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The Role of Artificial Intelligence in Advancing Administrative Management: Towards a More Efficient and Innovative Administration — Estonia as a Model

دور الذكاء الاصطناعي في تطوير الإدارة العامة: نحو إدارة أكثر كفاءة وابتكاراً ـــ إستونيا نموذجا

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Abstract :

Artificial intelligence (AI) plays a pivotal role in advancing administrative management towards greater efficiency and innovation, with Estonia serving as a leading model in this field. Since its digital transformation began post-independence, the Estonian government has embraced AI technologies to streamline public sector workflows by automating decision-making processes, enhancing citizen communication, and developing big data analytics systems. Notable projects include the "Bürokratt" virtual assistant network, optimized unemployment insurance application processing, and AI applications in border control. These innovations accelerate transaction times, reduce costs, and improve service quality. However, challenges concerning transparency, fairness, and algorithmic bias remain, which the government addresses by establishing regulatory frameworks and ethical standards. Estonia's model exemplifies how AI can reshape public administration toward a smarter, more effective future.

Keywords: Artificial Intelligence, Administrative management, Estonia, Digital Transformation, E-Government, Smart Governance, Automation

JEL classificationcodes:O33, O38, H83, M10, O32, J24

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1. Introduction

In light of the ongoing digital technological transformation witnessed globally over recent years, it has become imperative for every country, regardless of its policies or orientations, to keep pace with this change. Administrative management, as the essence of the administrative process, is undergoing a transformation driven by the rapid development of artificial intelligence (AI) technologies. The objective is no longer limited to digitizing procedures, but rather transitioning to intelligent management based on automated data processing, forecasting, and real-time decision-making.

Among international experiences that have achieved groundbreaking success in this field is Estonia, which has become a pioneering model in building a digital public administration reliant on AI and open data. Estonia's e-government development experience is unparalleled, having led this field for over 20 years with more than 2,000 digital public services that save thousands of human work hours annually. Estonia aims to transform governance into an effective and invisible process, making it a leading country in adopting innovative and emerging technologies, with a clear focus on AI, which enjoys global and national priority according to its national digital agenda. This has made Estonia an inspiring model and a distinctive vision in global digitization. Despite its small geographical size, Estonia has become digitally large and an exemplary reference for both large and small countries in digitization and its tools.

1.1. Research Problem

How does artificial intelligence impact the development of administrative management methods towards greater efficiency in Estonia's successful experience, and what lessons can be derived?

1.2.Hypothesis

- The adoption of artificial intelligence in Estonia's public administration has contributed to improving administrative management efficiency.

1.3.Importance of the Study

The significance of this study stems from the growing international interest in enhancing public services amid the deep digital transformation worldwide, where AI has become central to designing

the most efficient administrative models. Specifically, the importance lies in:

- Estonia's pioneering experience in integrating AI within administrative processes, serving as a model for many countries.
- The scarcity of studies explaining the causal relationship between digital administration and the efficiency or effectiveness of government performance.
- Enriching scholarly literature with real-world experiences regarding the impact of AI applications on administrative performance.

1.4.Objectives of the Study

- To study the impact of AI integration on public administration development indicators in Estonia during the period 2018–2024.
- To evaluate the effectiveness of Estonia's digital policies.
- To analyze the evolution of AI use in Estonian administration.
- To propose practical recommendations for policymakers in countries aiming to digitize their administrations, inspired by Estonia's example, such as Algeria.

1.5.Research Methodology

The study uses an analytical and descriptive approach relying on various indicators reflecting the extent of AI utilization in Estonian administration and its impact on overall performance, based on:

- A dataset from official sites and platforms such as e-Estonia, KrattAI project, OECD, and EGOV Academy covering 2018–2024.
- Review of literature and previous studies on AI's impact on administrative decision-making and performance improvement.
- Analysis of reports and secondary sources (books, articles, case studies). Theoretical and Analytical Framework

1.6. Previous Studies:

Several recent studies have examined the role of artificial intelligence and digital technologies in transforming public administration, particularly in digitally advanced countries such as Estonia.

The study by **Jan Izdebski (2023)**, published in the *Discourse of Law and Administration Journal*, analyzes Estonia's public administration system as a leading example of digital governance. The research highlights how Estonia has integrated artificial intelligence and digital platforms into government operations. The study concludes that the country's advanced digital infrastructure enables efficient administrative processes, enhances transparency, and significantly improves public service delivery.

Similarly, **Tuğba Damgacı (2025)**, in the *ODU Journal of Social Sciences Research*, explores the transition from traditional e-government to AI-driven government (A-Government) through a comparative analysis between Estonia and Türkiye. The study emphasizes that strong digital infrastructure, clear regulatory frameworks, and active citizen participation are essential conditions for the successful implementation of artificial intelligence in public administration.

Another important contribution is the study by **Engin, Crowcroft, Hand, and Treleaven (2025)** published in the *arXiv Research Repository*. The authors propose the concept of the **Algorithmic State Architecture**, which explains how governments can integrate artificial intelligence into administrative decision-making systems. Using several international examples including Estonia, the study demonstrates that effective AI governance requires the integration of digital infrastructure, large-scale data systems, and algorithmic decision tools.

In addition, **Rajamäe Soosaar and Nikiforova (2024)** investigate data-sharing practices among local governments in Estonia. Their study highlights the importance of open government data as a key resource for developing artificial intelligence applications in the public sector. The results indicate that although Estonia has an advanced digital ecosystem, institutional barriers can still affect the full exploitation of government data for AI development.

Finally, a study published in the *Journal of Economic Behavior & Organization (2025)* analyzes the broader impact of digital government systems on institutional performance and public trust. Using Estonia as a case study, the research finds that digital governance and AI-supported public services contribute to reducing bureaucracy, improving administrative efficiency, and strengthening citizens' trust in government institutions.

Overall, these studies confirm that Estonia represents one of the most successful international models in integrating artificial intelligence into public administration. Its success is largely attributed to advanced digital infrastructure, extensive data availability, strong institutional support for innovation, and high levels of digital adoption among citizens and businesses.

2. Conceptual Framework

2.1.Definition of Administrative Management

Definitions vary, including:

- A coordinated and integrated set of processes encompassing mainly planning, organizing, directing, and control — essentially setting objectives and coordinating efforts to achieve them; management involves coordinating different functions**.**(Al-Raqiba, 2024)
- Mosebraun defines it as the process of establishing strong positive relationships between leaders and subordinates to foster cooperation instead of conflict **(The Role of Artificial Intelligence in Digital Transformation and Its Most Important Forms, 2025).**
- It is the performance of functions (planning, organization, direction, control) among different physical, human, and intangible resources aimed at achieving goals while considering environmental influence**.**(Al-Mulla, 2020)
- Mohamed Al-Jawhari defines it as directing elements granted formal authority to coordinate and organize subordinate work aligned with institutional goals, considering employees' needs and demands **(Al-Mulla, 2020).**

These definitions reveal administrative management as an integrated, coordinated process directing and harmonizing human, material, and intangible resources through core functions (planning, organizing, directing, controlling) to achieve goals efficiently and effectively. It also relies on building positive leader-subordinate relationships that encourage collaboration, considering workers' needs and environmental changes to ensure adaptability and continuity.

4.2. Definition of Artificial Intelligence

Artificial intelligence (AI) has many definitions:

- AI is the simulation of human intelligence processes by machines, especially computer systems, including learning, reasoning, and self-correction. Examples include expert

systems, natural language processing (NLP), speech recognition, computer vision, and generation tools like ChatGPT. AI requires specialized hardware and software to develop machine learning algorithms, commonly using languages like Python, R, Java, C++, and Julia(Bahaz, 2023)

- AI is the ability of machines to simulate human mental processes such as thinking and exploration, capable of performing complex tasks like proving mathematical theorems and playing chess skillfully. Despite its large storage capacity and high speed, AI still cannot fully replicate human mind's analytical, inferential tasks
- AI enables computers and machines to simulate human learning, understanding, problem-solving, decision-making, creativity, and autonomy. AI-powered applications can see, identify objects, understand and respond to human language, learn from new information, provide detailed recommendations, and act independently, exemplified by self-driving cars (Al-Ghubari, 2023)**.**

Thus, AI (Artificial Intelligence) comprises computer systems capable of simulating human cognitive and behavioral abilities by means of various techniques that enable performing complex tasks usually requiring human intelligence, such as natural language processing, voice and image recognition, user interaction, and environmental response. It employs machine learning and deep learning algorithms to improve performance over time through experience and data. While advanced, AI still cannot rival the human mind in deep inference or self-awareness, but its rapid, precise execution and autonomous operation in many applications make it pivotal in the contemporary digital revolution.

2. Applications of AI in Public Sector Administration

Modern administration integration with AI is indispensable and sought internationally to advance and enhance public service delivery with greater acceptance. Digital transformation enables organizations to achieve goals efficiently through rapid adaptation to new technology and environments, focusing on developing individual capacities to ensure loyalty, commitment, and optimal performance while meeting customer needs and total quality in products and services. AI applications in public administration have

shifted the traditional paper-based systems to electronic management, enabling better administrative activity management.

2.1.Key AI applications in public administration include:

- **Chatbots and Virtual Assistants**: AI-powered tools improving communication between citizens and government agencies, reducing response time, handling large volume inquiries (especially during crises), and enabling staff to focus on higher-level tasks.

Examples include Estonia's **Bürokratt**, Singapore's SG OneService(Barghouth, 2023)**.**

Table 01 :Examples of Government Chatbots

Application	Country	Purpose
Bürokratt	Estonia	A digital assistant that connects various government services.
SG OneService	Singapore	When residents in Singapore send the word "Hello" to a public phone number via WhatsApp or Telegram, they are connected to the SG OneService.
Alex	Australia (Australian Tax Office, ATO)	Helps citizens with tax-related queries and services; an early example of public-sector chatbot use (since 2016).

Source: prepared by the author based on: (COMISSION, 2022)

Intelligent Process Automation (IPA): Replacement of human tasks with computer systems to achieve routine office work automation, including document verification, tax filing, and licensing without human intervention, requiring clear task identification, resource allocation, and modern digital communications(Boulghouas, 2025)

- **Predictive Analytics:** Data analysis to forecast future events or trends using statistical methods and machine learning, applied in Estonia for service consumption monitoring, epidemic prediction, security risk analysis, fraud detection in agriculture subsidies, and economic licensing
- **Cognitive Services**: AI applications simulating cognitive human capabilities such as understanding, reasoning, and speech recognition, exemplified by Bürokratt components like Neurotõlge and Neurokõne for voice-text recognition and translation.
- **AI in Judicial Systems:** Utilized for legal data analysis, decision suggestions based on precedents, and even predictive

case outcomes; Estonia has deployed a "robot judge" for small claims under €7,000, alleviating court pressure.

- **Fraud Detection:** Machine-learning algorithms to detect suspicious transactions, credit card fraud, money laundering in banking and insurance through real-time financial transaction
- **Digital Identity and e-Voting:** Enhancing security and automated verification in voting processes.

2.2. Digital and Smart Administration in Estonia

Since gaining independence in 1991, Estonia undertook rapid reforms prioritizing a digital approach to modernize its economy and public sector. Deploying widespread internet access, digital literacy initiatives, and integrated technological infrastructure, Estonia's digital transformation progressed through four key phases:

Table 2. The Evolution of Digital and Smart Administration in Estonia

Phase	Period	Key Highlights
1. Digital Foundation	1997–2005	Tiger Leap initiative; almost universal internet use; e-banking services; establishment of digital cabinet meetings; e-Tax Board; mobile parking payment; launch of X-Road data exchange platform; digital ID and signatures; i-Voting system
2. Service Expansion & System Integration	2006–2013	Cybersecurity leadership post-2007 cyber-attacks; blockchain-based KSI for data integrity; national e-health systems; e-prescription; public services green paper
3. International Outreach & Digital Expertise	2014–2017	e-Residency program; road administration e-portal; world's first data embassy in Luxembourg; Northern Interoperability Solutions Institute (NIIS) establishment for e-governance solutions
4. AI Integration & Advanced Innovation	2018–present	Proactive integrated services; national AI strategy (2019) for public/private sectors; launch of government virtual assistant KrattAI; proactive child welfare services; remote notary verification; hydrogen-powered autonomous vehicle; e-Marriage and e-Divorce services; Eesti.ee integrated mobile app

Source: prepared by the author based on:Estonian Business and innovation Agency; e-Estonia; https://e-estonia.com/story/

The current phase (2024–2030) focuses on expanding AI adoption with an €85 million budget, aiming to transform Estonia into a global digital economy hub based on the "KrattAI" concept enabling voice-controlled public services and widespread AI techniques use, anticipating 75% AI integration in the private sector by 2030.

2.3. Legislative and Technical Environment Supporting AI in Estonia

- **Legislation:** Estonia has advanced legal frameworks supporting AI, emphasizing responsible innovation, privacy protection, and digital ethics since 2019.
- **Digital identity** is used centrally with strict legal data governance. Laws regulate automated administrative decisions and smart decision support systems, updating for autonomous vehicles and cloud services(Bakkah, 2025)**.**
- **Technology:** Since 1999, Estonia's X-Road platform enables secure, interoperable data exchange across institutions and with countries like Finland. The pioneering "data embassy" concept secures government data backups internationally for resilience against cyberattacks or emergencies. Government invests heavily in AI training and adopts AI across over 70 public sector use cases **(The Role of Artificial Intelligence in Digital Transformation and Its Most Important Forms, 2025).**

2.4. Trends Analysis: AI and Administrative Management in Estonia (2018–2024)

AI technologies have increased rapidly in Estonian public administration, automating transactions, delivering smart citizen services, and improving institutional performance. Some Key indicators show:

Table 3. "The Impact of Artificial Intelligence on Administrative Management in Estonia (2018–2025)

Indicator	Measure	Notes / Source
Number of AI Solutions in Government	Quantity of smart systems	Grew from 4 (pilot) in 2018 to ~130 active in 2024
The use of AI	% of Estonia's businesses	The use of AI among Estonia's businesses more than doubled in 2024 from the previous year (from 5.19% in 2023 to 13.89% in 2024) **(*Estonia-2025-Digital-Decade-Country-Report,* 2025).**
Cloud services	% Rate of european cloud services usag	With 52.6% of businesses adopting cloud, Estonia is leader in the uptake of cloud, significantly surpassing the EU average of 38.7% **(*Estonia-2025-Digital-Decade-Country-Report,* 2025).**

Digital Service Coverage	% of public services available online	95.8% for citizens, 98.9% for businesses (***Digital Decade 2024: Country Reports*****, 2024)**
e-ID / Smart Card Adoption	Number of digital transactions per year	Nearly 98% of adult population **(e-Estonia Facts & Figures)**
e-Service Usage	Number of digital transactions per year	Includes tax filings, health services, e-Voting, e-Residency **(*E-Estonia Facts*, 2025)**
Open Data Availability	Number of datasets publicly available	>900 datasets across government (Open Data Portal / Estonia, 2024)**(*Estonian-Open-Data-Portal*, 2024)**
Citizen Digital Satisfaction	% of citizens satisfied with digital services	85–88% in OECD surveys **(Government at a Glance, 2023)**
Automation Readiness	% of government processes digitized / automated	Approx. 90–95% of standard administrative processes (EU Digital Decade)**(*Digital Decade 2024: Country Reports*, 2024)**
Time Saved via Digital Processes	Human work years / hours saved	Estimated ~1,800 human work years per year via data exchange (e-Estonia Factsheet)**(*Facts-and-Figures*, n.d.)**
Trust in Government Digital Services	% citizens reporting trust	80%+ according to OECD surveys and national polls**(OECD, 2025)**
ICT Specialist Workforce	% of total workforce in ICT	6.7% of workforce (Digital Skills Snapshot, EU) **(*E-Estonia Facts*, 2025)**

Source: prepared by the author based on:(Directorate-General for Communications Networks, 2026)+ (e-estonia, 2025)+ (commision, 2024)+ (e-estonia, E-governance saves money and working hours, 2020) + (OECD, 2025)

The table presents a comprehensive overview of Estonia's digital government ecosystem and highlights key indicators that directly or indirectly influence the adoption and effectiveness of Artificial Intelligence (AI) in public services.

- **Number of AI Solutions in Government**; demonstrates a dramatic growth from 4 pilot systems in 2018 to approximately 130 active AI solutions in 2024. This indicates a clear commitment by the Estonian government to integrate AI into administrative processes, enabling smarter decision-making and more efficient service delivery.

- **The use of AI among businesses**; which more than doubled in 2024 (from 5.19% in 2023 to 13.89%), reflects a broader digital ecosystem. A strong AI-enabled private sector supports the development of AI skills and solutions that can spill over into public services, creating synergies between the government and industry.
- **Cloud services adoption**; (52.6% of businesses, surpassing the EU average of 38.7%) underpins AI deployment by providing scalable, flexible infrastructure for data processing and storage, which is essential for large-scale AI applications in the public sector.
- **Digital Service Coverage**; (95.8% for citizens and 98.9% for businesses) ensures that nearly all public services are accessible online, creating a foundation for AI integration in service delivery, such as automated responses, intelligent workflows, and predictive analytics.
- **e-ID / Smart Card Adoption** and **e-Service Usage**; reflect citizen engagement with digital services. Nearly 98% of adults use digital IDs, and transactions cover tax, health, voting, and residency services. High adoption facilitates AI-based personalization, fraud detection, and process automation in public services.
- **Open Data Availability**; (>900 datasets) is critical for AI applications, as transparent, structured, and accessible data enables predictive modeling, policy simulations, and informed decision-making.
- **Citizen Digital Satisfaction. (85–88%)** and **Trust in Government Digital Services**; (>80%) indicate public acceptance, which is essential for deploying AI in sensitive areas such as healthcare, taxation, and e-Governance without resistance or distrust.
- **Automation Readiness**; (90–95% of standard administrative processes digitized) shows the operational maturity needed for AI systems to function effectively, minimizing manual intervention and ensuring consistency in AI-driven processes.
- **Time Saved via Digital Processes** 1,800 human work years per year); demonstrates measurable efficiency gains. AI can further enhance these gains by handling complex, repetitive, or data-intensive tasks, allowing human resources to focus on higher-value decision-making.
- Finally, the **ICT Specialist Workforce**; (6.7% of the total workforce) provides the human capital necessary to develop, maintain, and improve AI solutions, ensuring sustainability and innovation in public services.

Overall, the interplay of these indicators—digital infrastructure, citizen engagement, workforce capacity, and technological adoption—creates an ecosystem in which AI can be effectively leveraged to improve efficiency, accessibility, and responsiveness of Estonia's public services. This comprehensive digital readiness positions Estonia as a global leader in AI-enabled governance.

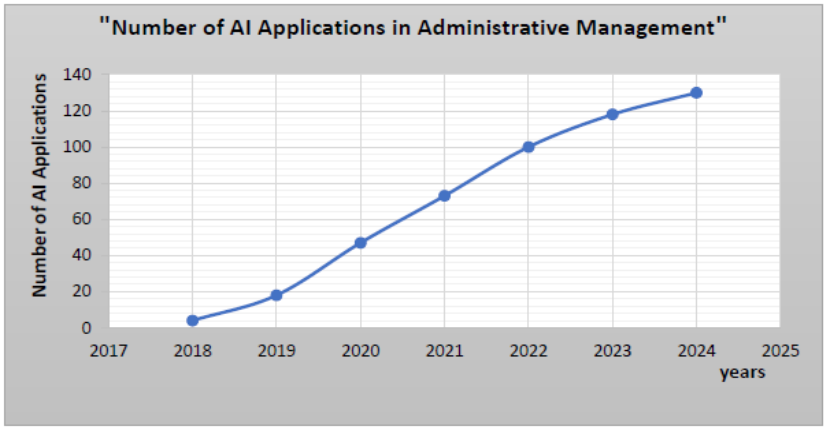
Note: While the table provides a clear snapshot, it is important to note that annual trend data (2018–2024) are not available for all indicators, which limits the ability to analyze year-on-year progress.

2.5. Qualitative Analysis of AI and Administrative Management Relationship

The qualitative analysis of the relationship between artificial intelligence and administrative management aims to understand how this technological integration influences the nature of administrative work, its structures, and performance levels—by examining non-quantitative interactions that reflect transformations in organizational culture, decision-making methods, and administrative innovation.

2.5.1. Growth in the Number of Smart Systems in thePublic Sector This indicator has the ability to directly measure the extent to which a country can expand the adoption of artificial intelligence and integrate it across all sectors.

Figure 1. Number of Smart Systems and Applications in Estonian Government Institutions during the Period 2017–2024



Source: prepared by the author based on**:** (COMISSION E. , 2024)+ **OCDE**

Projects in 2018 to **18 applications under implementation and development in 2019**, reaching **47 active applications in 2020**, and **73 applications in 2021**. By **2023**, the number rose to **118 active applications** within the *Bürokratt* ecosystem, and by **2024**, it reached approximately **130 fully integrated active applications**,

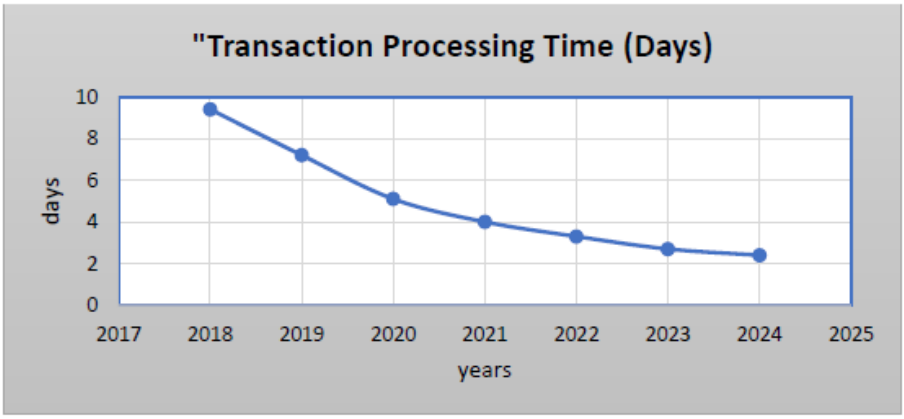
including automated document processing platforms, virtual assistants, and self-service systems for citizens.

This reflects the rapid acceleration of AI-driven digital transformation. The number of AI applications in Estonian administration has shown remarkable growth and a qualitative leap, particularly after 2020, which coincides with the launch of the national artificial intelligence strategy "KrattAI" in 2020 and the government's adoption of an open-source platform approach to facilitate the continuous integration of new technologies.

2.5.2. Reduction in File Processing Time

This indicator allows for assessing the extent of improvement in administrative efficiency and the reduction of time and bureaucratic costs within Estonian public administration.

Figure 2: Electronic Data Processing Time in Estonia Measured in Days during the Period (2017–2024)

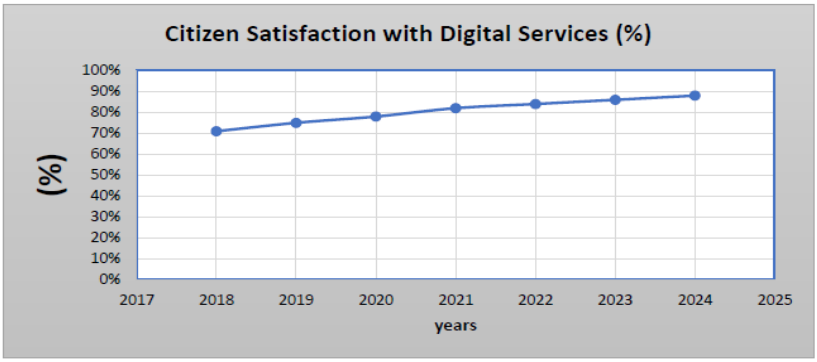


Source: prepared by the author based on ((SGI), 2024)+ (Teataja, 2019/2022)

According to the figure, the processing time of administrative files has shown a significant and rapid decrease since the early adoption of artificial intelligence applications in public administration. It dropped from **9.4 days in 2018** to **2.4 days in 2024**, representing a **74% reduction within just six years**. As previously noted in the stages of development, this improvement results from the implementation of **automatic verification solutions and intelligent file classification systems**, which stem from the shift toward **automation**, where processing is now performed automatically and in **real time**, rather than manually — particularly in areas such as **taxation, licensing, and social assistance**.

2.5.3. Improvement in Citizen Satisfaction Indicators This indicator demonstrates the extent to which artificial intelligence has succeeded in enhancing Citizens' trust in public administration

Figure 3: Percentage of Citizen Satisfaction with Digital Services Provided in Estonia during the Period (2017–2024)

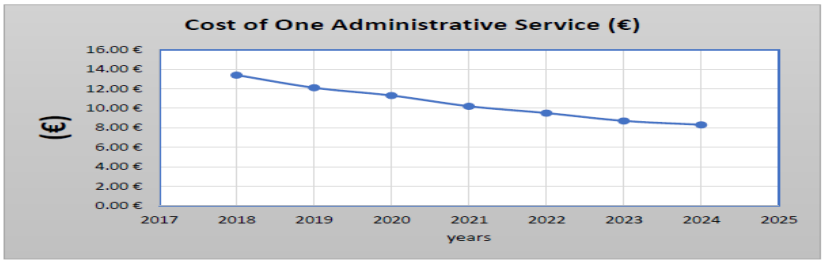


Source: prepared by the author based on: (AFFAIRS, 2025)+ (Lõvi, 2025)

Estonia recorded a digital satisfaction rate of 88% in 2024 compared to 71% in 2018. This improvement can be attributed to several key factors, including the **simplification of procedures**, the **acceleration of service delivery**, the **reduction of human errors**, and the **provision of multilingual and multimedia support** (voice, sign, and text).

2.5.4. Reduction in Administrative Operating Costs This indicator helps determine the extent to which **economic efficiency** has been achieved as a direct result of employing artificial intelligence.

Figure 4: Average Cost of Administrative Service in Estonia during the Period (2017–2024)



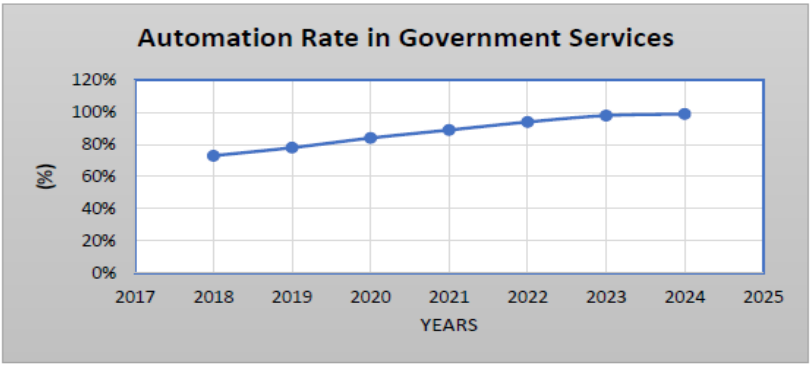
Source: prepared by the author based on**:** (Smyth, 2024)**+** (OECD, OECD Economic Surveys, 2024)

As shown in this figure, there has been a rapid decline in the cost of administrative services provided within Estonian public administration, reaching **€8.3 in 2024**, down from **€13.4 in 2018**, representing a **38% decrease**.
This reduction can be explained by the **dominance of automation and artificial intelligence** in various administrative tasks and functions, which has **reduced the need for human resources, paper usage, and time**, thereby leading to a **significant decrease in operational expenditures**.

2.5.5. . Automation in Government Services

This indicator illustrates the extent to which the government has successfully moved **beyond traditional digital transformation** toward a **smart, AI-driven transformation**.

Figure 5: Automation Rate in Estonian Government Services during the Period (2017–2024)

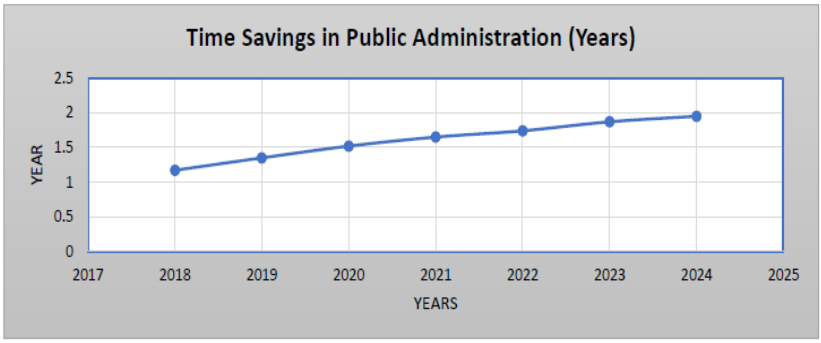


Source: prepared by the author based on**:** (COMISSION E. , Estonia 2024 Digital Decade Country Report, 2024)**+ OCDE**

As illustrated in the figure, the level of automation increased sharply from **73% in 2018** to **over 99% in 2024**, making **Estonia the only country that provides nearly all of its public services fully online**.
This achievement is primarily attributed to the **integration of the X-Road infrastructure with the Bürokratt virtual assistant**, which has enabled citizens to complete administrative procedures **without the need to visit physical offices**.
Time Savings in the Public Sector (Human Work Years Saved)
This variable demonstrates the role of artificial intelligence in

reengineering administrative functions and **enhancing institutional efficiency**.

Figure 6: Time Savings in the Public Sector during the Period (2017–2024)



Source: prepared by the author based on**:** (Estonia 2024 Digital Decade Country Report, 2024)

According to the figure, the number of work years saved by the government since the adoption of artificial intelligence increased from **1,172 years in 2018** to nearly **1,950 years in 2024**.
This outcome reflects the **automation of routine tasks**, which has saved **thousands of working hours** and allowed for the **reallocation of human resources to strategic functions** such as **planning and supervision**.

2.5.6. Analysis of the Impact of Artificial Intelligence Integration on Administrative Performance Indicators

Based on the analysis of the previously discussed indicators, it is evident that they all demonstrate a **consistent and harmonious development**, revealing a **direct causal relationship** and confirming the **effectiveness of AI-based digital policies**, which will be further analyzed in the following points.
Estonia's leadership in digital governance integrating AI since 2018 led to fundamental changes:

- AI went beyond automating routine tasks to reengineering administrative processes, with platforms like Bürokratt replacing human clerks and governing via intelligent networks rather than hierarchical structures

- Big data analytics improved policy-making and administrative decisions by providing reliable, real-time insights, reducing reliance on intuition.
- AI algorithms dynamically monitor citizen needs, enabling adaptable public policy agendas.
- Challenges remain concerning data privacy, ethics in automated citizen-impacting decisions, highlighting the need for clear policies safeguarding rights and integrity.

3. Comparison with Previous Studies

AI improves administrative efficiency up to 30%, reduces operational costs, automates HR and data management (e.g., Siemens, Unilever) **(Al-Raqiba, 2024).**

- AI applications support precise decision-making free from bureaucratic delays, with emphasis on comprehensive legal frameworks **(The Role of Artificial Intelligence in Digital Transformation and Its Most Important Forms, 2025).**
- AI fosters transparency and balance in public administration quality and integrity .
- AI enhances decision quality in specific institutions, as seen in case studies like Holcim Cement **(Barghouth & Maouchi, 2023).**
- AI boosts HR management effectiveness in performance tracking and leadership evaluation **(Bahaz, 2023).**

All previous studies confirm AI's vital role in advancing administrative management.

4. Lessons from Estonia's Experience

Key takeaways include:

- **Comprehensive national AI strategy** since 2019 supporting public/private sectors, scientific research, and legal environment.
- **Supportive, flexible legislation** ensuring privacy, digital identity trust, and transparency **(Khamees, 2023).**
- **Long-term investment** in digital infrastructure (X-Road platform) and skills development gave Estonia a competitive edge. (investinestonia, 2025)
- **Inclusive, transparent digital services** offering over 2,000 government e-services accessible without physical presence **(Khamees, 2023).**

- **Strong institutional frameworks** with expert teams monitoring AI strategy implementation.
- **Alignment with EU policies** harmonizing standards and attracting joint funding **(Al-Ghubari & Yousri Abdul Fattah Othman, 2023).**
- **Broad impact** improving service quality, speeding administrative processes, reducing bureaucracy, cutting costs and promoting economic progress.

For Algeria:

- It can benefit by accelerating current AI and digital transformation strategies inspired by Estonia's integrated legislative and infrastructural approach **(The Role of Artificial Intelligence in Digital Transformation and Its Most Important Forms, 2025).**
- Automating administrative services and advanced data analytics can improve service quality and reduce bureaucracy.
- Intensive AI training programs will enhance government employees' digital competencies.
- Developing clear, modern legal frameworks will ensure ethical, effective AI use protecting citizen rights.
- Building unified, secure digital infrastructures will enable interoperability among administrative institutions.

5. Summary

- Since 2018, AI and administrative management in Estonia show a positive, integrated relationship significantly enhancing public administration quality and efficiency.
- Estonia created a flexible administrative environment responsive to citizens' needs, underpinned by robust digital infrastructure and clear legislative policies **(The Role of Artificial Intelligence in Digital Transformation and Its Most Important Forms, 2025).**
- Ethical, privacy, and transparency challenges remain key concerns alongside ongoing AI expansion in administration.
- Numerous studies affirm AI's pivotal role in administrative performance improvement **(OECD, 2025).**
- For Algeria, these lessons offer an invaluable roadmap to accelerate digital public sector transformation, improve services, reduce bureaucracy, and strengthen citizen trust,

requiring clear AI strategy, modern legislation, digital infrastructure upgrades, and skill development for sustainable progress.

- Estonia stands as a practical, effective model not only technologically but also in reshaping the citizen-government relationship for an era requiring agile, efficient digital governance.

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