criteria in Financial Systems in Industry 6.0"	Advanced Businesses in Industry 6.0	Analyzes the impact of technological advancements on financial systems, with a focus on enhancing security measures.	Emphasizes the need for updating financial systems to address emerging cyber threats and ensure the security of financial transactions.
[20]	"Customer-Centric Excellence in the Marketing 6.0 Era: Industry 6.0"	Advanced Businesses in Industry 6.0	Investigates the shift towards a customer-centric approach in Marketing 6.0, driven by advancements in technology and data analytics.	Demonstrates how companies can leverage technology to meet the evolving preferences and expectations of modern consumers.
[21]	"AI and Influencer Marketing: Redefining the Future of Social Media Marketing in Industry 6.0"	Advanced Businesses in Industry 6.0	Explores the role of AI in transforming influencer marketing, focusing on personalized and cost-effective strategies.	Highlights how AI-driven influencers are reshaping social media marketing, offering businesses new ways to engage with their audience.
[22]	"Utilization of AI Technology in Supply Chain Management"	Utilization of AI Technology in Supply Chain Management	Examines the application of AI and machine learning in optimizing supply chain processes and addressing complex logistical challenges.	Provides insights into how AI and ML can bridge the gap between human expertise and technology, improving overall supply chain efficiency.

[23]	"Toward Industry 6.0 and Society 6.0: The Quintuple Innovation Helix with Embedded AI Modalities as Enabler of Public Interest Technologies Strategic Technology Management and Road-Mapping"	IEEE Transactions on Engineering Management	Focuses on the integration of AI within the emerging paradigms of Industry 6.0 and Society 6.0, with case studies on key technologies.	Discusses the critical role of AI in driving the transition to Industry 6.0, highlighting its pervasive impact on various sectors.

uncover practical challenges and benefits. Carayannis et al. [23] explore AI's integration into Industry 6.0 and Society 6.0, presenting case studies that illustrate its widespread impact. However, their study could be strengthened by addressing regional and sectoral disparities in digital transformation, as highlighted by Vial [32].

These sectoral findings resonate strongly with the NEP 2020 vision, which emphasizes leveraging cutting-edge technologies to foster inclusive, personalized, and equitable learning experiences. AR/VR, a dominant theme in Industry 6.0 research, directly supports NEP 2020's goals by:

1. Creating immersive learning environments that enhance student engagement.
2. Bridging resource gaps through virtual simulations and interactive content.
3. Supporting personalized education tailored to individual learning needs.

These technologies have transformative potential for addressing traditional education challenges, positioning Industry 6.0 as a critical enabler of systemic reform.

Discussion

This study employs bibliometric analysis to examine the research trends, applicability, and future research prospects in Industry 6.0. An analysis of 28 publications from 2000 to 2024 highlights a clear upward trend in scientific output, reflecting the growing interest in this transformative phenomenon. A significant observation is the role of India, which leads the research landscape with 94 papers and the highest number of citations during the study period. This dominance is further complemented by notable contributions from countries like the United States and Italy, underscoring the global interest in Industry 6.0's potential. The results demonstrate a gradual shift in research focus, with keywords like "Industry 6.0," "Industry 5.0," and "Industry 4.0" frequently appearing, reflecting the progression of industrial revolutions. The three-field plot analysis also reveals India, Bulgaria, and Italy as primary contributors, with collaborations between India and the United States showcasing a robust partnership in advancing Industry 6.0 research. This collaboration is crucial for developing scalable models and best practices applicable across diverse socio-economic contexts. Technologically, this study emphasizes the transformative power of AI, AR, and VR in the educational sector, aligning closely with NEP 2020 objectives. These tools are shown to foster personalized and immersive learning environments, addressing systemic gaps in accessibility and quality. From the study of Marirajan Murugan and Prabadevi [33], robotics have been shown to drive autonomy and efficiency in MSMEs under Industry 6.0. Similarly, AI and AR/VR technologies enable adaptive and immersive learning environments in education. These parallels emphasize that autonomous systems and human-centric innovations, such as Emotional Intelligence (EI), are critical to achieving systemic transformations across diverse sectors. For example, AR/VR technologies can simulate real-world scenarios, offering students hands-on experience without physical constraints, thereby enhancing engagement and comprehension. Key publications are concentrated in prominent journals such as IGI Global and IEEE Access, which have published pivotal research in Industry 6.0. According to the Bradford Law analysis, 10 journals fall into Zone 1, highlighting their substantial impact in shaping the discourse around Industry 6.0. The inclusion of these sources lends credibility and depth to the study's findings. Despite these advancements, critical gaps remain. The study identifies a lack of empirical data on the real-world implementation of Industry 6.0 technologies in education. While theoretical models and conceptual frameworks abound, practical evaluations of their impact on student outcomes, teacher effectiveness, and institutional performance are scarce. Additionally, challenges related to cost, infrastructure, and digital inequity pose significant barriers, particularly for institutions in resource-constrained environments. These factors highlight the need for targeted interventions and pilot studies to bridge the gap between research and application. Another concern is the ethical dimension of deploying advanced technologies. Data privacy, especially in AI-driven personalized learning systems, and the digital divide require careful consideration to ensure inclusivity and equitable access. Without addressing these challenges, the transformative potential of Industry

6.0 may remain confined to privileged groups, exacerbating existing educational inequalities. Future research must focus on addressing these challenges by expanding the scope of bibliometric studies to include multiple databases, conducting longitudinal studies, and exploring localized applications of Industry 6.0 technologies. Policymakers and educators should prioritize collaborations with technology providers to develop affordable and scalable solutions, such as AR/VR kits for rural schools or AI-driven teacher training platforms. The post-training phase of Ravindra Kumar Kushwaha and Chandan Kumar Singh [14], professional development model highlights the importance of sustained support through virtual coaching and feedback mechanisms. Similarly, implementing Industry 6.0 technologies in education necessitates continuous engagement with teachers to ensure successful integration and long-term impact. Finally, the findings affirm Industry 6.0's capacity to revolutionize education by fostering personalized, inclusive, and innovative learning environments. The upward trend in research output and India's leadership in the field present a unique opportunity to develop frameworks that align technological advancements with NEP 2020 goals. By addressing identified gaps and challenges, Industry 6.0 can serve as a catalyst for systemic educational reform, equipping students and educators to thrive in the global knowledge economy.

Final considerations

Industry 6.0 marks a pivotal shift in technological innovation, with profound implications for multiple sectors, including education. This study offers a detailed exploration of its trends and impacts, focusing on its transformative potential within the Indian education framework under NEP 2020. By analyzing bibliometric data, this research highlights global advancements, India's leadership, and the critical role of AI, AR, VR, and IoT in fostering inclusive, personalized, and immersive learning environments. Despite these advancements, this study identifies significant gaps, including the limited exploration of Industry 6.0's application in education and the lack of empirical assessments to validate its impact. Additionally, while advanced economies dominate the research landscape, emerging economies like India provide unique opportunities to contextualize these technologies in diverse socio-economic settings. Addressing these gaps is essential to ensure that Industry 6.0's benefits are equitably distributed and effectively leveraged. Moving forward, future research should prioritize longitudinal studies to assess the long-term impact of Industry 6.0 on human behavior, educational outcomes, and institutional performance. Investigating the role of alternative technologies and inclusive strategies in bridging the digital divide is also imperative. Moreover, integrating findings from multiple databases can provide a more holistic understanding of this field. Ultimately, the integration of Industry 6.0 innovations presents an opportunity to redefine education, ensuring it aligns with global technological advancements while addressing local challenges. This study underscores the importance of continuing research and collaboration to harness the full potential of Industry 6.0 in driving systemic transformation.

4. Conclusions

Industry 6.0 emerges not merely as an industrial transformation but as a profound redefinition of how technology intersects with humanity, education, and societal progress. This study captures the essence of Industry 6.0's potential, especially in education, highlighting its capacity to dismantle traditional barriers and establish a human-centric paradigm. By leveraging advanced technologies such as Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), and the Internet of Things (IoT), Industry 6.0 presents unparalleled opportunities to create immersive, adaptive, and inclusive learning environments tailored to individual needs. India's leadership in Industry 6.0 research, underpinned by global collaborations, positions the nation as a pioneer capable of transforming its education system into a beacon of innovation. However, the study also uncovers critical gaps—such as the lack of empirical validation and the challenges of digital inequity—that must be addressed to maximize the benefits of Industry 6.0. These gaps underscore the need for localized research, scalable technology solutions, and policy frameworks that bridge the divide between innovation and accessibility. More than a technological evolution, Industry 6.0 signifies a shift toward equitable progress, where data-driven personalization and immersive technologies can address systemic educational inequalities. AR and VR, for example, are not mere tools but catalysts for creating experiential learning that fosters deeper comprehension, creativity, and collaboration. As education becomes increasingly adaptive, it also becomes a conduit for societal transformation, empowering learners to thrive in the global knowledge economy. This study reaffirms that Industry 6.0 is not an endpoint but a dynamic journey of continuous innovation and integration. Its future lies in transcending geographical, socio-economic, and disciplinary boundaries to deliver universal benefits. For India, this means aligning NEP 2020 goals with cutting-edge advancements to craft a resilient, future-ready education system. By

doing so, the nation can ensure that technology becomes an enabler, not an inhibitor, of inclusive progress. Ultimately, Industry 6.0 offers a transformative vision: an education ecosystem that marries human potential with technological prowess, fostering a generation equipped to lead in a rapidly evolving world. This study calls for a collective effort to refine, implement, and scale these innovations, ensuring that Industry 6.0 realizes its promise of creating not just smarter systems, but smarter societies.

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- **Ethical approval:** The conducted research is not related to either human or animal use.
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