



Industry 5.0 and the Vision of Viksit Bharat: Towards Ethical, Inclusive and Sustainable Industrial Growth

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Abstract: Industry 5.0 develops a key transformation in the discourse of the contemporary industry; this is very evident that sustainability is now at prime in the technological development. This swing is particularly significant in the Indian framework, as it aligns with the government's visualization of building a Viksit Bharat by 2047, which includes inclusive and sustainable development drove by technological development. This study goals at discussing the socio-economic and human-centric development of India in the era of speedy digital advancement and the role of Industry 5.0 in complementary the two. This study exploits qualitative secondary data analysis of the reports and policy documents relating to Industry 5.0 and digital advancement from NITI Aayog, Ministry of Electronics and Information Technology, UNESCO, World Bank, and IMF added academic literature. This study makes the case that technology alone is not enough to safeguard equitable development and will require inclusive governance, digital user-friendliness, institutional coordination, and skill-based human development contexts. The analysis highpoints the major encounters such as digital inequality, gender inequality, unequal digital infrastructure and uneven policy implementation. Meanwhile, opportunities of innovation-based development, sustainable eco-systems, and human centric machine collaboration exist in Industry 5.0. The study carries to a conclusion that the shift towards latest Industry in India's weights a set of unified policy frameworks, ethical governance, digital inclusion, and conducive investments in education and skill development. The study recommends that there needs to be a human-centric and solution-oriented method, which can be able to synchronize the technological revolution with the mission and vision of a Viksit Bharat.

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Introduction

The history of industrial growth has seen a series of changes which have transformed economies, societies and production methods. From the First Industrial Revolution which saw mechanical integration of labour, through to Second which introduced mass production, and the Third which brought in automation each of these stages brought in new tech options as well as changed the role of man in the production process. In Fourth Industrial Revolution, it observed that, the addition of digital tech into the mix which includes AI, robotics, and the Internet of Things (Schwab, 2016). Although it brings great promise the 4th Industrial Revolution also has wide spread criticism which is directed at its heavy focus on efficiency and automation which in turn leaves social equity by the wayside, environmental sustainability, and human agency.

As a result of these issues, the industry 5.0 model has put forth as a more complete and human centered approach. In contrast to what we saw before, in which technology was presented as a neutral element, Industry 5.0 is put forth to improve the well-being, creativity and resilience of human beings (European Commission, 2021). Also, it puts forward human computer collaboration, eco-friendly production, and ethical use of information technology. That is a shift which also includes a rethinking of development models which It is observed that as we deal with issues of the future of work, climate change and inequality which are preeminent global issues. In the case of India this transition takes on a special relevance as it is observed that the country progress toward Viksit Bharat which is to place India developed nation by 2047. This mission and vision are comprehensive and inclusive about the economic growth, but social inclusion too, technological advancement and sustainability. The fast pace of development of digital infrastructure, in terms of higher internet penetration and the creation of more digital services, demonstrates the Indian interest in using technology to drive development. Nevertheless, the present situation also indicates ongoing issues. India is witnessing a significant digital advancement with many digital initiatives in last few years such as Skill India, and Digital India and Make in India, etc. The advantages of digital change are not distributed evenly, with big differences between cities and towns, as well as across gender and socio-economic groups. Women, especially in rural areas, still have to overcome restrictions in the use of digital advancements in the sphere of Science related activities (UNESCO, 2022). Also, the growing popularity of automation is causing issues of job displacement and the necessity of reskilling in an increasingly dynamic labor market. These issues highlight the need to take a moderated stance, and amalgamate technological progress and social justice.

Research Methodology

This study is theoretical, analytical, and interdisciplinary in nature and is mainly based on qualitative secondary data analysis. The research observes the affiliation in Industry 5.0, technological advancement, the progression in Viksit Bharat through a policy-oriented and informational framework. This study widely depends on the secondary data including books, government reports, policy documents, peer-reviewed journal articles, and institutional publications associated with the industry 4.0, digital governance, sustainability, industry 5.0, and inclusive advancement. Major governmental and institutional sources contain reports and frameworks from NITI Aayog, MeitY, Ministry of Skill Development, mission Digital India, Make in India Initiative, and Skill India Programme, along with international reports published by UNESCO, the World Bank, IMF, UNDP, and the European Commission. This study consists the thematic analysis of the literature review, descriptive, and interpretative analysis for the critical human centric development and the thematic analysis of four themes i) Industry and the human centric transformation, ii) Sustainability, Resilience and Governance, iii) Gender Inclusion and Skill Development iv) Industry 5.0 and Inclusive Development. Existing literature, policy documents and the institutional reports were analysed through the thematic analysis framework additionally to examine the industry 4.0 and 5.0 comparative analysis and conceptual framework were used for its implication for inclusive growth and advancement. So that this methodology provides a very inclusive and comprehensive consideration of prevailing industry 4.0 and about the Industry 5.0 in the broader socio-economic, technological advancement and the policy driven process for the sustainable, equitable, inclusive model of advancement and development.

Review of Literature

- **Human-Centric Transformation of Industry 4.0 and Industry 5.0**

This pattern of industry 5 shows the shift to human-centric and sustainable approach from the earlier automation Centred Industrial System. The existing literatures and the studies show that industry 4.0 stresses on the AI, Advance manufacturing Internet of Things, and Robotics etc. Kagermann et al., 2013. India adapted technological advancement and smart manufacturing techniques. (Iyer, 2018). Additionally, scholar such as (Brynjolfsson & McAfee, 2014) highlight and criticized industry4.0 for the manual displacement, labour dislocation and social inequalities. However, the scholar Kumar, Verma, and Mirza (2024) focus on the Ai and Digitalization are rebuilding the digital societies and economies.

- **Sustainable, Resilience, and Ethical Governance**

Scholars such as Pasi, Mahajan and Rane (2021) focus on the resilience and sustainability are the central dimension of the industry 5.0 and suggest that industry 4.0 should be environmentally friendly and aligned for the industrial practices. According to the Sustainable Development Goals (UNDP, 2020) industry 5.0 is suitable for the sustainable production system. Another study suggest that this is much

robust industrial system and the adaptive manufacturing (Leng et al. (2022). Contemporary scholarship identifies sustainability- resilience as core dimensions of Industry 5.0. Pasi Mahajan and Rane (2021) argue that earlier Industry advancement in Indian development must align with environmental sustainability and responsible industrial practices. Studies suggest that Industry 5.0 supports sustainable production systems consistent with the Sustainable Development Goals (UNDP, 2020). However, the theoretical perspective of the Amartya Sen called Capability Approach emphasized on the technical progress for the social opportunities and human wellbeing. (Sen,1999)

- **Gender Inclusion and Skill Development**

According to the Wajcman (2010) highlights that inclusion and social justice is directly associated with the digital advancement, transformation and power structure. However, Sharma and Sharma (2021) focus on that there is much gender disparity in the developing countries through the digital transformation. The studies suggest there would be required increasingly critical thinking, creativity and technical skills for the developing nations such as India.

- **Industry 5.0 and Inclusive Development**

Japan introduced the Society 5.0 concept on the industry 5.0 by technology driven activities, inclusive development and the social well-being. Gupta and Singh (2023) highlight that India need stronger policy implementation, policy coordination, human capital development and digital inclusion for the transition towards industry 5.0. Therefore, the existing scholarly articles and literature highlights that effective execution of industry 5.0 totally rely on the policy capabilities on catering digital inequalities, governance gap, and institutional encounters within the broader outline of Viksit Bharat.

Statement of the Problem

This approach of industry 5 is basically identifies more sustainable and human- centric style for the industrial advancement and its growth. India as a nation is very diverse so the challenges are too diverse. Spreading the existing risk in access, opportunities and the skills are the hurdles for the digital technologies. Gender inequality, uneven policy frameworks and the digital divide make this more difficult in a balanced way. If these issues are not handled or talked about then the vision of the transformation end up in the beginning. That's why it's crucial to look thoroughly at how Industry 5.0 can be formed to fit India's growth goals safeguarding that progress is inclusive, reasonable, and sustainable in line with the vision and mission of Viksit Bharat.

Central Question

- ***What can be the suitable style to Industry 5.0 and accommodate to the mission of Viksit Bharat?***

An in which It is observed that the path to Industry 5.0 in India is through a human centered, inclusive and strategic policy framework. To that which is put forth by Viksit Bharat the digital transformation must add to what it is to be human, reduce gaps between the have and have nots, and promote sustainability which goes beyond the issue of technical efficiency. This requires the government to put in place coordinated policies which straddle the fields of education, industry and digital governance also It is observed that a role for investment in skills and digital access. We also must see in this the embedding of ethical and sustainable practices which will in turn see innovation which is at the same time fair and which produces results over the long term.

Objective of Study

- ***How can Industry 5.0 be beneficial for a comprehensive and progressive economy?***

Industry 5 can permit an inclusive and advanced economy by endorsing human-machine association generating new forms of skilled engagement and expanding access to digital amenities. By enlightening connectivity and digital contribution, it can decrease regional and social inequalities, particularly in underserved parts. Its stress on flexible and technology-enabled work also opens paths for gender insertion.

- ***What challenges and chances offered by industry 5 in the vision of Viksit Bharat?***

Industry 5 bargains occasions for innovation, productivity and sustainable industrial development, solidification India's global competitiveness. Though, challenges such as the digital gap, skill gaps, gender inequalities, and disjointed policies loom its inclusive potential. Without targeted interferences and institutional direction, these blockades may develop prevailing inequalities.

- **What is the significance of a human-centric approach in digital transformations?**

This technique improves innovation while talking risks such as algorithmic prejudice and elimination. In India, it is key for safeguarding that technological systems endure accessible and interested to varied social realities, thereby positioning digital transformation with inclusive growth.

- **How can an Apt Policy integration be factored in for an inclusive meeting with industry 5.0**

Growing digital access, talking social inequalities, and hardening ethical procedures are important for inclusive conclusions.

Research Gap

The available literature on Industry 4 and Industry 5 mainly highlights advanced technological innovation, automation, smart manufacturing, though soberly limited attention has been given to explore Industry 5.0 within the larger framework of inclusive growth and progress and Viksit Bharat in India. Furthermore, in developing economies, the interdisciplinary research critically associates digital revolution with issues of ethical governance, social equity, sustainability, and institutional capacity. This study attempts to address this gap by exploring Industry 5.0 with a human-centric, policy-oriented, and inclusive developmental.

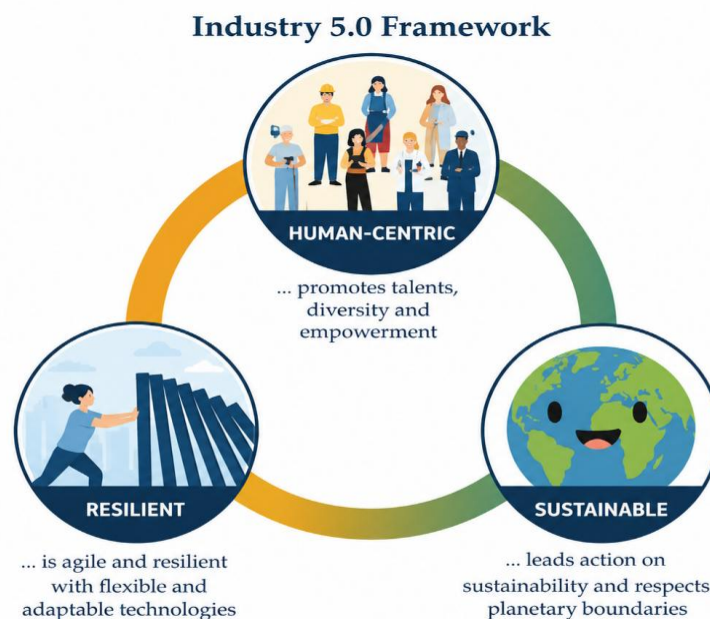


Figure 1. Industry 5.0 Framework: Core Principles and Characteristics.
 Source: Adapted from European Commission (2021); Breque et al. (2021).

Figure 1: Core Principles of Industry 5: Human-Centric, Resilient, and Sustainable European Commission (2021)

Analysis and Discussion

The key outcomes of this study shows that the positive placement of Industry 5.0 with the mission and vision of Viksit Bharat needs far more than the implementation of modern technologies alone. Relatively, the shift demands a human-centric, inclusive, and institutionally coordinated developmental background capable of sustainability, corresponding technological advancement with social equity and equality, and long-term resistance. It is observed through the contemporary policy discussions that technological advancement alone not proficient enough function efficiently in separation with social institutional realities. In the rapid expansion of digital technologies, artificial intelligence, digital infrastructure, digital governance and the fintech, it is projected by the NITI Aayog report and the MeitY, the digital expansion of India's Economy is expected to grow up to twenty percent of the country's overall GDP by 2026.

The Analysis shows that over the 850 million internet users of India, they are reshaping the digital expansion, however, there are still significant inequalities continue to shapes the participation and access across the socio- economic groups. Real execution of the India's industry 5 human capital is key aspect. The evolution from automation-driven industrial structures toward human-machine association involves future workforces equipped not only with technical capabilities but also with critical thinking, interdisciplinary skills, creativity and adaptability. A report by the World Bank shows that there would be required a reskilling of India's workforce by 2030 by rapid emergence in digital technologies, AI and automation in every sector especially in the industry sector. However, according to a report by IMF, it is observed that the countries those who are investing in the rapid digital literacy, skill advancements, automation and better eco system are in good position to reduce the technological unemployment and make better shift in productive advancement. Although one of the key initiatives such as Skills India is upskilling and training million of youths and reducing the digital and technological education across the gender, socio-economic background and region.

Table 1: Key Indicators Related to Digital Transformation and Industry 5.0 in India

| Indicator | Recent Data | Source |
|--|------------------------|--------------------|
| Internet Users in India | 850+ million | MeitY / TRAI |
| Rural Internet Penetration | Approx. 37% | NITI Aayog |
| Women in STEM Workforce | Around 27% | UNESCO |
| Digital Economy Share in GDP | Expected 20% by 2026 | MeitY / World Bank |
| India's AI Market Growth | Expected CAGR over 20% | NITI Aayog |
| Workforce Requiring Reskilling by 2030 | Nearly 50% | World Bank / IMF |
| Smartphone Users in India | Over 750 million | TRAI |
| India's Global Innovation Rank (2023) | 40th Position | WIPO |

The above tabulated data shows that there is significant progress has been made by India through its digital access and participation but its distribution is uneven. According to the recent NITI Ayog report urban region have more internet penetration and uses in comparison with rural regions that is creating a significant hurdle for the technological inclusion and digital participation. These disparities show even more visible among rural women and marginalized societies where digital access, educational infrastructure, and technological revelation persist partial. Subsequently, digital inequality rises not simply as a high-tech issue but the broader developmental and socio-economic task. Without affordable and reasonable internet access, inclusive educational systems, and gender-sensitive digital policies, the reimbursements of Industry 5.0 risk enduring concentrated amid socially advantaged groups. Resilience and Sustainability are central proportions of Industry 5.0. The recent global pandemic COVID-19 uncovered major vulnerabilities in global supply chains and industrial eco-systems, solidification the necessity for adaptive, decentralized, and indigenous resilient manufacturing structures. The future economic stability and the climate responsive growth will be the key in achieving the sustainable industrial system and green technologies according to the UNDP and the IMF reports. The significant investment in the digital manufacturing, renewable energy and in the smart industrial eco-system under the banner of Digital India and Make in India programs by the India, however, there would be the requirement of a balanced and sustainable approach to achieve a long-term sustainability in rapid industrial growth with resource efficient production, ethical technologies, and environmental responsibilities. Additionally, there should be a proper coordination between ethical governance and digital transformation processes. There should be proper law, and legal regulations to conquer the data privacy, algorithm biases, accountability as big data, automation and artificial intelligence have become more prominent for the policy perspectives. National strategy for the AI by NITI Aayog policy digital framework for the policy for the MeitY stressed the vital of accountable human centric ethical governance. Irregular coordination among industrial, educational, digital, and environmental policies often produces execution breaks and patchy developmental results. The study consequently stress that stronger incorporation among initiatives and future AI governance eco-system is crucial for building a comprehensible Industry 5.0 environment. Several nations such as European nations and Japan have implemented more integrated and comprehensive approaches to Industry 5.0 by highlighting human-centered innovation, sustainability and synchronized policy governance. Societal well-being and resilience are the paramount in the EU's industry 5.0 eco-system along with the industrial development and productivity. However, there are several challenges are still prevalent in India, such as digital literacy, infrastructural inequalities and regional disparities. Yet, India does have world youngest population

along with rapid digital infrastructure and possess very significant technological advancement and demographic eco system. The challenge consequently lies not in technological competence alone but in safeguarding that technological advancement remains socially responsive, inclusive and ethical.

The study also demonstrates that implementation of the industry 5.0's success alone is not depended on the state led interventions but multi stakeholders' collaboration such as industries, organisations, government institutions, civil societies, local communities and academia remains vital for crafting the inclusive technological framework and ecosystem. In enhancing skill development, promoting digital literacy, innovation, interdisciplinary research and future oriented growth educational institutes play a very important role. PPP model (Public private partnership model) is also the key component for safeguarding digital infrastructure, industrial innovation, accessibility in enlightening proficiency. Eventually, the study accomplishes that Industry 5.0 is not understood simply another chapter of technology but broader socio-economic progress demanding inclusive governance, ethical technological systems, human-centered institutional frameworks and sustainability-oriented policies. Through coordinated execution and unbiased access, Industry 5 has significantly contribution toward attaining the broader growing vision of Viksit Bharat by building a technologically progressive, inclusive and resilient economy equipped for the future.

Conclusion

Summary

This study investigates the industry 5.0 offers a substantial opportunity to bring into the line of technological advancement with the broader progressive mission and vision of Viksit Bharat over a human-centric, inclusive, and sustainability-oriented approach. The discussion stress that technological development alone cannot safeguard reasonable development and advancement unless reinforced by digital accessibility, continuous skill development, ethical governance, and strong institutional coordination. Additionally, the analysis highlights the significance of integrating sustainability, resilience, and social inclusion within industrial and digital advancement policies, and therefore argues that Industry 5 should be understood not only a industrial evolution but broader socio-economic revolution meant at balancing innovation with inclusive and sustainable development.

Future Scope

Inclusive digital governance, ethical artificial intelligence, future oriented skills development program and sustainable ecosystem will strengthen coming scope of the industry 5 in India. For the sustainable growth there are greater policy integration required along with technological governance framework and emerging technologies for the sustainable growth. Initiatives such as green technologies, gender inclusive digital transformation, human centric machine collab within under developed economies sand smart cities program may Furter explore the industry 5.0 vision. Strengthening interdisciplinary and policy-driven research on Industry 5.0 will therefore remain crucial for building an equitable, technologically advanced, and socially responsive model of Viksit Bharat

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