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Enhancing Public Sector Efficiency in Pakistan by Integration of Artificial Intelligence (AI): Insights from The Republic of Estonia

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ABSTRACT

The public sector of Pakistan has been facing problems that impact governance and the provision of public services, including administrative challenges, ineffective leadership, and a lack of transparency. This paper aims to determine how artificial intelligence (AI) can optimize policy formulation processes to improve transparency, speed, and outcomes in public institutions in Pakistan. The research is based on a global AI governance model analysis (Estonia's digital services) and Pakistan's emerging initiatives (AI use in NADRA, tax automation by FBR). The study explored the innovative possibilities offered by AI. The result shows that AI technologies, including AI-driven governance and data analysis, can improve policies. The paper suggests a step-by-step implementation framework that emphasizes localized pilot projects in essential areas such as the public sector. This study emphasizes the necessity of changes in institutions to effectively use of AI and it also provides helpful suggestions for technological innovations for the development of successful governance in developing nations, especially in Pakistan, in the digital age.

Keywords: *Artificial Intelligence, Digitization, Estonia, FBR, NADRA, Pakistan, Public policies, Technology.*

INTRODUCTION

Research Questions

How can institutional reforms be designed to integrate AI into Pakistan's administration to make efficient public policies?

How can Pakistan use Estonia's AI-driven public policy design to shape its AI approach in the digital age?

Research Objectives

- To identify the challenges for implementing AI in Pakistan's public policy formation process.
- To understand the impact of AI on public-sector policy-making in Pakistan.
- To design a framework for integrating AI into public policymaking in Pakistan by taking insights from the Estonian AI-integrated public policy model.

Statement of the Problem

The public sector in Pakistan suffers from administrative delays, and limited data availability, which results in ineffective policies. In Pakistan's public sector, AI's efficacy and transparency are restricted. The

purpose of the research is to investigate the function of AI in Pakistan's public sector, identify obstacles to its adoption, and highlight methods for improving effectiveness.

Research Methodology

The paper employs the AI-driven public policy model of Estonia for taking insights for the adoption of AI in the public policy process of Pakistan. The Data collected from secondary sources. Through the qualitative analysis this research formulates pragmatic recommendations for the policymakers of Pakistan.

Significance of Research

AI integration in the public sector in the era of digital democracies, or electronic democracies, has become a highlighted topic of study. Pakistan is focusing on the shift of the technological revolution. The need for AI and strategies for its adoption is still a point of research. The study focuses on how AI can help address Pakistan's issues with transparency and public sector ineffectiveness. By automating repetitive tasks and enabling data-driven decision-making, artificial intelligence (AI) may boost productivity and transparency.

INTRODUCTION

The simulation of human intelligence in computers that are designed to understand, learn, and arrive at selections similarly to humans is known as artificial intelligence (AI). Nowadays, AI is utilized in almost all sectors of society, such as politics, public administration, education, legislation, medicine, etc. The technology of artificial intelligence (AI) in the public sector of Pakistan is still in its early stages. The country struggles with slow policy action, fragmented information systems, and a lack of qualified personnel. This research analyzed the impact of artificial intelligence on public policy areas. It also considers socio-cultural and ethical barriers, such as discrimination, algorithmic bias, and privacy concerns. The study aims to construct more reasonable policy proposals that allow civil society, international actors, and decision-makers to effectively change governance in Pakistan through AI-enhanced systems.

The goal of this study is to examine how artificial intelligence is affecting organizations and policy domains. It also takes into account ethical and societal hurdles, such as concerns about privacy, by addressing the gap between technological advancement and institutional development. This research investigates the potential of Artificial Intelligence (AI) to make policy-making effective in the public sector of Pakistan. It discusses the current applications of artificial intelligence operating in Pakistan, identifies hurdles in adopting them, and proposes solutions for large-scale implementation of AI-based solutions in a resource-restricted setup by studying the Estonian AI-driven public policy model.

LITERATURE REVIEW

Yar, Hamdan, Anshari, Fitriyani, and Syafrudin discussed the impact of artificial intelligence on the policy-making process. Developing policies is a complex task that involves choosing the best path for proceeding while taking the viewpoints of many politicians, including specialists, authorities, the general public, the media, and other committees, as well as pressure organizations. In digital societies, public policymakers have been interested in artificial intelligence (AI) because of its potential advantages, which include more predictive analytics and improved data analyses. This also presents ethical concerns concerning possible prejudice in past data and issues related to transparency (Yar, Hamdan, Anshari, Fitriyani, & Syafrudin, 2024). This paper encompasses insufficient details about ethical frameworks. The research aims to cover these gaps by defining the use of AI in Pakistan’s public policy-making process for

the better future of the nation. It will highlight the public engagement strategies and ethical frameworks for Pakistan.

Ahmad, Hussain, & Mir discussed the legal importance of AI rules and regulations. AI adoption has created the need for strong legal frameworks to deal with its ethical, social, and legal implications. International approaches, such as those of the EU, US, China, and UK, provide solutions to ethical issues such as transparency, accountability, and fairness. The absence of comprehensive AI legislation in Pakistan highlights the imperative of a special regulatory framework (Ahmad, Hussain, & Mir, 2024). The paper lacks the social aspects. The research aims to fill the gaps by studying the AI adoption social challenges in Pakistan with their solutions.

Kulal, Dinesh, Rahiman, Abishek, & Suvarna stated that AI can enhance efficiency and transparency across a range of fields, such as academics, healthcare, and governance. The use of predictive analytics and AI-powered chatbots has been successful in simplifying local activities, which has led to improved government. Furthermore, a shortage of highly qualified staff and innovative technology affects numerous government departments, limiting successful adoption (Kulal, Dinesh, Rahiman, Abishek, & Suvarna, 2024). The paper lacks AI adoption strategies, particularly in developing nations like Pakistan. It is still unclear how Chief Information Officers can encourage the deployment of AI and which particular domains will be affected by its use. The research aims to cover these mentioned gaps by conducting an analytical study about the adoption of AI into Pakistan's public services for boosting the public policy process.

Gur, Hemiri, and Maaravi explained the role of artificial intelligence in democratic governments. AI technology is being promoted in government affairs, influenced by political ideology. Trust in AI depends on public satisfaction. Public institutions believe that the element of trust affects public opinion about AI in governance, especially in public domains (Gur, Hameiri, & Maaravi, 2024). The writers didn't provide an understanding of AI, and it also lacks strategies for integrating AI in the public sector in developing nations. Further research is needed to address the ethical aspects of data privacy and security. The research aims to fill the above-mentioned gaps by providing AI adoption strategies in the context of the case study of Pakistan and its benefits and challenges.

Benoit emphasized the impact of AI and data science on public policy. The integration of artificial intelligence is reshaping the process of the formulation of public policy in the digital age. Combating ethical issues and advancing scientific research are two benefits of incorporating data science and artificial intelligence into public policy (Benoit, AI and Data Science for Public Policy, 2024). The study didn't provide a case study, and the social and technological aspects were also absent. The research aims to cover the gaps by providing a case study of Pakistan with AI's influence on the social and technological sectors.

Maalla endorsed the specificity of artificial intelligence in the governmental sector, especially in public services. AI is the most important pillar in a digital society that has dramatically changed all sectors of society, including the public sector. AI can speed up the policy process in a short time. According to the writer, public-private collaboration is one of the focal opportunities for integrating AI into the public sector (Maalla, 2021). AI has become a strong weapon in the digital age, but its strength depends on its adoption. The process is based on AI adoption strategies. The paper lacks a case study. The writer didn't write any strategies for the adoption of AI into the public sector and its challenges. The research aims to fill the gaps by providing AI- adoption strategies in the context of Pakistan by taking insights from Estonia's AI-driven public policy model.

Patel, Manetti, Mendelsohn, Mills, Felden, Litting, and Rocha provided a roadmap for starting AI in public policy. Governments nowadays mostly rely on artificial intelligence (AI) to make evidence-based decision-making better, speed up bureaucratic processes, and ensure a more responsive government. But

there are moral challenges that AI poses, such as privacy issues and access (Patel, et al., 2021). This paper didn't provide a case study and recommendations for the adoption of AI in developing nations. The research aims to cover the gaps by providing a case study of integrating AI in public policy in Pakistan with policy recommendations.

Artificial Intelligence

The skill of a computer or computer-controlled robot to carry out actions typically performed by humans with intellect is known as artificial intelligence (Copeland, 2025). AI is based on data, hardware, and connections, enabling robots to simulate human intellect in areas like innovation, problem-solving, understanding, and language communication (UNESCO, 2025).

AI-driven Public Policy Global Model

As the world moves towards digitalization, the demand for AI adoption is increasing in digital societies (Yar, Hamdan, Anshari, Fitriyani, & Syafrudin, 2024). AI offers special potential to transform the formulation of policies. Evidence-based decision- making policy formation, efficient execution, and fast evaluations can be facilitated by its statistical analysis capacity and continuous tracking. To take advantage of the power of artificial intelligence in shaping the future of decision-making, authorities have to accept it and modify their techniques (Aim- Research, 2023). AI has the potential to enhance the transparency and speed up the process (Kulal, Dinesh, Rahiman, Abishek, & Suvarna, 2024). Public trust in AI-driven policies is a key element in democratic governments (Gur, Hameiri, & Maaravi, 2024). Within the process of promoting artificial intelligence (AI) and data science, they are transforming public policy via offering significant shifts in the fields of social and policy sciences (Benoit, 2024). Policy- making is a complex but cyclic process that consists of four stages: identification, preparation/designing, adoption, implementation, and evaluation. The technology of artificial intelligence can help to make policy more impactful (Patel, et al., 2021).

AI in Estonian Public Policy

The small Baltic nation of Estonia, which gained independence from the Soviet Union in 1991, is currently paving the way at the forefront for electronic governance and technology development. To assist it in creating a responsive, effective, and fair system of governance, the nation has embraced a wide range of innovations. The e-Estonia leadership attempts to improve citizens' quality of life and digitize public (Hamer, 2024). In Estonia, 99% of public services are online. Additionally, Estonia has a secure digital infrastructure, digital identity cards, laws about e- solutions, a culture of innovation, digital skills, and a data-driven government. AI is used in detecting cases of tax fraud by the Estonian tax and customs board, in education for personal learning by the Ministry of Education and Research, in distance monitoring by the environmental agency, environmental board, and information board, in unemployment assessment risk by the Estonian unemployment insurance fund, in automatic transcriptions of court hearings and parliamentary sittings by Estonian courts and the Estonian parliament (e-estonia, 2025).

Lesson Learned

Estonia is known across the world as an innovator of technological advancement, or "e-Estonia" (e-estonia, 2025). For nations such as Pakistan, which are seeking to enhance the provision of public services, the effective use of artificial intelligence (AI) in public policy in Estonia offers significant insights. Some are the following:

Digital Infrastructure: Estonia built an efficient digital network that includes fast internet, digital identity frameworks in support of AI (e-Residency), and secure data transport mechanisms (X-Road).

Insights for Pakistan: Increase in technological infrastructure and broadband speeds nationwide, especially in remote and rural regions.

To make it easier to use services provided by the government, create a secure online identification system (such as NADRA digital ID).

Create an extensive transfer of information infrastructure that will ensure safe information transfer across government departments.

Citizen-Centric AI Services

AI is being used by Estonia to enhance the quality of public services like e-health, e-education, and e-tax. AI chatbots have been used by the government for citizen-focused programs, empowering citizens and facilitating engagement. Traffic jams decrease via the employment of AI algorithms to control traffic networks. To improve connectivity and effectiveness, the government is also developing intelligent public transportation options, such as smart public transport solutions (Hamer, 2024).

Insights for Pakistan: Implementing AI-powered e-Government systems for education, health care, and tax paying.

Create chatbots and virtual assistants powered by AI to answer questions from citizens.

Data-Driven Decision Making
For better distribution of resources, estimated innovations, and advice on political decisions, Estonia uses AI analysis as a leader in AI adoption (Velsberg, 2024).

Insights for Pakistan: Establish AI-powered data analytics divisions in government agencies to evaluate information and guide policymaking.

Use AI for crisis solutions, agricultural predictive analytics (crop production), and medical prediction data analysis (infections, pandemics).

Digital Literacy

Estonia puts the greatest importance on learning as well as the ability to enable residents and government employees to use AI and digital technologies efficiently. AI Leap 2025 (TI-Hüpe 2025 in Estonian) is an aspirational national artificial intelligence education program that has been proposed by Estonia. The project will usher in the next step of Estonia's transition to the age of technology by giving teachers and pupils free access to the top AI applications available worldwide and the training they need to utilize them successfully in the classroom. It is scheduled to start on September 1, 2025 (e-estonia, 2025).

Insights for Pakistan: There is a need to address the public about the significance of AI in modern times (Maalla, 2021). For this purpose, Pakistan needs to establish nationwide programs for digital literacy to teach people the importance of AI and how to use AI-based technologies.

To improve administration and the provision of services, train civil servants in artificial intelligence and digital technology.

Integrate knowledge of technology and artificial intelligence into academic institutions courses.

Public-Private Partnership

Estonia encourages cooperation between the public and private sectors to further the development of artificial intelligence technologies (e-estonia, 2021).

Insights for Pakistan: To provide AI solutions for public services, Pakistan should promote collaborations between the public and private sectors.

The Pakistan's government should create opportunities for private businesses to make investments in AI research and development with public companies.

International Collaboration

Estonia contributes alongside other nations and global groups to share efficient procedures and information. Estonia is ranked top in the EU on the Global Cyber Security Index, which is demonstrates its status as a global leader in cybersecurity (Nolan, 2025).

Insights for Pakistan: Through international cooperation, Pakistan may successfully strengthen its AI capabilities by utilizing resources and expertise from around the world, promoting knowledge sharing and strategic alliances.

The ministries of science and technology work together with countries like Estonia and international institutions to get knowledge from their experiences with AI.

Participate in international AI conferences to stay up to date on global advancements and techniques.

Seek out foreign collaborators for technical and financial assistance for artificial intelligence projects.

AI in Policy-Making of Pakistan

The Ministry of Information Technology and Telecom (MoITT) of Pakistan published the proposal for the National Artificial Intelligence (AI) Policy in May 2023, indicating the country's determination to be successful in the era of the Fourth Industrial Revolution (IR). Pakistan's Parliament has stated in its proposal to promote the use of AI as well as tackle dangers associated with the specific utilization of this modern technology (Ahmad, Hussain, & Mir, 2024). The "AI for Good" initiative encourages cooperation and creativity in the application of AI solutions and is the foundation of the program. The objective is to ensure that progress in technology helps every aspect of the community, and this will help to achieve the Sustainable Development Goals (SDGs) (Abid, 2024).

AI use in NADRA

Pakistan's National Database and Registration Authority (NADRA) is leading the electronic age with its advanced technologies, including behavioral AI detection systems and intelligent video surveillance. These technologies simplify travel, money transfers, and administration access. NADRA uses multi-biometric authentication, including fingerprints, facial features, and eye recognition, to protect personal information and ensure data integrity even in the face of hacked cards (Shabir, 2024).

Tax automation by FBR

By Section 148 of the Income Tax Ordinance-2001, the Federal Board of Revenue (FBR) has developed an enhanced procedure for issuing Exemption Certificates, specifically for the importing of industrial inputs and raw materials. The Automated Risk-Based Mechanism will serve as the foundation for this planned

system, which will decrease operating duration and exemption certificate issuing and protect imports from waste of time for both public and private limited corporations as well as all other individuals. The process will provide exemption certificates to public confined businesses within seven days, private limited companies within ten days, and everyone else within fifteen days. Individuals will receive a temporary exemption certificate. FBR is seeking feedback from stakeholders to improve decision-making standards (FBR, 2025).

Challenges to the adoption of AI in the Public Policy of Pakistan

Major challenges remain in Pakistan, including a lack of technological knowledge, a lack of funding, and sociocultural resistance to implementing AI technologies (Rehman, Ullah, Jalal, & Yousafzai, 2024).

The technological framework represents one of the biggest barriers to AI integration in Pakistan. Many people still cannot get fast speeds or cheap internet. The companies are unable to maximize the potential of AI solutions that depend on real-time data processing and transmission without a stable connection. Furthermore, the efficacy of AI technology is hampered by the absence of accurate information accumulation and storage mechanisms (News-Desk, 2025).

The importance of adapting AI solutions to the local environment is not addressed in the draft National AI Policy, which ignores the variety of language and cultural requirements. For example, AI teaching portals need to be able to provide material in native languages in Pakistani villages where English is not the primary medium of interaction. If this isn't done, a significant section of people might not be able to gauge the prospects presented by AI (Abid, 2024).

One of the biggest challenges in Pakistan is the shortage of skilled AI professionals. Pakistan's tech-oriented issues related to artificial intelligence include the lack of skilled professionals in domains like programming, data science, computer science, machine learning, and development, as well as providing funding for the education and training of future AI professionals (Khan, 2024).

AI cannot be implemented successfully without reliable, up-to-date, and robust information from a variety of sectors, such as agriculture, education, health, climate, and resources. The adoption of artificial intelligence techniques could be hindered by today's situation's restricted information accessibility (Abid, 2024).

The ethical and social impact of AI is a legal challenge for Pakistan. Government must strike a balance between ethical and social aspect in light of the ethical and societal ramifications of AI. The legislation must focus on the issue of the digital divide to ensure equitable access across the country. AI adoption on a large scale may have detrimental effects on society, including job loss and economic inequality. To guarantee an inclusive AI-driven future, governments must also address data privacy rights, such as copyright protection and data privacy (Ahmad, Hussain, & Mir, 2024).

Strategies for Implementing AI in Public Policy of Pakistan

- Firstly, Pakistan has to invest in building AI infrastructure. For this purpose, it is necessary to invest in high-speed internet, promote open government data, and develop robust data collection, storage, and exchange from one agency to another securely.
- The legislative body should pass laws like the Personal Data Protection Bill to ensure privacy.
- AI and data science programs should be introduced in universities and training centers.
- Equitable access to AI and high-speed internet is must across urban and rural areas. A program should be started by the government of Pakistan, named as the ‘’PICI (Pakistan Internet Connectivity Initiative)’’. It should be applied in one provision and then in others to ensure digital connectivity.

- Collaborate with other nations and organizations that are experiencing the technology of artificial intelligence.
- Cooperate with private tech companies or AI experts and data scientists to introduce digitized centers on a large scale across the country.

CONCLUSION

Artificial Intelligence (AI) can transform government, increase accountability, and boost the effectiveness of providing services when incorporated into Pakistan's public policy structure. Pakistan gained important lessons from the Republic of Estonia. Pakistan should emphasize investments in high-speed internet, data collecting, and storage technologies; public-private cooperation; and promote international collaboration by taking inspiration from Estonia's innovative, AI-powered public policy model. The government must also work towards developing an efficient workforce using AI and its associated programs in universities and training institutions. The formulation of AI policies must prioritize ethical issues like data privacy. Pakistan will be able to confront obstacles and fully utilize AI for sustainable development and bettering the lives of its people if these suggestions are put into practice.

RECOMMENDATIONS

- ✓ Forums like the Special Investment Facilitation Council (SIFC) are essential for Pakistan to succeed in AI.
- ✓ The Prime Minister should oversee the creation of a specialized management body to enhance the execution procedure.
- ✓ To educate compatible departments to achieve full acceptance of AI, the panel should consist of an array of stakeholders from the National Security Division, including academics, the political community, and AI professionals.
- ✓ Make a team for regulatory review and to update AI policies actively.
- ✓ AI chat boxes should be added to every official government website for ease of use and guidance of the public.
- ✓ Pakistan's AI plan must consider the ethical concerns

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