

AI-Based Decision Support Systems for Enhancing Transparency and Combating Administrative Corruption: Toward a Smart Governance Roadmap in Algeria

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Abstract

This study examines the strategic utility of Artificial Intelligence-based Decision Support Systems (AI-DSS) in advancing digital transparency and curbing administrative and financial corruption within public sector organizations. Employing a threefold methodological framework—a descriptive-analytical approach for theoretical grounding, a comparative analysis evaluating benchmark models (Singapore and Estonia), and a foresight method to map local implementation prospects—the research analyzes how predictive algorithms and big data analytics drive a structural shift from conventional ex-post auditing to proactive digital oversight and early risk mitigation. A key contribution of this work is a strategic roadmap (2026–2035) designed to operationalize smart governance across Algeria’s public administration. The findings demonstrate that a viable institutional transition relies fundamentally on cross-departmental data integration and the adaptation of legal structures to ensure algorithmic transparency and digital accountability. Operationally, the paper advocates for the swift establishment of a unified national data-interoperability platform alongside modernized regulatory frameworks as essential prerequisites for executing predictive monitoring in public service..

Keywords: AI-DSS; Algorithmic Transparency; Administrative Corruption; Smart Governance; Algeria; Foresight Analysis.

Introduction

1.1. Background and Context

Contemporary public administration is undergoing structural transformations driven by rapid advancements in emerging technologies. Recent administrative literature has shifted focus from routine procedural automation—the traditional e-government paradigm—toward designing advanced organizational models centered on smart and cognitive governance. Within this evolving landscape, AI-Based Decision Support Systems (AI-DSS) have emerged as a strategic cornerstone. Their impact extends beyond enhancing operational efficiency and optimizing public expenditure to actively reshaping institutional integrity through precise digital transparency, stronger accountability, and proactive oversight capable of mitigating administrative and financial corruption before occurrence.

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Reinforcing integrity in public resource management no longer hinges on traditional ex-post control mechanisms that rely on limited document audits and periodic physical inspections. Instead, modern governance demands digital architectures capable of processing big data and detecting anomalies, suspicious patterns, and conflicts of interest through precise predictive analytics. Although international experience demonstrates the efficacy of coupling machine learning techniques with open government data to restrict corruption channels, successful implementation remains contingent upon the maturity of the host institutional and regulatory environment. In Algeria, digital transformation represents a vital avenue for modernizing public services and streamlining administrative bureaucracy; nevertheless, effective deployment of these intelligent systems faces persistent challenges regarding infrastructure readiness and regulatory frameworks that guarantee algorithmic transparency and digital accountability.

1.2. Problem Statement and Research Questions

The primary research gap addressed by this study lies in the scarcity of Arab academic literature and empirical research that integrates theoretical foundations of AI-DSS with an actionable, empirically grounded foresight framework for emerging economies—specifically Algerian public administration. Existing scholarship has predominantly focused on superficial procedural digitization or generalized theoretical discussions of artificial intelligence, lacking concrete methodological frameworks that articulate how public institutions can transition from reactive ex-post oversight to proactive digital monitoring.

Against this backdrop, the central problem statement of this study asks: **To what extent can AI-Based Decision Support Systems enhance transparency and curb administrative corruption within public utilities, and what are the requirements and prospects for their implementation in Algeria?**

To address this central inquiry, the study poses the following operational questions:

- What is the conceptual and evolutionary framework of AI-Based Decision Support Systems and smart governance in the public sector?
- How do predictive techniques and big data analytics improve administrative decision quality, enhance transparency and accountability, and mitigate corruption?
- What insights can be drawn from benchmark international experiences (Singapore and Estonia) in leveraging intelligent systems to foster integrity?
- What is the current status of digital and legislative readiness in Algeria, and what foresight roadmap can guide AI-DSS adoption through 2035?

1.3. Significance of the Study

The scholarly and practical value of this paper lies in its alignment with evidence-based smart administration trends. Its core contributions are structured across four dimensions:

- **Theoretical Dimension:** Addresses a gap in Arab academic literature bridging artificial intelligence applications with anti-corruption mechanisms.
- **Technical and Applied Dimension:** Highlights the operational function of predictive algorithms and data mining in shifting administrative oversight from a reactive posture to a preventive framework.
- **Comparative Dimension:** Identifies structural determinants and success factors from leading international paradigms (Singapore and Estonia) to assess their local applicability.
- **National Foresight Dimension:** Formulates a structural model and actionable roadmap (2026–2035) supporting Algeria’s efforts to modernize public administration and embed digital integrity.

1.4. Objectives of the Study

The overarching objective of this study is to examine how AI-DSS can be deployed to enhance transparency and combat corruption, establishing a smart governance model within public services.

The specific objectives include:

- Grounding theoretical concepts explaining the relationship between intelligent systems and digital governance.
- Deconstructing technical tools and predictive analytics utilized in early detection of administrative and financial irregularities.
- Evaluating benchmark international models to identify best practices in data governance and integrity.
- Assessing existing capacities and constraints in Algeria to formulate foresight alternatives for intelligent technology adoption.

1.5. Methodological Framework

To address the core problem statement and research questions, the study adopts an integrated three-dimensional methodological framework suitable for foresight research in public administration and digital governance:

1.5.1. Descriptive-Analytical Method

Used to ground conceptual and theoretical frameworks related to AI-DSS and smart governance, review recent literature (2020–2026), and analyze technical mechanisms of predictive algorithms and big data analytics in advancing transparency and anti-corruption.

1.5.2. Comparative Method (Case Study Analysis)

Employed to extract critical success factors from advanced international applications of AI in the public sector. Singapore and Estonia were selected based on distinct academic and functional rationale:

- **Rationale for Singapore:** Represents a mature global model transitioning from traditional ex-post control to proactive predictive monitoring of public spending and procurement risk management under its *Smart Nation* initiative, allowing evaluation of predictive analytics in corruption detection.
- **Rationale for Estonia:** Offers an international benchmark in integrated digital government and database interoperability through its *X-Road* platform, which minimized direct official-citizen interaction and reduced opportunities for bureaucracy and bribery.
- **Methodological Synergy:** Combining both cases provides a balanced institutional reference (a Asian financial/predictive model paired with a European structural/interoperability model). Merging comprehensive data interoperability (Estonia) with early risk prediction (Singapore) yields the strategic mix required for Algerian public administration to overcome isolated information silos and establish integrated smart governance.

1.5.3. Foresight Method

Applied to assess digital and legislative readiness in Algeria and construct a structural foresight model featuring a phased roadmap (2026–2035) tailored to Algerian public sector requirements.

2. CONCEPTUAL FRAMEWORK OF SMART GOVERNANCE AND DECISION SUPPORT SYSTEMS IN THE PUBLIC SECTOR

2.1. Conceptual Foundations and Evolution of AI-Based Decision Support Systems

In recent decades, public administration has transitioned from traditional information systems to intelligent platforms capable of processing complex and semi-structured data, enabling decision-makers to derive solutions and formulate more objective policies. (Kuziemski & Misuraca, 2020)

AI-Based Decision Support Systems (AI-DSS) are advanced digital frameworks that integrate artificial intelligence, big data analytics, and machine learning to deliver real-time information, predictive insights, and evidence-based recommendations, thereby reducing uncertainty and risk within complex governmental environments. (Islam & Ma'aram, 2025; Rahman, 2025)

These systems have undergone an extended evolutionary trajectory: originating in the 1970s and 1980s

as basic tools for quantitative analysis and database management, incorporating expert systems in the 1990s to model human reasoning, and expanding by the early 2000s through big data analytics and cloud computing. **(ADEPOJU & CHINONYEREM, 2025)**

Driven by recent technological advancements, AI-DSS now relies on an array of sophisticated technologies underpinning smart administration. Chief among these is machine learning (ML), which enables systems to identify patterns, discern data relationships, and forecast trends, complemented by deep learning (DL) for processing unstructured data such as images, official documents, and audio records. Additionally, generative AI has introduced capabilities for semi-automated analytical reporting, scenario modeling, and policy option generation. **(Liu & Li, 2025)**

Natural Language Processing (NLP) plays a prominent role in contemporary public decision-support architecture, enabling the automated analysis of administrative texts, legislative documents, public grievances, and audit reports to extract indicators of administrative irregularities or corruption risks. Concurrently, predictive analytics facilitates risk anticipation and the early detection of financial or administrative fraud, strengthening the capacity of public institutions to adopt preventive measures over reactive responses. **(Ajayi et al., 2024)**

Furthermore, the operational success of AI-DSS remains inextricably bound to principles of transparency and algorithmic explainability. Recent empirical research indicates that system effectiveness depends not only on efficiency gains, but also on fostering public trust and administrative accountability; transparent and explainable algorithms heighten the perceived legitimacy and civic acceptance of automated public decisions. **(Berman et al., 2024; de Fine Licht & de Fine Licht, 2020)**

Consequently, AI-DSS represents a core pillar of modern smart governance, offering an integrated digital environment that leverages data, knowledge, and artificial intelligence to refine administrative choices, elevate public performance, enhance transparency, and counteract corruption—ultimately providing advanced governments with tools for accountable, effective, and sustainable administration.

2.2. The Concept and Core Principles of Smart Governance in Public Services

The rapid evolution of information technology and AI applications has catalyzed the emergence of "smart governance" as an administrative paradigm transcending traditional public sector management. This model embeds algorithms and big data into public governance frameworks, transitioning from paper-based procedures and intuitive decisions toward data-driven, real-time administrative responses. This transition marks an evolution beyond "e-government"—which primarily focused on digitizing service delivery—toward "smart government," wherein data functions as a strategic resource and predictive analytics improve policy efficiency while building institutional trust.

Within public services, smart governance relies on an interconnected set of core administrative principles, outlined in Table 1 below:

Table 1: Structural Principles of Smart Governance and the Role of Intelligent Technologies in Their Activation

Administrative Principle	Role of AI & Intelligent Technologies in Activation	Citation / Reference
Transparency	Real-time and accurate dissemination of public data, providing automated mechanisms to log and audit electronic transactions to minimize fraud opportunities.	(Li, 2025)
Accountability	Subjecting administrative operations to digital auditing and generating precise performance indicators that enable oversight bodies to detect deviations early and establish responsibility.	(Adewusi et al., 2024)
Efficiency and Effectiveness	Optimizing public resource allocation through intelligent predictive analysis of administrative needs, reducing operational costs, and streamlining file processing.	(Margetts, 2022)

Digital Participation	Enabling citizens and stakeholders to contribute to policy design and evaluation via digital platforms, fostering participatory democracy and civic acceptance.	(Adewusi et al., 2024)
Equity and Fairness	Ensuring equitable treatment of citizens without bias, focusing on algorithmic transparency and decision explainability to preserve public trust.	(ADEPOJU & CHINONYEREM, 2025)

Source: Compiled by the author based on Section 1.3 synthesis and cited literature (Interdonato, 2025; Rahman, 2025; Bondac et al., 2026; de Fine Licht & de Fine Licht, 2020; Patro et al., 2025).

In this context, contemporary administrative trends emphasize the necessity of operationalizing "responsible AI governance," uniting technical innovation with human and institutional oversight to safeguard data privacy and ensure ethical deployment across public entities. Smart governance thus serves as the overarching institutional framework enabling AI-DSS to effectively serve public utilities and combat administrative corruption.

2.3. Impact Dimensions of Smart Decision-Making on Administrative Performance Quality

Administrative quality in public institutions is increasingly linked to their capacity to integrate emerging technologies into policy design. Smart decision-making entails deploying AI techniques and big data analytics to synthesize raw information into actionable knowledge, thereby guiding policy choices in complex operational settings while minimizing subjective bias. (Interdonato, 2025)

Table 2: Impact Dimensions of Smart Decision-Making on Administrative Performance Quality

Impact Dimension	Smart System Mechanism & Administrative Output	Citation / Reference
Operational Process Efficiency	Automating repetitive procedures, accelerating decision velocity, and minimizing time and resource waste compared to conventional methods.	(Rahman, 2025)
Decision Quality and Accuracy	Analyzing multi-variable indicators simultaneously, mitigating human error, and reducing uncertainty in complex policy choices.	(Bondac et al., 2026)
Enhancing Transparency and Accountability	Maintaining digital audit trails and real-time tracking of decision pathways and rationales, contingent on algorithmic explainability.	(de Fine Licht & de Fine Licht, 2020)
Predictive / Foresight Capacity	Proactively monitoring operational irregularities and identifying early indicators of corruption or administrative deviation.	(Patro et al., 2025)
Resource Allocation Rationalization	Generating empirical insights into actual public needs, guiding budgetary and human resource deployment toward evidence-based priorities.	(Interdonato, 2025)

Source: Compiled by the author based on cited literature in the table (Interdonato, 2025; Bondac et al., 2026; Rahman, 2025; de Fine Licht & de Fine Licht, 2020; Patro et al., 2025).

Nevertheless, realizing these positive outcomes remains contingent upon a supportive organizational environment that guarantees data quality, workforce competence, and robust cybersecurity infrastructure; absent trust and algorithmic transparency, system efficacy can be compromised. (Berman et al., 2024) Current scholarly consensus emphasizes that optimal performance is achieved through a hybrid Human–AI collaboration model: algorithms process data and generate predictive insights, while human officials maintain supervisory authority, legal judgment, and ethical oversight to

ensure sustainable organizational performance. (Ferdousi et al., 2026; Patro et al., 2025)

3. MECHANISMS OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN COMBATING CORRUPTION AND ENHANCING ADMINISTRATIVE INTEGRITY

Rapid advances in artificial intelligence have brought fundamental changes to how public services are managed and monitored. Anti-corruption strategies in administrative contexts no longer depend solely on traditional ex-post oversight; instead, they rely increasingly on intelligent systems capable of processing data, identifying potential risks, and detecting operational anomalies at an early stage. In this framework, AI-Based Decision Support Systems stand out as a key foundation of smart governance due to their capacity to handle big data, improve organizational transparency, and reinforce integrity and accountability across public sector institution. (Busuioc, 2021; Kovari, 2024)

3.1. Intelligent Big Data Analytics Tools and the Examination of Bureaucratic Practices

3.1.1. Concept of Big Data and Its Role in Public Administration

Big data refers to high-volume, diverse information streams continuously generated across digital platforms that exceed the analytical capacity of conventional processing tools. In public sector management, big data functions as a strategic asset by delivering precise information that refines decision-making and sharpens administrative monitoring. Within administrative frameworks, AI tools process data from public records, procurement systems, tax platforms, and e-services to uncover irregular patterns and suspicious behaviors that may signal early indicators of financial or administrative corruption. (Aldemir & Uçma Uysal, 2025)

3.1.2. Artificial Intelligence and the Analysis of Bureaucratic Practices

Many public administrations suffer from procedural complexity and prolonged decision-making timelines, creating conditions conducive to corrupt practices and influence-peddling. Machine learning algorithms offer the capacity to analyze thousands of administrative transactions simultaneously, identifying organizational bottlenecks, unjustified decisions, and abnormal operational delays. These systems evaluate administrative performance metrics against established benchmarks to pinpoint units or departments exposed to higher risk profiles. In doing so, they provide objective assessments of staff performance and administrative workflows, mitigating personal bias, bolstering institutional integrity, and suppressing illegitimate bureaucratic practices. (Levy et al., 2021)

3.1.3. Data Mining Techniques for Detecting Anomaly Patterns

Data mining represents one of the most effective AI-driven mechanisms for counteracting corruption due to its capacity to untangle complex data relationships and reveal subtle patterns hidden from traditional review methods. Oversight entities deploy these techniques within AI-DSS frameworks to proactively identify administrative and financial risk areas—such as conflicts of interest, procurement bid-rigging, unusual payment flows, supplier concentration, and high-risk administrative decisions. Empirical findings demonstrate that data mining substantially improves audit effectiveness and monitoring in data-heavy public environments compared to conventional review procedures. (Velasco et al., 2021)

3.2. Predictive Algorithms in the Early Detection of Financial and Administrative Corruption

3.2.1. Fundamentals of Predictive Algorithms and the Shift Toward Proactive Oversight

Predictive algorithms are mathematical and statistical models built on artificial intelligence to process historical data and extract recurring patterns, enabling the projection of future events. In anti-corruption applications, these algorithms gauge the likelihood of irregularities or administrative violations prior to their occurrence. This capability marks a structural shift from traditional, reactive ex-post auditing to a proactive, risk-based oversight mechanism designed to manage vulnerabilities before they manifest as full-fledged corruption cases. (Kovtun & Shmahun, 2026)

3.2.2. Application Domains of Predictive Algorithms in Anti-Corruption

Predictive algorithms operate across various governmental functions. In public procurement, they serve as a strategic tool by analyzing tender data to flag collusion among contractors or suspicious ties with contracting authorities. Within financial oversight, predictive models isolate anomalous transactions that depart from established public spending baselines. In human resource management, predictive tools untangle nepotism networks and favoritism in hiring and promotional pathways by analyzing career mobility trajectories. Finally, in tax administration, these algorithms assess tax

evasion probabilities and verify financial declaration accuracy by cross-referencing multi-source datasets.

3.2.3. Determinants and Efficacy of Predictive Models in Corruption Mitigation

Recent scholarship highlights that AI-driven early detection systems achieve high accuracy in isolating high-risk transactions. Empirical applications in public purchasing confirm that intelligent models outperform traditional auditing in flagging suspicious activity. (Ayobami et al., 2023) However, the long-term efficacy and sustainability of these digital frameworks depend on several interconnected structural factors: data quality and completeness, system interoperability across public databases, specialized technical talent, robust legal and ethical guidelines governing AI use, and the preservation of human oversight over algorithmic outputs.

3.3. AI Applications in Advancing Transparency, Accountability, and Digital Auditing

3.3.1. AI Contributions to Enhancing Digital Transparency

Transparency remains a fundamental pillar of sound governance. Artificial intelligence strengthens transparency by facilitating the continuous flow, analysis, and publication of public sector information. These intelligent platforms support open government data initiatives, track public expenditure trajectories, monitor project execution, improve administrative reporting standards, and enrich digital communication channels with citizens. Contemporary literature confirms that higher levels of digital transparency correlate directly with reduced corruption opportunities, as institutional and civic oversight mechanisms are automatically activated. (Cheong, 2024)

3.3.2. Reinforcing Administrative Accountability via Intelligent Systems

AI-DSS platforms strengthen administrative accountability by maintaining complete digital logs of operational and financial actions, making decision trails fully traceable and responsibilities clearly assignable. These systems document each stage of the decision-making process and evaluate compliance with applicable regulatory frameworks, mitigating potential abuses of discretionary authority. (Busuioc, 2021)

3.3.3. Continuous Digital Auditing as a Smart Governance Tool

Continuous digital auditing represents a major advance in public sector oversight, relying on real-time, comprehensive monitoring of financial and administrative transactions. This mechanism enables immediate detection of deviations, automated compliance checks, and ongoing risk assessment while delivering real-time metrics to inspection agencies and cutting traditional audit overhead. Consequently, continuous digital auditing reinforces institutional integrity and embeds automated accountability across public operations. (Aldemir & Uçma Uysal, 2025)

Synthesizing the analysis in this section, artificial intelligence has evolved beyond a supportive technical tool into a strategic engine capable of fostering transparency and curtailing administrative misconduct. Tools such as big data analytics, predictive algorithms, and continuous digital auditing offer notable agility in detecting operational risks early. Recent 2026 literature highlights that the operational success of these platforms remains bound to robust cyber infrastructure, modernized legal frameworks, and workforce development tailored to leverage AI in instilling integrity across public utilities.

4. FORESIGHT ANALYTICAL STUDY: INTERNATIONAL EXPERIENCES AND LOCALIZATION PROSPECTS IN ALGERIA

4.1. Leading International Experiences in Anti-Corruption Through Intelligent Systems

Artificial intelligence applications and Decision Support Systems (DSS) have become globally recognized mechanisms for advancing smart governance and mitigating administrative and financial corruption within public entities. These systems utilize big data analytics, pattern recognition, and predictive risk modeling to enhance transparency and raise public sector operational performance. (Kovari, 2024)

4.1.1. Singapore's AI Integration Paradigm: The "Smart Nation" Initiative

Singapore stands as a global reference in implementing smart governance through its overarching *Smart Nation* initiative. This initiative integrates artificial intelligence and big data analytics across public administrative and financial structures, shifting oversight from conventional reactive mechanisms to a predictive framework. (Aldemir & Uçma Uysal, 2025)

This paradigm rests on two core operational pillars:

- **Technical Oversight Mechanisms:** Singaporean authorities employ intelligent platforms to continuously inspect big data streams related to procurement and public spending. This capability enables automated flags on suspicious activity, identifies corruption risk indicators, and strengthens internal auditing to reinforce public trust.
- **Determinants of Success:** Modern scholarship attributes the success of Singapore's model to the seamless integration of high-tier cyber infrastructure, an adaptable regulatory framework capable of accommodating technological change, substantial investment in digital human capital, and the treatment of data as a sovereign decision-making asset. (Sharmin & Chowdhury, 2025)

4.1.2. Estonia's Digital Government Paradigm via the "X-Road" Interoperability Platform

Estonia represents a benchmark model for public sector digital transformation, having developed an integrated e-government ecosystem powered by the X-Road data-exchange platform, which connects diverse public entities within a unified information grid.

This system has significantly reduced face-to-face interactions between citizens and public officials, curtailing opportunities for bribery, favoritism, and administrative bureaucracy. Furthermore, Estonian digital platforms allow real-time tracing of administrative processes, reinforcing transparency and accountability while streamlining audit and oversight functions. (Pasupuleti, 2025) The Estonian government deploys artificial intelligence to process public data, spot administrative anomalies, and supply decision-makers with updated empirical insights. This approach has elevated public service efficiency and boosted Estonia's international standing across global integrity indices. (Engin et al., 2025)

4.1.3. Comparative Analysis and Strategic Lessons Learned

A comparative synthesis of the Singaporean and Estonian experiences reveals shared structural determinants that enabled successful AI deployment in anti-corruption efforts. Key success factors include advanced digital infrastructure, interconnected and interoperable public databases, clear national strategies for digital governance, data-driven policy engineering, continuous digital auditing mechanisms, and adaptive legal frameworks governing emerging technologies.

Consequently, curbing administrative corruption was not solely a function of technological adoption, but rather the result of embedding technology within broader institutional and administrative reforms—underscoring the necessity of a holistic, cross-cutting strategy for smart public governance.

4.2. Digital Infrastructure and Legislative Readiness in Algeria

Digital transformation constitutes a central pillar of contemporary Algerian public policy aimed at modernizing public administration and improving service delivery through expanded adoption of digital tools and artificial intelligence.

4.2.1. Diagnostic of Digital Infrastructure and Operational Challenges

Algeria has recorded progress in digital expansion over recent years, evidenced by fiber-optic network expansion, electronic payment development, procedural digitization across public agencies, and the

establishment of sector-specific databases and government portals.

Despite these gains, structural bottlenecks persist: limited interoperability and integration across governmental IT systems, restricted data sharing among public institutions, a shortage of specialized talent in AI and data analytics, digital disparities across regions and sectors, and the lingering influence of paper-based administrative practices. Scholarship confirms that the efficacy of AI-DSS platforms remains fundamentally bound to data quality, completeness, and cross-institutional data integration. (Levy et al., 2021)

4.2.2. Evaluation of the Legislative and Regulatory Environment

Algeria has taken steps to update its digital regulatory framework by enacting legislation concerning cybersecurity, personal data protection, and electronic transactions. While these efforts are foundational, moving toward AI-assisted public decision-making requires specialized legislative updates.

Specifically, legal frameworks must address algorithmic transparency, administrative accountability for automated system outputs, AI ethics, digital privacy, and standardized protocols for public data usage. Recent 2026 literature cautions that ambiguous legal boundaries risk introducing algorithmic bias, undermining administrative accountability, and compromising individual rights. (Cheong, 2024)

4.2.3. Digital Readiness Indicators for Smart Governance Transition

Current indicators suggest that Algeria possesses a baseline foundation suitable for a phased transition toward AI-DSS adoption. However, overall digital and institutional readiness remains at a moderate stage compared to international benchmark models. Bridging this gap requires moving beyond surface-level procedural digitization toward building an integrated digital ecosystem capable of deploying AI to eliminate bureaucratic friction.

Key prerequisites for Algeria's transition to smart administration include accelerating comprehensive sector-wide digitization, establishing unified national data-interoperability platforms, addressing skill deficits through targeted talent development in data science, updating legal safeguards for algorithmic transparency, and cultivating an evidence-based decision-making culture across the public service.

4.3. Foresight Roadmap for AI-DSS Deployment in Algerian Public Sector

To leverage AI effectively for transparency and anti-corruption, a structured, phased roadmap is necessary to guide implementation across Algerian public administration.

4.3.1. Foundational Phase: Infrastructure and Digital Ecosystem Building (2026–2028)

This initial phase focuses on establishing core digital infrastructure:

- Digitizing physical government archives and records.
- Unifying and standardizing national databases.
- Developing secure cross-institutional data-exchange systems.
- Strengthening national cybersecurity protocols and data protection framework.

Achieving database integration while strictly enforcing data privacy legislation (such as Law No. 18-08 on Personal Data Protection) is a critical requirement for establishing institutional credibility and public trust in AI-DSS platforms. (Wilson & Van Der Velden, 2022)

4.3.2. Capacity-Building Phase: Institutional and Human Capital Development (2028–2030)

This phase centers on talent and organizational preparation:

- Establishing specialized government data analytics centers.
- Designing specialized training programs for public personnel in AI and analytics.
- Partnering with universities and research laboratories on digital transition projects.
- Fostering an administrative culture grounded in empirical, data-driven choices.

4.3.3. Intelligent Deployment Phase: Predictive Analytics and Risk Modeling (2030–2033)

This phase addresses operational implementation:

- Deploying predictive algorithms to identify corruption vulnerabilities.

- Implementing continuous digital auditing across financial and administrative workflows.
- Developing interactive executive dashboards for public decision-makers.
- Utilizing AI platforms to evaluate public sector performance metrics.

Research shows that AI-DSS integration enhances decision accuracy and institutional transparency when linked to effective supervisory structures. (Kovari, 2024)

4.3.4. Sustainable Governance Phase: Strategic Consolidation and Proposed Model (2033–2035)

This final phase establishes long-term oversight mechanisms:

- Creating a national authority to oversee public sector AI applications.
- Setting national benchmarks and indicators for digital transparency.
- Instituting independent auditing protocols for government algorithms.
- Conducting regular evaluations of the social and ethical impacts of intelligent systems.

4.3.4.1. Proposed Smart Governance Model for Algeria

The proposed framework for localizing AI-DSS in Algeria rests on four interconnected structural dimensions, facilitating a smooth transition from reactive ex-post oversight to proactive digital monitoring. Table 3 details the operational components of this model:

Table 3: Structural Framework of the Proposed Smart Governance Model in Algeria

System Dimension	Key Components	Operational Content
1. Inputs	Digital Infrastructure	Interconnected IT architecture and public big data repositories across utilities.
	Regulatory Framework	Legislative and ethical guidelines regulating public data usage and AI deployment.
↓		
2. Algorithmic Processes	Data Processing	Processing data using data mining, machine learning, and deep learning techniques.
	Analysis & Prediction	Deploying predictive algorithms for early detection of conflicts of interest and suspicious patterns.
↓		
3. Supervisory Outputs	Decision Support	Smart executive dashboards for decision-makers paired with automated early warning alerts.
	Oversight & Accountability	Continuous digital auditing reports documenting decision pathways and enforcing accountability.
↓		
4. Strategic Impact & Feedback	Institutional Impact	Enhancing digital transparency, reducing administrative bureaucracy, and rationalizing public spending.
	Continuous Improvement	Ongoing system updates and algorithmic recalibration aligned with the 2026–2035 roadmap.

Source: Developed by the author adapted from (Kovari, 2024). and (Aldemir & Uçma Uysal, 2025), tailored to Algerian public administration requirements.

As illustrated in Table 3, the operationalization of the proposed model requires moving beyond fragmented e-services toward an integrated ecosystem. In the Algerian context, executing this dynamic

feedback loop hinges on aligning automated algorithmic oversight with the national legal provisions—specifically Law No. 18-08 on Personal Data Protection—thereby ensuring that predictive risk detection directly informs regulatory and audit action.

5. CONCLUSION AND POLICY IMPLICATIONS

Based on the preceding analysis, Artificial Intelligence-based Decision Support Systems (AI-DSS) mark a fundamental shift in the philosophy of public sector management. They transcend classical procedural automation and basic digitization to serve as a strategic engine for engineering smart governance, refining public policy decisions, and activating proactive monitoring and auditing mechanisms against corruption and administrative deviations.

The analytical review of benchmark international experiences (Singapore and Estonia) demonstrates that curbing corruption within digital environments does not rely solely on adopting technological solutions *per se*; rather, it is structurally tied to integrating these technologies into a comprehensive reform vision centered on database interoperability, algorithmic transparency, and empowering human capital to manage complex digital transitions.

In light of these insights, investing in AI-DSS within Algerian public administration is no longer merely a supplementary technical choice, but a strategic imperative for establishing a transparent, efficient public service capable of anticipating and mitigating administrative and financial risks before they escalate.

5.1. Findings of the Study

The study yields several core findings, summarized below:

- **Qualitative Shift in Decision-Making:** AI-DSS platforms improve administrative decision quality by transitioning from subjective assessments to evidence-based management grounded in intelligent data analytics.
- **Transition Toward Proactive Oversight:** Deploying predictive algorithms and data mining techniques enables the early detection of corruption hotspots, conflicts of interest, and public procurement manipulation prior to their occurrence.
- **Strengthening Digital Accountability:** Continuous digital auditing and automated logging of administrative workflows raise transparency levels and facilitate end-to-end traceability of decisions, thereby curbing discretionary abuses of power.
- **Imperative of Institutional Integration:** Comparative international models demonstrate that intelligent technology does not operate in isolation; its success depends fundamentally on interconnected cyber infrastructure and a legislative framework capable of governing AI ethics.
- **Status of National Readiness:** Algeria possesses foundational digital assets that support a transition toward smart governance; however, the trajectory faces structural challenges related to weak interoperability across sector-specific information systems and a shortage of advanced skills in big data processing.

5.2. Recommendations of the Study

To operationalize the proposed smart governance model within Algerian public administration, the study advances the following actionable recommendations:

- **Institutional and Technical Level:** Accelerate the establishment of a unified national platform for government big data interoperability to ensure secure data flows across public entities, while founding sector-specific centers for predictive analytics and risk management.
- **Legislative and Ethical Level:** Modernize the legal framework by enacting dedicated legislation addressing algorithmic transparency, digital privacy protection, and clear legal accountability mechanisms for decisions assisted by intelligent systems.
- **Capacity-Building and Research Level:** Launch specialized training programs to reskill administrative leaders and executives in data-driven decision-making, while strengthening

5.3. Future Research Horizons

To open new avenues for academic inquiry, this paper suggests addressing the following strategic topics in future research:

- **Advanced Technological Dimensions:** Investigate integration opportunities between Generative AI models and Blockchain technology to enhance transparency in public procurement and public financial management.
- **Empirical Field Studies:** Develop and test predictive models to evaluate operational digital readiness within critical public sectors (e.g., taxation, customs, and healthcare).
- **Governance and Ethical Frameworks:** Deepen research into developing standardized metrics for evaluating the social and ethical impacts of algorithmic decision-making across public utilities.

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