

THE TRANSFORMATIVE LANDSCAPE OF ARTIFICIAL INTELLIGENCE AND THE IMPERATIVES OF GOVERNANCE: A FORESIGHT APPROACH TO EMERGING OPPORTUNITIES AND THREATS

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ABSTRACT

This study adopts a foresight approach to examine the transformations brought about by Artificial Intelligence (AI) and their social, cultural, and institutional implications in Iran. The primary aim is to address three key questions: the opportunities AI presents for enhancing quality of life and social development; the threats and harms arising from the unregulated expansion of this technology; and the strategic outlook and governance scenarios for AI in Iran. The research methodology is qualitative, descriptive-analytical, and based on content analysis of 33 reputable domestic and international articles. Findings indicate that AI can play a significant role in sustainable national development by creating opportunities across sectors such as education, healthcare, industry, culture, security, media, ethics, and identity. Conversely, thematic analysis reveals that unregulated AI development may lead to consequences including job displacement due to automation, deepening digital divides, power concentration within large corporations, weakening of national sovereignty in cyberspace, and disruption of decision-making systems. At the cultural and identity level, threats such as the erosion of human relationships, promotion of non-indigenous values, loss of identity among younger generations, weakening of the Persian language, and reduction of human ethics to algorithmic logic have been identified, making responsible AI development an urgent necessity. Based on analysis of global trends and patterns, five strategic scenarios are proposed: responsible development, technology localization, strengthening university-industry-government collaboration, digital literacy enhancement, and participatory governance. Ultimately, the study emphasizes the need for developing indigenous and ethics-centered policies, improving digital literacy, and establishing participatory, multi-level governance structures to ensure AI becomes an effective, human-centric, and forward-looking tool aligned with Iran's cultural and social objectives.

KEYWORDS

Artificial Intelligence, Foresight, Participatory Governance, Policy-making, Sustainable Development, Digital Justice, Opportunities and Threats

1 INTRODUCTION

In recent decades, emerging technologies – particularly AI – have brought about fundamental transformations across social, economic, cultural, and political structures. As one of the main drivers of the "Fourth Industrial Revolution," AI is redefining the relationship between humans and machines. Its capabilities in processing large-scale data, autonomous learning, rapid decision-making, and natural language processing have positioned it as a strategic tool in domains such as healthcare, education, industry, security, and culture [Russell 2020, Topol 2019].

However, the rapid expansion of AI has raised growing concerns about its social, ethical, cultural, and identity-related implications. Researchers have warned of deepening social divides, algorithmic discrimination, unequal access to technology, and emerging threats such as deepfakes and cyber abuse [Bostrom 2014, Noble 2018]. Additionally, automated decision-making algorithms may distance humans from independent judgment and choice, increasing cognitive dependence on intelligent systems [Eubanks 2018].

While countries such as China, India, and members of the European Union are developing national strategies for responsible and localized AI development, Iran's position within the global AI landscape remains emergent. Key barriers – such as weak technical infrastructure, lack of culturally grounded ethical frameworks, fragmented policy-making, and disconnects among academia, industry, and government – pose significant challenges to the effective and sustainable deployment of AI technologies. Therefore, there is an urgent need for systematic research that analyzes AI's multifaceted dimensions, identifies emerging risks, and proposes forward-looking policy pathways. This study, with a focus on Iran and an analytical-foresight perspective, aims to provide a multidimensional outlook on the social, cultural, and identity-related impacts of AI. It seeks to address the following three key research questions:

- 1) What are the major opportunities that AI presents for improving quality of life and advancing social development in countries like Iran?
- 2) What are the most significant threats, risks, and social harms associated with the unregulated development of AI?
- 3) What strategic outlooks and scenarios can be envisioned to guide AI governance in Iran in a future-oriented manner?

2 RESEARCH BACKGROUND AND THEORETICAL FOUNDATIONS

AI is a multifaceted concept that has, over recent decades, transcended technical boundaries to become an interdisciplinary topic encompassing philosophy, ethics, social sciences, policymaking, and cultural studies. While the roots of AI can be traced back to seminal works in the field [Turing 1950, Simon 1981], recent years have witnessed a qualitative leap in both the depth and scope of its social and economic impacts.

At the international level, numerous studies have analyzed the implications of AI. For instance, Bostrom [Bostrom 2014] has explored the existential risks posed by "superintelligence", while Floridi et al. [Floridi 2018] have proposed an ethics-based framework for AI development. Jobin et al. [Jobin 2019] have identified significant gaps in global ethical and legal standardization. From a security standpoint, Brundage et al. [Brundage 2018] have highlighted the threats associated with the malicious use of AI technologies.

In the social domain, Eubanks [Eubanks 2018] has demonstrated how algorithms may reproduce structural poverty and discrimination, and Noble [Nobl 2018] has

addressed racial biases embedded in search engines. Furthermore, scholars such as Topol [Topol 2019] and Tegmark [Tegmark 2017] have examined the long-term implications of AI on human biological structures and identity. The experience of technology localization in China, as documented by Zeng et al. [Zeng 2019], has also been presented as a successful model of AI adaptation.

In Iran, there has been a growing body of research addressing the challenges of localizing, applying, and governing AI technologies. For instance, Firuzpour et al. [Firuzpour 2025] explored the ethical considerations of AI deployment in Iranian healthcare, emphasizing the need for culturally aware frameworks. Similarly, Alemi et al. [Alemi 2020] analyzed the role of indigenous algorithms tailored to Iran's socio-technical context, highlighting their importance in enhancing trust and effectiveness. Research by Hamedani et al. [Hamedani 2023] evaluated AI's potential in medical diagnostics within Iranian clinical settings, underscoring both opportunities and risks. In recent years, AI has attracted growing attention for its role in disaster management. Rahmatizadeh and Kohzadi [Rahmatizadeh 2024], in a review focused on Iran, found that AI methods like neural networks and random forests significantly aid in prediction, detection, and emergency response. Their analysis of recent literature highlights how AI enhances risk assessment and strengthens preparedness, particularly in hazard-prone regions.

Other studies have concentrated on governance and policy issues. One key area of AI application in Iran is librarianship. Asefeh Asemi and Adeleh Asemi [Asemi 2018] categorized AI techniques in library systems using Exploratory Factor Analysis. Their findings show that expert systems are widely used to simulate librarian behavior, while recommender systems have progressed most, and natural language processing is still emerging. The study by Sihag et al. [Sihag 2019] explores the application of AI techniques for modelling infiltration processes in semi-arid regions of Iran. Specifically, the researchers applied Adaptive Neuro-Fuzzy Inference System, Support Vector Machine, and Random Forest models to predict cumulative infiltration and infiltration rate based on soil characteristics such as sand, clay, silt, soil density, and moisture content. Cultural and identity dimensions have also been addressed, as in the work of Atwood [Atwood 2025], who examined the societal impact of AI on Iranian digital identity and cultural values. AI techniques have shown significant potential in optimizing resource management in cropping systems. In a case study focused on orange orchards in northern Iran, Nabavi-Pelesaraei et al. [Nabavi-Pelesaraei 2016] used Artificial Neural Networks and a Multi-Objective Genetic Algorithm to model and reduce both energy consumption and greenhouse gas emissions. Additionally, Mohammadi et al. [Mohammadi 2023] assessed AI readiness in Iranian industries, highlighting infrastructural and educational barriers to effective AI integration.

From the perspective of technological governance, key international documents – such as those by the Organisation for Economic Co-operation and Development [OECD 2021] and the European Commission [European Commission 2020] – have proposed frameworks for participatory governance of AI. Additionally, the World Economic Forum [WEF 2020] has addressed the emerging opportunities and challenges in the labor market brought about by AI integration.

Despite these research advancements, significant gaps remain in the literature, including:

- A lack of comprehensive analysis regarding the identity-related, cultural, and cognitive impacts of AI in non-Western societies;

- Insufficient attention to indigenous research on cognitive addiction and the erosion of public trust in reality;
- The absence of localized indicators for responsible AI development in Islamic countries.

Accordingly, the present study aims to provide an interdisciplinary analysis of the opportunities, challenges, and future outlooks of AI, with a specific focus on cultural, ethical, and identity-related dimensions. This article seeks to contribute to the development of an ethics-oriented and culturally localized approach for national AI policymaking.

3 RESEARCH METHODOLOGY

This study employs a qualitative, analytical-descriptive methodology with a foresight-oriented approach, aimed at examining the dimensions and consequences of AI development in the foreseeable future. The research is primarily based on a comprehensive and systematic analysis of the scientific literature and documentary sources, focusing on reputable academic publications, strategic reports, policy documents, and both national and international research papers.

A total of 33 sources were selected for this study. These sources were meticulously reviewed and analyzed to provide a multidimensional understanding of the opportunities, threats, and governance requirements associated with AI in the context of Iran.

Three complementary methodological tools were utilized for data analysis:

1) Trend Analysis:

Global trends in AI development across economic, cultural, political, educational, and media domains were examined. Identifying key trends – such as widespread automation, the proliferation of deepfake technologies, and the advancement of smart cities – has contributed to uncovering potential future opportunities and risks.

2) Strategic Foresight:

Based on the analysis of key stakeholders – including government, industry, academia, and civil society – alternative scenarios and desirable pathways for the responsible development of AI were formulated. This foresight process relied solely on the systematic study and interpretation of existing literature, without incorporating field data or expert interviews.

3) Thematic Analysis:

Key themes related to social justice, human identity, the collapse of reality, and cognitive addiction were extracted from the literature and analyzed through a networked perspective. Thematic analysis was conducted manually, without the use of specific software tools, and was based on the identification of recurring and significant concepts within the selected texts.

This methodological framework is designed to ensure analytical rigor while enabling the formulation of credible and actionable policy recommendations for AI governance. The integration of these three complementary approaches offers a multilayered and realistic perspective on the future transformations driven by AI.

4 FINDINGS AND CONTENT ANALYSIS

This section employs a thematic analysis approach to closely examine selected texts and sources that address the social impacts of AI at both national and global levels. The analysis is based on 33 reputable scholarly sources, selected according to criteria such as scientific credibility, diversity of perspectives, and relevance to the research problem.

The primary aim of this analysis is to address three fundamental research questions, each exploring a different aspect of the relationship between AI and society. To this end, the findings are organized into three subsections: first, key opportunities; second, risks and challenges; and third, foresight-based perspectives and scenarios. The results of the content analysis are presented below according to these three thematic axes.

4.1 Key Opportunities of AI for Enhancing Quality of Life and Social Development in Iran

In recent decades, AI has emerged as a major driver of transformation in human societies, with growing recognition of its potential to improve quality of life, increase productivity, and empower diverse segments of the population – particularly in developing countries. In the realm of social policy, AI is not merely a tool for problem-solving; it also serves as a platform for rethinking key concepts such as social justice, public participation, and human capital [Brynjolfsson 2017, Floridi 2021].

Based on the content analysis of scholarly sources and policy reports, the key opportunities of AI have been categorized into eight primary dimensions, as summarized in Table 1. These dimensions include education, health, industry, culture, security, media, ethics, and identity. Within each of these domains, specific applications of AI have been identified that hold the potential to generate meaningful transformations in both individual and collective life.

Table 1. Opportunity Dimensions of AI in Selected Scholarly Sources

Dimension	Key Manifestations	References
Education	Personalized learning, virtual tutors	[UNESCO 2021, Russell 2020]
Healthcare	Intelligent diagnostics, remote monitoring	[Topol 2019, Hamedani 2023, Firuzpour 2025, Dehnavieh 2025]
Industry	Robotics, predictive maintenance	[Frey 2017, Mohammadi 2023]
Culture	Intelligent content generation, preservation of languages	[Floridi 2021, Alemi 2020]
Security	Threat prediction, cyber defense	[Allen 2017, Brundage 2018]
Media	Content filtering, recommendation algorithms	[Noble 2018, Buolamwini 2018]
Ethics	Enhancing algorithmic transparency and fairness	[Jobin 2019, Floridi 2018]
Identity	Human-machine interaction, augmented decision-making	[Taddeo 2018, Atwood 2025]

As shown in Table 1, the impact of AI extends far beyond technology or industry and now encompasses cultural, ethical, and identity-related dimensions. This observation underscores the importance of avoiding a solely technocratic approach to AI governance and instead adopting an interdisciplinary and human-centered perspective.

In education, AI offers unprecedented opportunities for localized and personalized content delivery tailored to individual learners' needs. This transformation holds the potential to reduce educational inequalities and extend quality learning to underserved regions.

In healthcare, machine learning algorithms assist physicians in early disease detection with high accuracy. Moreover, smart

tools for remote care have helped reduce the burden on public health systems.

In the industrial sector, automation and predictive analytics contribute to resource optimization and cost reduction. Additionally, robots are increasingly deployed in high-risk environments, enhancing workplace safety.

In the cultural domain, AI can support the creative production of art and digital content. Intelligent linguistic tools also enable the preservation and revitalization of endangered or marginalized languages.

In terms of security, AI's capacity for identifying anomalous behavior presents significant opportunities for strengthening both cyber and physical security, particularly in critical infrastructures such as energy, transportation, and banking.

In the media domain, advanced content-filtering algorithms can help mitigate the spread of misinformation and rumors. However, this benefit depends on the fair and unbiased design of such algorithms to avoid reinforcing censorship or bias.

In the ethical realm, justice-oriented design frameworks for AI can prevent the reproduction of social discrimination through algorithmic decision-making. Furthermore, enhancing transparency in decision models fosters greater public trust in AI technologies.

Finally, in the domain of identity, human-machine interaction is reshaping both individual and societal roles. These changes necessitate a re-examination of foundational concepts such as agency, autonomy, and responsibility in the age of AI.

4.2 Social Risks and Threats Stemming from Unregulated AI Development

Despite the vast potential of AI to enhance quality of life, its unchecked and unstructured expansion within society can lead to significant adverse and disruptive consequences. A thematic analysis based on 33 credible academic sources reveals that if AI is developed without coherent ethical, legal, and policy frameworks, it poses considerable threats across various social dimensions. In this section, social harms and risks are categorized and analyzed under two overarching dimensions: structural and cultural-identity.

A) Structural Threats

This category includes risks that directly impact the social, economic, and governance structures of a country. Table 2 outlines the most critical structural threats identified.

Table 2. Key Structural Threats of Unregulated AI Development

No.	Structural Threat	Brief Description
1	Job displacement due to automation	Elimination of human jobs caused by automated processes, especially in industry and services
2	Widening of the digital divide	Marginalization of vulnerable groups and regions due to unequal access to technologies
3	Concentration of power in large corporations	Monopoly of data and algorithms by powerful transnational companies
4	Weakening of national sovereignty in cyberspace	Dependence on foreign technologies and difficulty in nationally controlling data
5	Disruption of decision-making systems	Excessive reliance on algorithms and gradual removal of human input from governance

The thematic analysis of the literature highlights the risk of widespread automation leading to job losses, particularly among low-skilled workers in labor-intensive sectors and urban services. Additionally, uneven development of digital infrastructure deepens socio-economic divides and hinders the

realization of digital justice. The monopoly of key AI algorithms and data by foreign tech giants also poses a serious threat to national informational independence and policymaking capabilities.

B) Cultural and Identity Threats

At the cultural and identity level, AI development poses risks that impact the value systems, semantic structures, and collective identities of society. Table 3 presents the main cultural and identity-related threats.

Table 3. Key Cultural and Identity Threats of Unregulated AI Development

No.	Cultural-Identity Threat	Brief Description
1	Decline in human relationships	Decrease in face-to-face interactions, increasing social isolation and individualism
2	Imposition of non-native values	Promotion of Western lifestyles through recommendation algorithms and non-local content
3	Identity erosion among younger generations	Detachment from cultural and historical roots due to dominance of digital narratives
4	Weakening of the Persian language	Preference for English in AI systems undermining the national language
5	Reduction of human ethics to algorithmic logic	Replacement of human moral values with impersonal, mechanical algorithmic reasoning

The reviewed sources frequently stress AI's transformative impact on lifestyles. Social media algorithms – primarily shaped by dominant global cultures – gradually erode local value systems and indigenous behavioral models. Furthermore, the substitution of human dialogue with machine-mediated interactions contributes to the erosion of empathy, civic participation, and social cohesion.

In sum, the findings of the thematic analysis demonstrate that AI development – if undertaken without integrating local cultural and structural considerations – may lead to a wave of soft social disintegration rather than progress. These insights underscore the urgent need for future-oriented, ethically grounded strategies to ensure the responsible governance of AI technologies.

4.3 Future-Oriented Visions and Strategic Scenarios for AI Governance in Iran

In light of global technological trends, Iran's specific socio-cultural context, and the imperatives of sustainable development, articulating a forward-looking vision for AI governance in the country has become indispensable. By the year 2031 (1410 in the Iranian calendar), Iran could be positioned to cultivate an AI ecosystem that is ethical, locally adapted, and community-driven – serving not only as a driving force for industry, education, and digital governance, but also as a catalyst for strengthening social capital, promoting digital justice, and enhancing civic engagement.

Achieving this vision requires a deliberate departure from the current state, which is characterized by technological gaps, institutional misalignment, and weak data infrastructures. A synergistic approach that combines indigenous capabilities with intelligent policy-making can play a pivotal role in aligning AI development with the broader public interest.

In response to the third research question—and drawing upon global trends in AI governance – five strategic scenarios have been designed to guide Iran's approach to managing AI

transformations. These scenarios are constructed using methods of strategic foresight and futures analysis, grounded in two key axes of uncertainty: the degree of government intervention and the extent of technological localization. As illustrated in Figure 1, each scenario represents a distinct policy pathway for navigating AI-related developments within a shared vision framework.

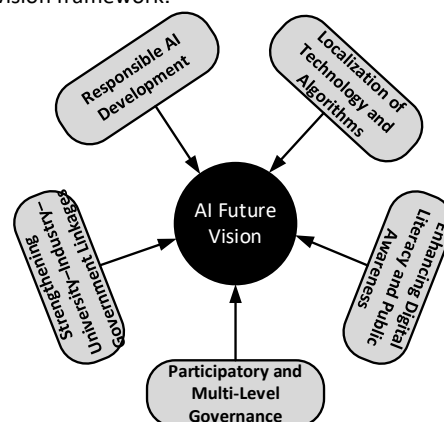


Figure 1. Pathways Toward Iran's AI Future Vision

Scenario 1: Responsible AI Development

This scenario emphasizes technological advancement underpinned by ethical principles such as transparency, accountability, fairness, and human dignity. The primary aim is to prevent the reproduction of bias, erosion of public trust, and algorithmic distortions. Countries like Germany and the Netherlands, through the adoption of advanced ethical frameworks, have demonstrated that responsible development is not only feasible but essential for modern digital governance [Floridi 2018].

Scenario 2: Localization of Technology and Algorithms

This pathway highlights the design of language models, technical standards, and datasets aligned with Iran's cultural values and societal needs. The experiences of countries such as China and India confirm that investing in localized AI models enhances system efficiency while mitigating cultural harms caused by the misalignment of digital content with national identity [Zeng 2019].

Scenario 3: Strengthening University-Industry-Government Linkages

Data-driven governance cannot be realized without active collaboration among universities, technology industries, and government institutions. In this scenario, the state provides legal and financial infrastructure; universities focus on training skilled professionals and producing relevant knowledge; and the private sector plays a central role in technology commercialization and implementation. Successful models of this tripartite collaboration are observed in countries such as South Korea and Canada [Taddeo 2018].

Scenario 4: Enhancing Digital Literacy and Public Awareness

This scenario focuses on public education and strengthening societal resilience against AI-related risks. Concepts such as algorithmic bias, reality distortion, and digital extremism must be recognized at the community level. Early digital education, particularly within the national education system, alongside active engagement from media and cultural institutions, is critical for achieving this goal [European Commission 2021].

Scenario 5: Participatory and Multi-Level Governance

In this model, AI governance is structured around broad-based participation involving the government, academia, private sector, and civil society. Such a framework prevents the concentration of power in the hands of select actors and fosters public trust. Initiatives like Canada's AI Ethics Council

and the OECD's Global Partnership on AI exemplify the success of multi-stakeholder governance models [OECD 2021].

To conclude, a desirable future for AI in Iran requires a multifaceted, ethically grounded, and participatory policy approach. The integration of technological localization with robust institutional development, and the synergy between education, industry, and government, constitute the cornerstone of foresighted AI governance. Neglecting this comprehensive approach could not only neutralize potential opportunities but also trigger profound social and cultural disruptions.

5 CONCLUSION, POLICY RECOMMENDATIONS, AND FUTURE RESEARCH DIRECTIONS

This study, focusing on the social, cultural, and governance dimensions of AI in Iran, sought to present a forward-looking, context-sensitive, and multi-layered picture of the opportunities, risks, and strategic pathways related to AI development. In response to the three central research questions – (1) What are the key opportunities of AI for enhancing quality of life and social development in Iran? (2) What are the major social risks and harms arising from the unregulated development of AI? and (3) What future-oriented scenarios and strategic visions can be drawn for AI governance? – a qualitative content analysis of academic and policy-based sources highlighted three major sets of findings.

First, the identification of opportunities revealed that AI has significant potential to enhance quality of life and strengthen social capital across eight key domains, including education, healthcare, industry, culture, security, media, ethics, and identity. These opportunities, in turn, can support institutional efficiency and help lay the groundwork for sustainable development.

Second, the analysis of social risks showed that unregulated AI development can result in serious threats on two levels: structural and cultural-identity. On the structural level, issues such as job displacement due to automation, widening of the digital divide, concentration of power in large corporations, weakening of national sovereignty in cyberspace, and disruption of decision-making systems were identified. On the cultural-identity level, challenges such as the decline in human relationships, the imposition of non-native values, identity erosion among younger generations, weakening of the Persian language, and the reduction of human ethics to algorithmic logic were underscored. These threats, categorized in Tables 2 and 3, highlight the potential for a form of “soft social collapse” in the absence of intelligent policy responses.

Third, a set of five strategic policy scenarios – visualized in a future-oriented model (Figure 1) – mapped out possible pathways for responsive and adaptive governance: responsible development, technology localization, strengthening university-industry-government collaboration, enhancing digital literacy, and multi-Level governance. These scenarios were developed based on two axes of uncertainty: the level of government intervention and the degree of technological localization. They offer a roadmap for policymakers and stakeholders in preparing for AI-driven transformations.

Based on these findings, the following policy recommendations are proposed for anticipatory and responsible AI governance in Iran:

1) Formulate a National Strategic AI Framework grounded in ethics, inclusivity, and cultural relevance, with active participation from government, academia, religious authorities, and civil society.

2) Develop indigenous frameworks for algorithmic ethics based on Islamic values, cultural traditions, and global best practices.

3) Establish an ex-ante system for social impact assessment of AI, especially in sensitive domains such as health, education, judiciary, and media.

4) Support interdisciplinary research in social sciences, philosophy, psychology, and technology law to explore the hidden and soft consequences of AI.

5) Create a National Algorithmic Governance Authority with an intersectoral structure to coordinate policy, regulate implementation, and ensure institutional accountability.

Despite the relative comprehensiveness of this analysis, the study is limited by its reliance on secondary sources and the absence of empirical field data. This limitation opens avenues for future investigations. Accordingly, the following research directions are suggested:

- ❖ A comparative study of AI ethics policies in Islamic, Western, and Asian countries to extract a culturally appropriate Iranian-Islamic model.
- ❖ A qualitative analysis of Iranian users' experiences with domestic and foreign AI systems, focusing on justice, transparency, and trust.
- ❖ An examination of AI's impact on personal identity and digital lifestyles, using approaches from the sociology of technology and media psychology.
- ❖ The development of localized indicators for evaluating responsible AI development, aligned with Iran's cultural values and institutional structures.
- ❖ A study of mechanisms to enhance societal resilience against threats such as deepfakes, misinformation, and cognitive manipulation.

In conclusion, AI should not be seen merely as a technological tool; it is a civilizational, cultural, and identity-shaping force. Effective engagement with this transformative power requires a blend of intelligent policymaking, ethical commitment, and broad societal participation. Iran's future in the AI era hinges on the decisions made today – decisions that must be informed by deep understanding, moral responsibility, and collective wisdom.

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