

SMART STATE AID: INTEGRATING AI INTO STRATEGIC PUBLIC SECTOR MANAGEMENT

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ABSTRACT

This paper investigates the transformative potential of artificial intelligence (AI) in modernizing state aid management, with a focus on strategic efficiency and institutional transparency. Drawing on recent evaluations—including the World Bank’s 2021 analysis of Romania’s state aid programs—we highlight both the socio-economic impact of aid measures and persistent structural challenges such as data fragmentation, administrative burden, and limited oversight. By linking empirical findings with forward-looking digital solutions, we explore how AI—through automation, predictive analytics, and algorithmic monitoring—can optimize fund allocation, detect fraud, and enhance public trust. Comparative insights from European best practices (e.g., digital portals, interoperable registers, and open data frameworks) illustrate how Romania can align with evolving standards. The article concludes by proposing a strategic roadmap for embedding AI in public sector governance, grounded in ethical principles and legal safeguards for algorithmic decision-making.

KEYWORDS: *artificial intelligence; digitalization; public policy; state aid; strategic public management; transparency.*

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1. INTRODUCTION

State aid represents a key public policy instrument through which governments support specific economic sectors, regions, or enterprises, with the aim of stimulating development and correcting market imbalances. The efficient management of state aid schemes is crucial to ensure that public funds are allocated transparently, in line with strategic objectives, and with maximum impact (Bryson, 2018). However, the administration of state aid involves complex procedures—from beneficiary selection and project evaluation to implementation monitoring and abuse prevention—which may be hindered by bureaucracy, large volumes of data, and administrative capacity constraints. In this context, digital transformation and new technologies—especially Artificial Intelligence (AI)—offer significant opportunities to optimize these processes.

At the European level, there is a clear strategic orientation toward excellence and trust in the use of AI, as outlined in the European Commission’s White Paper on Artificial Intelligence. The EU’s approach emphasizes the development of trustworthy AI, which ensures transparency in decision-making, safety, and the protection of fundamental rights, while also fostering innovation. In the administration of public funds, these principles translate into the need for AI-based tools to be transparent, explainable, and accountable—so that resource allocation is perceived as fair and results-oriented.

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State aid schemes represent a key policy tool by which governments support economic development, innovation, and social cohesion (Osborne & Brown, 2013). In the European Union, these interventions are strictly regulated under Article 107 of the Treaty on the Functioning of the EU, to prevent market distortions. As an EU member, Romania has implemented numerous state aid and de minimis schemes to encourage investment and job creation, especially in strategic sectors and for small and medium-sized enterprises (SMEs). However, managing these schemes efficiently remains a challenge, due to the large volume of data, the need for compliance with EU rules, and the risks of abuse or conflict of interest.

2. THE NEED FOR EFFICIENCY AND TRANSPARENCY

Two key goals in the administration of state aid are the efficient allocation of public funds and transparency in decision-making. Efficiency requires that public money be directed promptly and appropriately to eligible beneficiaries, maximizing its economic impact. Transparency demands open access to information on who receives aid and why, enabling verification and ensuring public accountability. Weaknesses in these areas may result in bureaucratic delays, misallocation of resources, or suspicions of favoritism and corruption. For example, fragmented and manual procedures may prolong project evaluation times, while the lack of a centralized monitoring system may allow excessive or illegal aid to go undetected.

3. THE OPPORTUNITY OF AI

Recent advances in artificial intelligence and data analytics offer new tools to address these challenges. AI can automate repetitive tasks, analyze large datasets to extract relevant insights, and support more objective, criteria-based decision-making (Chambers, 2023). In the management of state aid, these capabilities could be leveraged to improve both efficiency (through faster processes and better resource allocation) and transparency (through real-time monitoring and reporting). Furthermore, Romania’s National Recovery and Resilience Plan (NRRP) includes substantial public administration digitalization reforms, creating a favorable context for integrating AI and digital tools into public fund management systems (Government of Romania, 2022).

This article presents an analysis of the current situation and improvement opportunities, drawing on practical lessons highlighted by a World Bank study (Pop et al., 2021) and explores European best practices in the digitalization of state aid management, followed by conclusions and policy recommendations for responsible AI adoption in Romanian public administration.

4. THEMATIC ANALYSIS: EFFICIENCY, TRANSPARENCY, AND LESSONS FROM PRACTICE

4.1 Lessons from the evaluation of state aid schemes in Romania

A crucial starting point for improving state aid management lies in evaluating the impact of existing schemes. An ex-post assessment conducted by the World Bank (Pop et al., 2021) on three Romanian state aid programs provided valuable empirical findings.

For example, the Romanian Counter-Guarantee Fund (RCG) scheme—a de minimis aid program designed to facilitate SME access to finance—had significant positive effects on supported firms. The average number of employees in assisted companies increased by approximately 43%, and their average turnover rose by over 140% compared to non-assisted firms. Furthermore, the probability of survival was higher among beneficiary firms (about a 23% lower closure rate), indicating a real stimulus effect.

In the case of a regional development aid scheme implemented by the Ministry of Finance (2008–2017), the evaluation reported increases in employment among beneficiaries ranging from 34% to

53% compared to the control group, along with a nearly threefold increase in private investment by assisted firms.

These results suggest that well-designed state aid schemes can fulfill public policy objectives such as job creation and investment stimulation.

However, practical insights also highlight issues requiring attention. For the RCG scheme, the World Bank’s study (2020) identified possible negative externalities: in regions with many beneficiaries, non-assisted firms showed slight declines in employment and new business formation, suggesting substitution effects—where limited labor market resources are drawn to assisted firms. Nevertheless, there was no strong evidence of significant market distortion: the local market share of beneficiary firms rose only marginally (~2.7%), and there was no robust indication of competitor crowding out. These findings underscore the importance of transparency and monitoring: to ensure that aid does not negatively affect competition or misallocate resources, authorities must track not only beneficiary performance but also the impact on the broader business environment. Here, advanced data analytics tools can play a key role—e.g., algorithms monitoring firm performance by region and sector to detect anomalies or unintended effects.

Another important lesson relates to data quality. The evaluation encountered difficulties due to limited access to detailed data on beneficiaries and non-beneficiaries. Pop et al. (2021) emphasized that a unified, granular database is essential for robust state aid evaluations. In other words, to measure scheme effectiveness, authorities need centralized and consistent data on firm-level outcomes (e.g., economic indicators, employment, innovation). This strengthens the argument for digitalizing data collection and monitoring systems—an area where AI can be used to automatically extract and cross-reference information from various sources (e.g., trade registries, tax databases, EU project databases).

In sum, lessons from practice indicate not only the concrete impact of aid programs but also key reform directions: greater transparency, better data collection, and the use of modern technology to support decision-making.

4.2 Digitalization and automation of administrative processes

A top priority for improving efficiency in state aid management is the full digitalization of administrative processes. Currently, many steps—from application submission to post-implementation monitoring—still involve cumbersome procedures, paper documents, or disjointed systems, leading to delays and errors.

Digitalizing the decision-making flow between beneficiaries and authorities can significantly accelerate fund disbursement and ensure better legal compliance. Workflow automation reduces bureaucracy, minimizes human error, and provides a clear audit trail of all actions.

For example, an integrated IT system could verify in real-time whether companies meet eligibility criteria (such as compliance with *de minimis* thresholds) and immediately flag applications exceeding legal limits, thereby preventing the unlawful granting of aid.

4.3 Concrete digitalization proposals

To illustrate how technology can transform state aid management, several specific measures proposed in both academic literature and administrative practice are presented below:

Centralized Online Platform for State Aid Management: Creating a centralized digital portal (a one-stop-shop) where applicants can submit funding requests, track evaluation progress, and submit implementation reports. This platform would eliminate repetitive document submission and improve accessibility for SMEs.

Best Practices: Spain operates a national platform—BDNS (Base de Datos Nacional de Subvenciones)—for managing and publishing all subsidies, while Poland has developed SUDOP for monitoring state aid. These can serve as models for Romania. The European Commission supports

such initiatives via the Single Digital Gateway to improve online access to public services across the EU (European Commission, 2020).

Database Interconnection and Automated Checks: IT system integration across relevant institutions (ministries, agencies, the National Agency for Fiscal Administration, the Trade Registry, etc.) to enable automatic checks on firm eligibility and aid ceilings.

Romania could expand its existing REGAS platform under the Competition Council (Romanian Competition Council, 2023) into a National State Aid Register to monitor all aid received by each company.

Other EU member states already have such registers—Italy, for instance, uses a National State Aid Register to track *de minimis* aid.

Integrated data would ensure compliance with EU regulations, triggering alerts when new funding might breach thresholds (e.g., *de minimis* limits).

Electronic Signature and Digital Archiving Solutions: Wide-scale implementation of electronic signatures and digital documents at all stages—from application to final reporting. This would eliminate paper-based processes, accelerate approvals, and ensure centralized information storage.

A digital system provides a transparent audit trail (who evaluated, approved, or paid, and when), boosting internal transparency and supplying robust evidence for control or audit.

Investments through Romania’s Recovery and Resilience Plan (PNRR) in government cloud infrastructure and the digitalization of public archives support this transition and enable rapid collaboration across institutions managing aid schemes.

5. EXPECTED IMPACT

These measures would have considerable effects. Digitalization reduces average processing times and administrative costs—particularly important for SMEs needing fast access to financing.

Simplified and accessible online procedures also encourage more firms to apply, increasing fund absorption rates and from a legal standpoint, built-in automatic controls help prevent errors or breaches that might otherwise lead to fund recoveries or EU sanctions.

According to the OECD (2021), digital maturity in public governance is essential for an efficient and inclusive public sector that ensures equal treatment for all beneficiaries.

Therefore, through digitalization and standardization, Romania can align its state aid management with international standards and the reform objectives it has committed to.

6. THE ROLE OF ARTIFICIAL INTELLIGENCE: FROM PROJECT SELECTION TO MONITORING AND FRAUD PREVENTION

Beyond basic digitalization, artificial intelligence (AI) introduces a set of advanced tools that can revolutionize decision-making and control in the field of state aid. AI can learn from historical data and detect patterns or anomalies that would elude traditional analysis. The integration of machine learning algorithms and intelligent automation within public institutions can increase both the efficiency and transparency of the process.

Here are several possible AI applications in state aid management:

a. Automated Project Evaluation (Smart Scoring):

Machine learning algorithms can be trained to evaluate funding applications rapidly based on predefined eligibility and performance criteria. These systems could assign scores to submitted projects by analyzing hundreds of variables (sector, financial history, growth potential, etc.), ensuring more rigorous and objective selection of beneficiaries, with minimal human intervention—only for final checks.

This approach would significantly reduce evaluation time and mitigate risks of human error or bias (Chambers, 2023).

b. Intelligent Scheme Matching Systems:

AI can also assist potential beneficiaries in identifying the most suitable support programs for their needs. A smart matching module could retrieve firm-specific data (size, sector, planned investment type) and automatically recommend the most appropriate state aid or EU funding scheme currently available.

By directing firms to the right instrument, this increases the success rate of applications and ensures more efficient use of funds—resources go where they have the best fit.

c. Chatbots and Virtual Assistants:

In interactions with beneficiaries, implementing chatbots on funding agency platforms can provide instant, 24/7 support. Conversational AI can answer frequently asked questions about eligibility, required documents, deadlines, and procedures—guiding applicants through each step.

This reduces the workload of staff handling repetitive queries and improves user experience while ensuring consistent and equitable information delivery.

d. Monitoring and Fraud Prevention:

One of AI’s most valuable advantages lies in detecting anomalies within large datasets. Authorities can employ fraud detection algorithms to analyze real-time data on beneficiaries and projects. For example, AI can identify suspicious patterns:

Related companies applying separately to bypass de minimis ceilings:

1. Sudden unjustified cost increases
2. Projects declared in different regions but with overlapping characteristics (suggesting artificial fragmentation)

Such systems would strengthen oversight and ensure rule compliance (e.g., “one-time, last time” conditions for rescue aid) and Romania already has initiatives like the PREVENT IT system, which uses algorithms to prevent conflicts of interest in public procurement by flagging in real time if an evaluator has ties to a participating company (National Integrity Agency, 2021).

Extending similar AI-based tools to state aid would help avoid allocations to improperly connected beneficiaries or cases of impermissible double funding.

7. PERFORMANCE ANALYSIS AND SCENARIO MODELING

After implementing aid schemes, AI can be used to aggregate and analyze performance data—investments made, jobs created, regional growth—offering near real-time ex-post evaluation of economic and social impact.

Furthermore, simulation algorithms can model different budgetary scenarios: e.g., what happens if a scheme’s budget increases or decreases by X%? These simulations help decision-makers anticipate effects and adjust policies proactively (World Bank, 2021).

Using AI this way supports evidence-based policy, where future funding decisions are grounded in measured outcomes and strong forecasts, not just political considerations.

Naturally, implementing these intelligent solutions also requires investments in administrative capacity. Public sector personnel—from the Competition Council to line ministries—must receive continuous training to use new digital and analytical tools effectively.

Inter-institutional coordination and dialogue with the private sector (e.g., establishing a consultative council on state aid) are also needed to ensure that the policies and systems developed address real economic needs.

The importance of a proper legal and ethical framework for integrating algorithms into public administration. It is imperative that AI usage be accompanied by principles of transparency, fairness, and accountability:

- a. Algorithms must be periodically audited for bias;

- b. Major automated decisions must be explainable;
- c. Citizens and companies must have the right to challenge machine-made decisions.

Additionally, a clear legal framework (aligned with initiatives such as the forthcoming EU AI Act) must define the boundaries of AI use, ensuring technological innovation does not infringe upon fundamental rights or fair competition rules.

8. EUROPEAN BEST PRACTICES IN DIGITALIZED STATE AID MANAGEMENT

The European context offers numerous examples of modernization in state aid management from which Romania can draw inspiration. The European Commission itself, through the State Aid Modernization agenda, has pushed Member States toward simplification, transparency, and ex-post evaluation of aid schemes.

A central element is the creation of a transparency culture. Since 2016, EU legislation requires Member States to publish all individual state aid awards above a certain threshold on a public portal (with the exception of de minimis aid).

This requirement ensures visibility over state interventions and allows the public and business community to monitor how public funds are distributed.

In practice, Romania developed the REGAS portal (State Aid Register) under the authority of the Competition Council. However, this system can be expanded and improved.

A European best practice is the implementation of open data policies. For example:

France and Germany provide open datasets on awarded subsidies, allowing civil society and researchers to analyze program effectiveness.

Another good example is how countries digitize inter-institutional communication.

Estonia, for instance, has an interoperable government system (X-Road) that connects institutional databases, enabling seamless data exchange regarding public fund beneficiaries.

This reduces administrative burden for companies—data is submitted once and reused by multiple agencies—and aids in detecting irregularities. If a company attempts to accumulate aid illegally from different sources, the integrated system flags it instantly.

The European Commission (2022) has also developed tools such as the Transparency Award Module (TAM)—a platform designed to centralize the reporting of both notified and exempted state aid, providing public access to data at the EU level.

The implementation of TAM and similar modules reflects the trend toward data standardization and the use of technology for compliance.

The OECD (2023) notes that such tools increase government accountability because data becomes internationally comparable and progress can be measured uniformly.

Finally, independent evaluations of aid schemes have become a recommended practice across Europe. Countries like the United Kingdom and the Netherlands regularly mandate ex-post evaluations of major support programs, conducted either by independent agencies or academic institutions, to ensure objective analysis of their effectiveness and the results of these evaluations are made public and used to redesign policies.

Romania has taken steps in this direction with the support of the World Bank (e.g., the 2021 evaluation discussed earlier), and should continue institutionalizing regular evaluation using modern analytical tools.

In summary, European best practices emphasize:

- (a) the development of unified digital platforms for aid management,
- (b) interoperability of databases at national and EU levels,
- (c) active transparency through the publication of aid data, and
- (d) continuous evaluation and monitoring, supported by data-driven analyses.

These already validated directions in other Member States provide Romania with a clear roadmap for modernizing its state aid management system.

9. CONCLUSIONS

The digital transformation and integration of artificial intelligence (AI) into state aid management is a necessary evolution to ensure that public funds are used effectively, transparently, and with maximum impact. Case studies from Romania confirm that well-designed and well-targeted state aid schemes can lead to significant economic gains—such as increased employment and turnover among beneficiaries (Pop et al., 2021).

At the same time, these studies highlight potential risks, including unintended effects on non-beneficiary competitors or difficulties in evaluating outcomes due to the absence of robust data.

These challenges can be mitigated by adopting digital and AI-based solutions that equip policymakers with better tools for analysis and oversight.

The primary recommendation is for Romanian authorities to develop an integrated State Aid Management System that includes:

- a. a unified platform for application and tracking,
- b. interconnected registers for automated eligibility and threshold checks,
- c. AI-based modules for continuous monitoring and ex-post evaluation.

Such a system should be piloted on large-volume aid schemes (e.g., SME grants), where efficiency gains would be most immediate.

In parallel, it is crucial to adopt a normative and ethical framework for algorithm use in public decision-making.

Any implementation of AI in project selection or evaluation must respect the principles of:

1. transparency (the algorithm’s logic and criteria must be explainable),
2. fairness (no discrimination based on region or applicant type),
3. accountability (automated decisions must be verifiable and appealable by humans).

Romania can align its regulatory principles with the upcoming EU AI Act and follow OECD recommendations on the ethical use of AI in the public sector.

Institutional capacity development is another precondition for success.

Investments in staff training, recruitment of data science specialists, and partnerships with academia can ensure that new digital tools are used to their full potential.

Initiatives like government innovation labs or Romania’s participation in EU e-Government networks could further promote knowledge and technology exchange.

10. FINAL THOUGHT

Artificial intelligence has the potential to become a strategic partner in state aid management—bringing more effectiveness in fund allocation and reinforcing public trust through enhanced transparency.

The practical lessons from recent evaluations (Pop et al., 2021) and forward-looking research converge on the same conclusion:

- a. Combining data and technology with solid governance can transform state aid from a bureaucratic tool into a smart, results-oriented policy instrument.
- b. Romania has both the reasons and the opportunity to take this path—gradually integrating AI and digital solutions and becoming a regional benchmark for good practice.

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