

Artificial Intelligence in Health Policy -A Global Perspective

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Abstract

Introduction: Artificial Intelligence has become the new frontier for digital transformation. For healthcare, AI brings a paradigm shift, powered by increasing healthcare data availability and the rapid progress of analytics techniques globally. Objective: Several hypotheses are set forward to design a policy framework for AI technologies was discussed. This review also suggests a framework that we reflect is a better case involving "responsible AI" and "permission less innovation." Methodology: In this perspective review, AI insights into countries such as the USA, UAE, UK, and the European Union using secondary research. Results: Policy recommendations would impact multiple stakeholders in the value chain. The efficient and responsible use of AI tools would mean culture, data management, technology shifts in the industry, and required up-grading and training professionals for better coordination

Index terms— artificial intelligence, privacy laws, future of AI, health policy, responsible AI.

1 Introduction

In the contemporary era, many governments worldwide shifted its' policy research agenda to understand and assess the uses of social media, eservices, digital transformation, smart cities, open government data, robotics, deep learning, big data, machine learning blockchain, and artificial intelligence. The idiom "artificial intelligence" was first coined by John McCarthy at a famously held workshop at Dartmouth College, Hanover, USA, during 1956. According to John McCarthy, the father of Artificial Intelligence (AI) defined as "the science and engineering of making intelligent machines," and researchers define AI as the aim to "mimic human cognitive functions." For healthcare, AI is bringing a paradigm shift, powered by increasing healthcare data availability and the rapid progress of analytics techniques. AI generally encompasses of various activities such as machine learning, robotics, and deep learning. For the context of this perspective review, deep learning is where there are artificial neural networks. Secondly, machine learning is making machines that learn from data, such as Automatic Teller Machine cheque readers. And finally, robotics is creating devices and machines that move, such as autonomous vehicles.

AI has become the new edge for digital transformation. Many factors support and drive the fast and powerful evolution of Artificial Intelligence across industries. Most common amongst these are:

Access to sophisticated, fast, and cost-effective computing (processing) tools, hardware, and software and applications, Availability of large (big) and longitudinal data sets generated by digital efforts worldwide and technologies like IoT.

Availability of open-source coding resources, online communities, users (coders and managers) sharing know-how.

However, many companies are still struggling with real business value, and many Governments are still toying with the idea. In a nutshell, everyone wishes to weigh the risk and reward before committing to such an expensive effort. The AI business risks can around [1,17,18] Hence, with the growing market potential and interest in AI, it is imperative to develop a thoughtthrough regulatory and legal framework on the adoption and use of AI. Several hypotheses are set forward to design a policy framework for AI technologies; the authors will discuss them. This review also suggests a framework that we think is a better case involving "responsible AI" and "permission less innovation."

45 **2 Size of the problem**

46 As per the Grand View Research report, The global artificial intelligence market size was valued at USD 62.3
 47 billion in 2020 and is expected to grow at a compound annual growth rate (CAGR) of 42.2% from 2020 to 2027.
 48 [1] AI decision-making applications that use algorithmic, neural networks, deep learning, expert and learning
 49 systems are used in education, digital imaging, healthcare, manufacturing, robotics, government, supply chain,
 50 manufacturing, and production can replace humans for a variety of processes and tasks. This dependency on
 51 automated AI-centric systems has raised enormous concern about over-allocating resources towards mitigating
 52 AI's most extreme impacts.

53 **3 II. Underlying Factors**

54 Regulations: There is an ongoing global debate on opaque AI systems, data protection regulations, and the lack
 55 of transparency on automated data processing. Regulatory approvals and interventions must have access and
 56 understanding of concrete definitions; however, the consensus around AI has been broadly worded, an elusive
 57 feat, especially in policy discussions. The United Kingdom and the European Union have already implemented
 58 AI policies that promote trustworthy AI. Europe has some stringent digital rules that are more strict than
 59 HIPAA rules in the US. For example, Article 22 stipulates that citizens cannot be submitted to medical decisions
 60 generated by an automated source. [2]NIST's revised data standards have become central to AI policy under the
 61 US's Trump order. [3] Policy versus Practice: AI advocates and researchers define AI that highlights its usability,
 62 functionality, and process. On the other hand, while designing Policy frameworks, policymakers recognize AI as a
 63 tool that should have caution, sensitivity, and prudence like human beings compared to human behavior. Hence,
 64 sometimes policies tend to over accentuate concern on the future use of these technologies, ignoring current
 65 usability and present-day issues. [4] impact. There is consideration required to understand the destructive power
 66 of AI as well. As suggested by Taddeo & Floridi (2018), there is a pertinent risk that the AI arms race [5] can
 67 trigger inadvertent development and AI use. Hence, in addition to Fairness, Accountability, Transparency, and
 68 Ethics, human rights serve as a complementary framework for guiding and governing AI and machine learning
 69 research and development. [6] Governance: Here, we are taking the example of healthcare as an industry to
 70 understand governancerelated challenges. Healthcare, as an industry, has established processes and frameworks.
 71 The fast pace development and roll-out of AI-related projects may hamper such frameworks. Hence, to maintain
 72 such processes and frameworks, an overarching framework must assess and establish potential areas of impact and
 73 how regulations may view these changes. Innovation in processes, analysis, and research needs to be developed in
 74 the light of maintaining transparency, accountability, and social impact/public interest, as stated in the problem
 75 statement above. In addition to these frameworks, it is also essential to develop skill sets amongst the subject
 76 matter experts and the user community to plan, assess, and evaluate the best use case of AI for their respective
 77 industries.

78 **4 III.**

79 **5 Policy Recommendations & Implications**

80 Fig. ?? : Recommendations on the AI policy framework Policy suggestions below would impact multiple
 81 stakeholders in the value chain. This is because efficient and responsible use of Artificial intelligence tools
 82 would mean culture, data management, technology shifts in the industry, and required up-grading and training
 83 professionals for better coordination. To achieve the promise AI technology brings in and its efficient use, these
 84 policy suggestions will form the policy framework upon which key stakeholders collaborate. The key factors
 85 and elements crucial for informing policy with sufficient evidence include collaboration, facilitation, oversight
 86 management, quality structure, education, benchmarking and best practices, ethics and accountability and
 87 'responsible AI. ?? Given the risk imposed with the advancement and uptake of AI amongst industries, here
 88 are seven high-level recommendations summed up in Figure ??:

89 Collaboration: AI development and implementation should involve multi-stakeholders to collaborate for social,
 90 economic, ethical, and legal implications of AI. Public funding should be provided wherever possible to drive
 91 mandates for such collaborations nationally and internationally. Collaborations and partnerships should promote
 92 knowledge sharing, building access to information, and innovation. Hence, policymakers need to collaborate
 93 with AI experts and researchers to design and implement frameworks that facilitate research initiatives and
 94 are aligned with the technical practice of AI gaping the divide between policy and practice. Facilitation:
 95 Involvement of experts and relevant stakeholders in discussing challenges and possible safeguards against threats.
 96 Both Public and Private sectors should pool inappropriate funding for the R&D efforts pertaining to AI. All
 97 parties (regulatory and industry stakeholders) should come together to provide access to resources that help
 98 facilitate digitization, building data access, and encouraging incentives like tax credits for both profit and non-
 99 profit research that prioritizes transparency and evidence-based validation. Policy frameworks should enable
 100 data access by creating a cooperation culture among policymakers, experts, technology users, and the general
 101 public. Oversight management: Safety and efficacy of AI are contingent upon well-thought-out risk management
 102 approaches and processes to align standards and drive compliance. "What the eye doesn't see, and the mind
 103 doesn't know, doesn't exist" [7]. Hence, awareness of possible misuse, abuse, and bias is necessary amongst both

104 researchers and policymakers alike to influence norms, design, and applications, proactively analyzing and flagging
105 potential misuse. The policy framework should highlight all actors-roles, process risks, liabilities, and incentives
106 to highlight opacity, bias, discrimination, inefficiency, and any other negative impact (responsible disclosure).

107 Quality structure: It is vital that stakeholders understand AI risk distribution and liability while using AI
108 tools. An ideal AI structure/ technological framework should support:

109 Guiding principles of being explainable, transparent (auditable), and fair (unbiased)

110 And augment human capabilities and maintain human well-being by being safe, ethical, and equitable (human-
111 centric).

112 **6 Design**

113 **7 Structure Development Education**

114 **8 Facilitation**

115 Collaborati on

116 **9 Ethics & Accounta bility**

117 **10 Oversight management**

118 **11 Best Practices**

119 Hence quality assurance should be taken into perspective while designing, developing, and deploying AI tools.
120 Policy frameworks also need to match realworld workflows, usability principles, and end-user needs. These
121 AI-driven systems should also solve the redundant, disjointed, and dysfunctions of the technology/ operational
122 systems. opportunities of AI, it is also important to realize that an uneven distribution of technology and
123 resources can hamper equitable access to AI resources. Hence, policymakers should influence investments in
124 building AI infrastructure, training personnel, and building an engaging community of users and researchers that
125 help demonstrate AI value leading to voluntary adoption and standards compliance. The education interventions
126 with stakeholder involvement should also encourage keeping these frameworks up-to-date and perceptive to
127 upcoming challenges. Ethics and Accountability: AI adoption will only progress and reach its potential if it is
128 used ethically to protect its users (that is, humans). A digital economic policy has been adopted by almost 40
129 countries, including the US and the European Union. For private organizations, the personal data protection
130 commission (PDPC), Singapore, proposed a model that guides how ethical principles can be converted into
131 implementable practices as per the World Economic Forum regulations.

132 In 2018, the UK also mandated five principles that could become the basis for a shared ethical AI framework.

133 These include [8]:

134 Development for common good

135 **12 Act with fairness and clarity**

136 Preserve data rights and privacy of communities.

137 AI to help improve citizens' cognitive intelligence alongside artificial intelligence.

138 Should not be used to destroy or deceive human beings autonomously.

139 IV. Education: In addition to understanding the risk and

140 **13 Responsible AI**

141 Responsible AI is a framework that emphasizes ethical, accountable, and transparent use of AI technologies
142 congruous with human rights, societal norms, user expectations, and organizational values. The overarching
143 eight principles of AI ethics and reliability as adapted from the Responsible AI framework by IT tech law is
144 mentioned in Figure 2. [9] Independent non-profit bodies like AI-Global [10] [15], submitted a report on the
145 implication of AI implementation from the angle of safety and liability. As two-thirds of the value creation by AI
146 contributes to the B2B segment, it is a call for us all researchers, academicians, business owners, governments,
147 and industry leaders to come together and provide due consideration to ethical automation with the use of
148 such technologies. Neural fuzzing can be used to test large amounts of random input data within the software
149 to identify its vulnerabilities. [18] Compliance to data privacy regulations (European Union's General Data
150 Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA).

151 V.

152 **14 Conclusion**

153 The review can influence policymakers and stakeholders to develop AI and data privacy policies and guidelines
154 across countries globally in healthcare facilities, especially during the current drive towards the future of AI.
155 Future research could investigate the effect of specific variables on healthcare facility users' perceptions that
156 might influence AI use and data privacy.

157 15 VI.
Statements

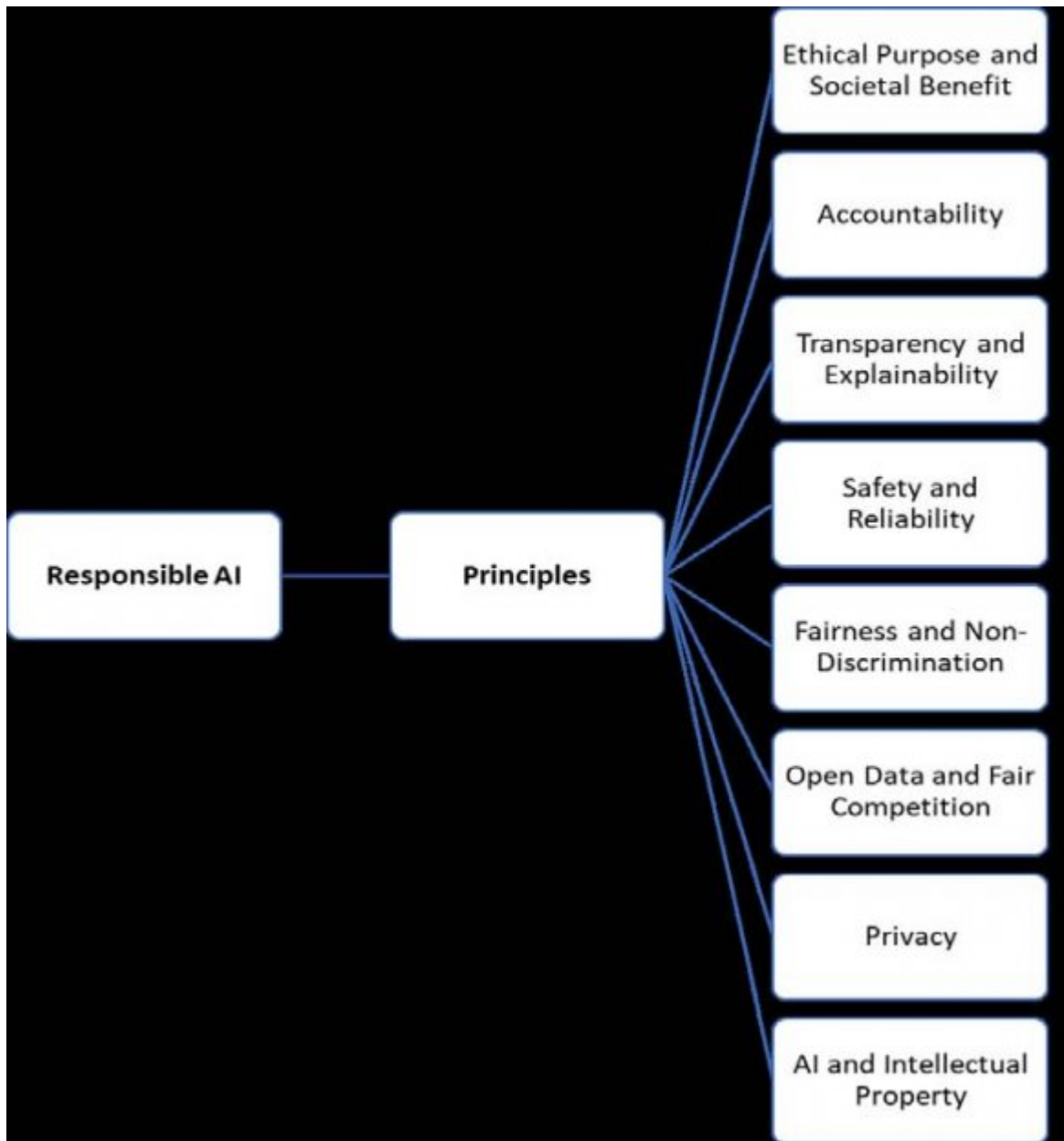


Figure 1:

158

Compliance-Does the design comply with industry regulations?

Governments, private businesses, and non-governmental organizations across the Middle East region are recognizing the shift globally towards AI and advanced technologies. PWC [13] estimates that the Middle East is expected to ensue 2% of the total global benefits of AI in 2030, which is equal to US\$320 billion.

The UAE's national program on Artificial Intelligence

performance and efficiency. Recently, the Government of Dubai, Smart Dubai, published Dubai's Ethical AI Toolkit. The toolkit has been created to provide hands-on support across a metropolitan ecosystem. It supports academia, industry, and citizens in understanding how AI systems can be utilized responsibly. It comprises principles and guidelines and a self-assessment tool for developers to assess their platforms. [14] Europe's Communication on Artificial Intelligence, 2018

Explainability-what was predicted and how "x" was predicted?

Fairness-Is it ethical or unfair to a particular group?

Robustness-Can the model be fooled? How robust is the model?

aim at enhancing government

Figure 2:

1

Drawbacks	Ethical challenge	Implementation considerations
1 AI Black box	Unexplained Predictions	Build Transparency
Though AI algorithms can learn from massive amounts of data and internalize them to make decisions, these algorithms could be a black box to even their creators. [16]	Predictions and decisions without reasons	<p>a) Transparent Interpretable output-Develop decision or prediction model with its explanation.</p> <p>b) Model Inspection-> Model explanation->Outcome explanation</p> <p>c) Use what can be explained.</p> <p>Treat self-learning networks and solutions with care.</p>
2 Algorithmic Complexity	Difficult to understand and comprehend the "how?"	Provide adequate training & Validate models
There is more emphasis on models to give smart decisions than ethical ones. Technical secrecy and complexity can be deception	Little understanding or skills around comprehending the algorithm, its functional elements, modus operandi, and relationship across system may blind decision making	<p>Training is required for the end professional to interpret and explicably understand the AI results</p> <p>the results of AI.</p>

Figure 3: Table 1 :

- 159 [FRA ()] , *FRA* 2018a.
- 160 [AI in the UK: Ready, willing and able? (Rep. No. HL Paper ()) [https://publications.parliament.](https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf)
161 [uk/pa/ld201719/ldselect/ldai/100/100.pdf](https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf) *AI in the UK: Ready, willing and able?* (Rep. No. HL
162 *Paper*, 2019. 100. (Retrieved 2020, from Authority of the House of Lords website)
- 163 [By End Use, By Region, And Segment Forecasts Trends Analysis Report By Solution (Hardware, Software, Services) ()]
164 'By End Use, By Region, And Segment Forecasts'. [https://www.grandviewresearch.com/](https://www.grandviewresearch.com/industry-analysis/artificial-intelligence-ai-market)
165 [industry-analysis/artificial-intelligence-ai-market](https://www.grandviewresearch.com/industry-analysis/artificial-intelligence-ai-market) *Trends Analysis Report By Solution*
166 *(Hardware, Software, Services)*, 2020. 2020. p. . (Rep. No. GVR-1-68038-955-5) (By Technology (Deep
167 Learning)
- 168 [Castelvecchi (2016)] 'Can We Open the Black Box of AI?'. Davide Castelvecchi . *NATURE* Oct. 5, 2016.
169 (characterizing "opening up the black box" as the "equivalent of neuroscience to understand the networks
170 inside" the brain)
- 171 [Conference on AI, Ethics, and Society] doi:10. 1145/3375627.3375835. *Conference on AI, Ethics, and Society*,
172 [PWC. (ed.) ()] *Cortex Certifai: Evaluate AI models for robustness, fairness, and explainability*, [https://www.](https://www.pwc.com/ml/en/publications/potential-impact-artificial-intelligence-middle-east.html)
173 [pwc.com/ml/en/publications/potential-impact-artificial-intelligence-middle-east.](https://www.pwc.com/ml/en/publications/potential-impact-artificial-intelligence-middle-east.html)
174 [html](https://www.pwc.com/ml/en/publications/potential-impact-artificial-intelligence-middle-east.html) PWC. (ed.) 2020. 2020. 2020. The Institute for Ethical AI & Machine Learning. (The potential impact
175 of AI in the Middle East)
- 176 [Barocas and Selbst ()] *Data quality and artificial intelligence -mitigating bias and error to protect fundamental*
177 *rights*, S Barocas , A D Selbst . [https://fra.europa.eu/sites/default/files/fra_uploads/](https://fra.europa.eu/sites/default/files/fra_uploads/fra-2019-data-quality-and-ai_en.pdf)
178 [fra-2019-data-quality-and-ai_en.pdf](https://fra.europa.eu/sites/default/files/fra_uploads/fra-2019-data-quality-and-ai_en.pdf) 2016.
- 179 [Krafft et al. ()] 'Defining AI in Policy versus Practice'. P M Krafft , M Young , M Katell , K Huang , G Bugingo
180 . *Proceedings of the AAAI*, (the AAAI) 2020. ACM.
- 181 [Gourraud ()] 'Differences between Europe and the United States on AI/Digital Policy'. P Gourraud . doi:10.
182 1177/2470289720907103. *Comment Response to Roundtable Discussion on AI. Gender and the Genome* 2020.
183 4 p. 247028972090710.
- 184 [Digital economy is next priority: The digital readiness of government ensures business continuity, regardless of the circumstances
185 *Digital economy is next priority: The digital readiness of government ensures business continuity, regardless*
186 *of the circumstances*, from <https://ai-global.org> August 17, 2020. 2020. Responsible AI Policy
187 Framework (Tech).
- 188 [Almarzooqi et al. ()] *Healthcare Professional and User Perceptions of e Health Data and Record Privacy in*
189 *Dubai. Information*, F M Almarzooqi , I A Moonesar , R &alqutob . 10.3390/info11090415. [https:](https://doi.org/10.3390/info11090415)
190 [//doi.org/10.3390/info11090415](https://doi.org/10.3390/info11090415) 2020. 11 p. 415.
- 191 [Weber ()] *Lawyers say NIST's revised data standards should be central to AI policy under trump order. Inside Cy-*
192 *bersecurity*, R Weber . [https://search-proquest-com.lbs.idm.oclc.org/docview/2242766558?](https://search-proquest-com.lbs.idm.oclc.org/docview/2242766558?accountid=16482)
193 [accountid=16482](https://search-proquest-com.lbs.idm.oclc.org/docview/2242766558?accountid=16482) 2019.
- 194 [Cath et al. ()] 'Leap of FATE: human rights as a complementary framework for AI policy and practice'. Corinne
195 Cath , Mark Latonero , Vidushi Marda , Roya Pakzad . 10.1145/3351095.3375665. [https://doi.org/10.](https://doi.org/10.1145/3351095.3375665)
196 [1145/3351095.3375665](https://doi.org/10.1145/3351095.3375665) *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*
197 *(FAT*' 20)*, (the 2020 Conference on Fairness, Accountability, and Transparency (FAT*' 20)New York, NY,
198 USA) 2020. Association for Computing Machinery. p. 702.
- 199 [Taddeo and Floridi ()] 'Regulate artificial intelligence to avert cyber arms race'. Taddeo , Luciano Floridi .
200 296-298.10.1038/d41586-018-04602-6. *Nature* 2018. 556.
- 201 [The accompanying Staff Working Document ()] [https://eur-lex.europa.eu/legalcontent/en/ALL/](https://eur-lex.europa.eu/legalcontent/en/ALL/?uri=CELEX%3A52018SC0137)
202 [?uri=CELEX%3A52018SC0137](https://eur-lex.europa.eu/legalcontent/en/ALL/?uri=CELEX%3A52018SC0137) *The accompanying Staff Working Document*, 2018. p. 137. (provided a first
203 mapping of liability challenges that occur in the context of emerging digital technologies)
- 204 [Lawrence] *What the eye doesn't see and the mind doesn't know, doesn't exist*, D H Lawrence .