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The use of AI tools in managing European funds allocated for regional development in Romania

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Abstract
The current study aims to analyze the use of AI tools in managing European funds related to the EU Cohesion Policy in Romania, as part of the policy making process that seeks to reduce regional disparities. Grounded in qualitative research and drawing on the new historical institutionalism approach, the paper presents and examines the perceptions of representatives from organizations responsible for the programming, monitoring, and evaluation of programs funded through European funds. These entities include relevant Managing Authorities from the Ministry of European Investments and Projects and Regional Development Agencies. The research addressed the following variables: openness towards AI, the extent of utilization, perceived benefits, apprehensions, and challenges related to the employment of AI tools, the boundaries of their use, the availability of resources, the regulatory context, the nature of decision-making involved, and potential new spheres of application.

Keywords: regional development in Romania, artificial intelligence, AI tools adoption, digital transformation, EU funds, EU Cohesion Policy

Introduction

European funds related to the EU cohesion policy, including those allocated through the NextGenerationEU provisional framework, are intended to reduce territorial, economic, and social disparities between EU regions. Cohesion policy has evolved from a distributive approach to achieving real convergence at the level of regions and public sectors (Pascariu & Incaltarau, 2018). The crises of the last two decades have changed the paradigm of fund allocation (Toderas, 2024; Toderas & Costăchescu, 2024). To have lasting effects, the funds support innovation and the application of disruptive technologies at the societal level. However, the EU is far from China, the USA, and Japan in the use of AI technologies and is a weak competitor in global value chains. The 9th Cohesion Report of the European Commission (2024a) highlights that many EU regions remain trapped in a development snare due to the failure to capitalize

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on digital transformations and disruptive technologies, including AI. Although the EU performs well in digital research and innovation, the absorption and exploitation of these technologies at the regional level are weak. In the lagging regions, the absorption of new technologies depends on institutional capacity and the ability to forecast shocks (Nijkamp et al., 2022).

Therefore, in the report prepared by Enrico Letta (2024), requested by the European Council, it is emphasized that AI can contribute to improving the EU's competitiveness both internally and globally. Letta considers that AI must become an essential component of the fifth freedom of the single market, originally proposed by Jacques Delors. This freedom would represent a technological upgrade of the existing four freedoms. Letta suggests that EU institutions and governments should intensively use AI in the design, implementation, and monitoring of EU policies, especially in cases that affect competition, product safety, and the proper functioning of the single market.

In the field of AI use in the public and private sectors, the EU has supporting competences. The EU approach aims for a balance between innovation and ethical sustainability, facilitating collaboration between AI actors through the exchange of expertise, research, development, and innovation among member states (Foffano et al., 2023). This stems from the Coordinated Plan on Artificial Intelligence, adopted by the European Commission in 2018 and revised in 2021 (European Commission, 2021). For the development and application of AI technologies in the period 2021-2027, including through the NextGenerationEU package, a total of 9.386 million EUR is allocated (Signorelli et al., 2024, p. 39).

In Romania, the degree of AI utilization is very low in both public and private sectors. According to the DESI 2024 report, Romania is at the bottom of the ranking regarding the proportion of enterprises that use AI, with 1.5% compared to the EU average of 8%. Denmark and Finland occupy the top positions, with 15% (European Commission, 2024b). There are no official statistics on the use of AI in public sector organizations. The national strategy for artificial intelligence for 2024-2027 (MRID, 2024) indicates a low degree of AI adoption but also a high openness to these technologies. Nearly 80% of public organizations have shown interest in AI, and 48% are exploring implementation opportunities. Therefore, through component 7 of Romania's National Recovery and Resilience Plan (NRRP), a project is being implemented in the period 2023-2026 to stimulate the adoption of robotic process automation (RPA) solutions in central administration.

Starting with the multiannual financial framework 2021-2027, Romania applies a partially decentralized system for managing EU funds. For example, the management of eight programs funded by the cohesion policy is carried out at the regional level, while the management of another eight programs is carried out at the national or trans-regional level (such as the case of the Just Transition Program). The computerized system for managing the European funds allocated to Romania through the cohesion policy is a common one (the MySMIS platform). However, at

the territorial level, the managing authorities and support organizations have the freedom to use robotic process automation solutions and artificial intelligence that facilitate the efficient management of the programs.

In this context, it is useful to analyze the factors that influence the introduction of AI technologies into the bureaucratic processes specific to public sector organizations. Thus, the present research initiative constitutes a case study on the use of AI technologies in the management of EU funds intended to contribute to the reduction of territorial disparities. The research focuses on the entities that manage programs funded through EU funds, aimed at reducing economic, social, and territorial disparities in EU regions. The phrase "management of European funds" encompasses the phases of the program lifecycle according to EU legislation (Regulation 2021/1060): programming, implementation, monitoring, and evaluation.

The article is structured into four sections. In the first part, the research design is presented, and in the second, some reference elements extracted from the study of the specialized literature are succinctly stated. Subsequently, the results of the research conducted are presented and discussed, and some perspectives for further research are detailed. In the end, some conclusions are drawn in relation to the hypothesis and research questions.

1. Research design

The aim of the research was to determine the degree of adoption of AI technologies by the authorities responsible for managing EU funds for regional development in Romania. To assess the level of AI use within the organizations and structures that were targeted, I started from the model developed by Alsheiabni et al. (2019) and later adjusted by Neuman et al. (2024). Thus, in Table 1, I have synthesized the main reference points for framing the organizations analyzed in relation to AI deployment.

Table 1. Maturity levels of AI deployment in organizations

Level	AI functions	Organization AI deployment
Initial	Very limited or no AI function, and the organization has no assumed plans to use AI.	No business case related to AI. AI is used informally at very little scale. No resources allocation.
Assessing	Discovery of AI technology. There are preliminary requirements or plans for use.	Organisation initial AI strategy. For each AI application, have defined a value proposition and minimal resources allocation. There is a mimetic isomorphism process within the organization.
Determined	AI project is at an advanced stage. Infrastructure needed to further implement AI is	Organisations have standard operating procedures that cover AI scenarios. Change management is introduced. Resources are

	identified.There is an implementation strategy, continuously monitored.	allocated on the basis of rigorous planning. There is a low degree of transfer of experience and knowledge.
Managed	Certain AI processes are defined throughout the organization. Preparation of large-scale AI deployment.	There is a well-defined allocation and full top management support is available. There are allocated resources which are supplemented according to the real needs of AI deployment or to mitigate externalities. There is a medium degree of transfer of experience and knowledge.
Optimized	Full AI infrastructure is ready for large-scale AI deployment.	Role, responsibilities, and accountability are clearly defined within each AI project. AI is integrated into the organizational culture. There is a high degree of transfer of experience and knowledge.

Source: adapted from Alsheiabni et al. (2019) and Neuman et al. (2024)

The research approach also involved identifying and analyzing the factors that contribute to or hinder the adoption of AI technologies in the EU funds management system. The research starts from the hypothesis that the structures managing EU funds are at the forefront of adopting emerging technologies, including AI, becoming examples of good practices for other public organizations. To see if this hypothesis is valid, a case study is used as a qualitative research method. The research is designed to address the following inquiries:

- To what extent are AI tools employed in the management of European funds allocated for the diminishing of regional disparities?
- What are the inherent challenges associated with the deployment of AI in this context?
- How could the management of European funds for regional development be enhanced through a broader integration of AI technologies?

The conceptual foundation of the case study fits within the considerations of the new historical institutionalism, which views change in organizations as a latent, incremental process that is often reversible. On one hand, there is a predominance of status-quo forms in order to maintain the increasing returns specific to the processes and technologies used on a daily basis. On the other hand, there are considerations specific to resistance to change, a characteristic especially of organizations in the public sector. However, in the context of crises or disruptive events, major changes occur, creating critical junctures for adaptation to new contexts. The COVID-19 pandemic has exemplified the expansion of digital solutions and the acceptance of AI in public administration. From the perspective of reducing regional disparities, disruptive events are suitable junctures for breaking away from stagnant development trajectories and for initiating new opportunities for development and economic growth through which to set new development trajectories (Bănică et al., 2024). The adoption of emerging technologies contributes to the irreversibility of old trajectories that are favorable to stagnation.

The empirical data used for designing the case study were obtained through the conduct of semi-structured in-depth interviews among officials responsible for coordinating the programming, monitoring, and evaluation of programs related to the EU funds allocated to Romania for the reduction of regional disparities. As such, a total of 16 interviews were conducted with decision-makers in the field of program management. Additionally, individuals involved in the programming and management of horizontal elements, such as strengthening administrative capacity and implementing Romania's NRRP, were also considered. Geographically, nine interviews targeted central structures, while seven interviews focused on regional structures managing programs specific to economic, social, and territorial cohesion. The interviews were conducted during June-July 2024, both face-to-face and by telephone.

The interviews were conducted based on a set of six major questions and 16 subsequent questions for in-depth exploration. Additional questions were also asked to clarify or delve deeper into certain aspects mentioned by the interviewees. During the semi-structured interviews, the main and subsequent questions addressed the following variables: openness towards AI, the extent of utilization, perceived benefits, apprehensions, and challenges related to the employment of AI tools, the boundaries of their use, the availability of resources, the regulatory context, the nature of decision-making involved, and potential new spheres of application.

2. Overview of the advantages, effects and challenges of AI in the literature

The specialized literature on the subject of AI use in the public administration sector has become quite diverse and thematically expanding in recent years. There are already enough case studies concerning the evolution, advantages, effects, and challenges of introducing AI into public sector organizations. In the last decade, numerous studies have also been published on the reshaping of public administration and bureaucratic processes as a result of applying technological innovations in the field of AI. Some analyses note that, unlike the first waves of digital transformations, those of the last decade, especially during and after the pandemic years, are much deeper (Dunleavy & Margetts, 2023) and have disruptive effects (Filgueiras & Raymond, 2023; Ungureanu & Amironesei, 2023). On one hand, the phenomenon leads to the destruction of the use value of techniques and applications used until now (Coccia, 2024). On the other hand, the analysis conducted by Wirtz et al. (2022) emphasizes that the widespread use of AI technologies contributes to increasing the productivity and performance of organizations, especially in terms of facilitating the decision-making process in organizations.

As the main benefits of AI technologies, it is recurrently invoked that, through automation, robotic data collection, algorithmic processing, and the widespread use of AI, new capacities have been generated for intensive processes of developing and evaluating public policies and programs (Filgueiras & Raymond, 2023; Höchtl et al.,

2016). Also, based on algorithms, new bureaucratic processes have been created (Roehl & Crompvoets, 2023; Vogl et al., 2020). Consequently, the current wave of digital transformation generates evident pressures regarding the structural and functional change of public sector organizations in a context of administrative holism (Dunleavy & Margetts, 2023). This leads to a more intense integration of capacities, solutions, approaches, and perspectives with the aim of providing quality public services with a much higher level of accessibility. Administrative holism also involves the regulation of digital markets and digital operators, as well as the continuous monitoring and improvement of services through the sharing of expertise and lessons learned and the personalization of analysis.

According to the approach of other authors, AI technologies contribute to changing the nature of bureaucratic or political decision-making regarding the allocation of resources or the provision of public services (Alon-Barkat & Busuioc, 2023; Yan, 2023; Young et al., 2019). With the introduction of AI technologies, bureaucratic decisions are made based on objective and purely functionalist criteria, and resources are allocated judiciously, according to real needs or demonstrated capabilities. It also strengthens the technical capacity of public sector organizations in carrying out complex analytical processes where progress has been quite limited until now, such as modeling (in economic, social, and environmental terms), and scenario-based prediction (Höchtl et al., 2016; Margetts & Dorobanțu, 2023; Ungureanu & Amironesei, 2023; Vogl et al., 2020). In the context of administrative holism, these experiences and practices are transferred from the private sector to the public sector, through mechanisms of voluntary or mimetic isomorphism.

The literature often indicates that compared to the private sector, change in the public sector occurs at a much more latent pace (Dunleavy & Margetts, 2023; Margetts & Dorobantu, 2019; Neumann et al., 2024) and that relatively little of the benefits and advantages of AI technologies are realized. The expansion of generative AI through the widespread availability of Chat GPT to the general public represents a driving factor for AI in the current bureaucratic flow, even in sectors or structures where resistance to change is predominant. The accessibility of generative AI solutions contributes to reducing the chronic gap between the public and private sectors regarding the use of AI-based solutions. The latent and phased development in relation to private sector organizations also stems from the way resources necessary for innovation, development, and customization of AI technologies are allocated. In the case of bureaucracies specific to public organizations, this is rarely fully possible, as resources are primarily concentrated on running already routinized processes (Dunleavy & Margetts, 2023) which ensure the stable and predictable operation of public services. In contrast, in the bureaucracies specific to the private sector, the aspect of resource allocation is viewed entirely differently in terms of optimizing expenses so as to ensure a constant increase in profit.

From the specialized literature analyzed, it is evident that the adoption and implementation of AI technologies within public sector organizations face numerous

obstacles and risks. Most of the obstacles are related to the endogenous nature of organizations, where aspects such as the following can be included: a) the lack of well-prepared human resources for the implementation of AI technological innovations; b) rather limited cooperation between the specialized structures responsible for bureaucratic flows and IT departments; c) fears regarding the status of human resources (such as job loss or professional downgrading); and d) ethical and moral considerations regarding the use of AI in relation to human intelligence. In addition, there is also the fear that AI technologies may perpetuate biases derived from human–algorithm interaction (Alon-Barkat & Busuioc, 2023).

Exogenous obstacles to public organizations refer to the risk of losing control over the processes of collecting, storing, and processing data (Scherer, 2016, pp. 366-367). From this perspective, resistance is very high in the case of organizations or governmental systems that provide sensitive or public security services, especially in areas such as defense, public order, transportation, political communication, etc. (Wirtz et al., 2022). Even though from the perspective of legal doctrine, "the digital market remains a market governed by similar rules to the conventional one" (Costea, 2023a), some of the exogenous obstacles also relate to the legality of processes and implications of liability, as well as the identification of governance appropriate to each type of process or operation involving AI (Wirtz et al., 2022). The issue of the final ownership of results delivered by AI raises quite a few legal uncertainties (Dunleavy & Margetts, 2023), as well as liability for the output. As Ungureanu and Amironesei (2023, p. 58) argue, liability for the output must be analyzed both from the perspective of contractual liability regarding the use of the results and from a non-contractual standpoint. Contractual liability can range from actual responsibility for the results generated by an AI application and used in the current administrative flow to the evasion of any potential exclusive liability. On the other hand, non-contractual liability has direct implications for the effects of using the results and involves risk mitigation regarding the wide-scale effects on security and social and economic stability.

Another identified exogenous obstacle refers to the fact that current AI capabilities are still not sufficiently performant compared to the requirements and rationales of human intelligence in delivering public services, especially in contexts where conditions and the environment are constantly changing (Sun & Medaglia, 2019). Additionally, as an exogenous obstacle, it was identified that under conditions of insecure management, AI technologies favor cyber espionage operations. Countries with authoritarian regimes have an interest in exporting AI technologies to democratic regimes through IT infrastructures (Bradford, 2023; Crosston 2020; Codreanu, 2022; Wirtz et al., 2022). Even though the last decade has seen increased control and caution by countries with democratic regimes, including the EU as a whole, in relation to the practices of countries with authoritarian regimes, against the backdrop of very high demand and low costs, digital markets are penetrated by infrastructures and AI technologies that facilitate cyber espionage operations. Therefore, against this backdrop of mistrust, governmental authorities in countries

with democratic regimes often behave evasively and circumspectly in relation to AI solutions implemented in private sector organizations. This fact leads to difficulties in scaling in governmental organizations AI operations that have been implemented in private sector organizations. AI technologies can be developed and implemented on a larger scale if preemptive and agile cybersecurity is ensured. In this regard, in recent years, through the use of public-private partnerships, the premises have been created for pooling capabilities between the public and private sectors with the aim of making digital markets operate at a high level of cybersecurity. For example, Costea (2023a) analyzes how the cybersecurity strategies of NATO member countries indicate and encourage the use of the principle of capability sharing through public-private partnerships. Even though the analysis shows that there are still large discrepancies between NATO countries in using resource sharing, responsibilities, and liability, it can be appreciated that over time, a contagion effect may be noticed also in the aspects of innovation and the use of AI technologies that are secure and compatible with democratic values.

As can be seen, the literature presents a wide range of benefits, effects, challenges, fears, uncertainties, and risks related to the adoption, development, and expansion of AI technologies in public sector organizations. Regarding the experience of public sector organizations in Romania in adopting AI technologies, the literature is still very scarce, especially in presenting case studies of institutional change and organizational transformation.

3. Empirical application: the current use of AI technologies in managing EU funded programmes for regional development in Romania

Before presenting the empirical data collected, it should be clarified that the national system for managing EU-funded programs for regional development in Romania is partially decentralized. In this context, the managing authorities under the Ministry of European Investments and Projects (MEIP) are considered subsidiary structures of a single organization. However, each managing authority for the eight regional programs is located within the Regional Development Agencies (RDAs), which are separate organizations. Coordination by MEIP is limited to strategic aspects of program management.

A key finding from the research conducted is that the organizations and structures in Romania responsible for managing programs funded by the EU Cohesion Policy are not prepared to use AI. Most respondents confirm that AI technology is not yet actively implemented in EU cohesion policy. There are only a few nascent initiatives and some experiments with robotic process automation, which assist in evaluating funding applications and other administrative processes.

However, these are in an early and testing stage and do not reflect an extensive application of AI solutions. During the interviews, it was specified that although AI solutions are not used in the actual management of the programs, staff frequently resort

to publicly accessible generative AI solutions for performing analytical tasks related to program management. The managing structures of the NRRP within MEIP are the first to have initiated the process of adopting and intensively using robotic process automation (RPA) solutions, but without an association with an explicit generative AI technology. At the same time, following a request from the Romanian Authority for Digitalization regarding the intention to use RPA solutions through Investment 18 of Component 7 of the NRRP at the MEIP level, there were only four expressions of intent. They were aimed at using RPA in the programming, management, and intermediate and ex-post evaluation of the Partnership Agreement, as well as in managing some calls for proposals. Additionally, one of the Managing Authorities (MAs) intends to gradually adopt AI solutions alongside RPAs. Furthermore, in several interviews, it was explicitly mentioned that internal analysis shows that beneficiaries widely use generative AI technologies for drafting funding applications, preparing supporting documents for reimbursement requests, or even for producing deliverables in the case of service contracts.

Overall, there is a significant openness to the use of AI solutions in the organizations that were the subject of the research, especially in activities or processes that would benefit from automation and advanced data analysis. However, the degree of openness is not uniform and is influenced by the level of knowledge of the potential of AI technologies, as well as by the available resources. Moreover, in the case of five interviews, particularly those conducted with individuals at the regional level, it was highlighted that the openness to implementing AI technologies is still limited or moderate due to a lack of information, as well as concerns related to the security and legality of processes.

Only one-third of the interviewees believe that AI applications can contribute to reducing territorial disparities through efficient information management and analysis of regional data. It is considered that AI can bring significant benefits if implemented correctly, with the proper training of experts in central and regional public administration. The rest of the interviewees believe that AI solutions cannot currently contribute to reducing territorial disparities. The main reasons cited are the poor level of digitalization and automation at all levels of public administration, the lack of interoperability of databases, and inadequate infrastructure. The table below succinctly presents the advantages, challenges, and fears associated with the adoption of AI technologies specified during the interviews.

Table 2. Advantages, challenges and worries associated with AI

Category	Criteria	Benefits	Challenges or fears
1. Improving strategic decisions and planning	Facilitating access to legal and regulatory data	Provides quick and organized access to relevant legislation and top-level information	Generates security risks and process confidentiality, especially in the case of sensitive data. Cyber warfare and espionage drive the lack of

Category	Criteria	Benefits	Challenges or fears
			widespread adoption of AI solutions
	Conducting analyses	Facilitates the substantiation of decisions through comparative, statistical and risk analyses	Influence political decisions, reducing the human factor in resource allocation and affecting traditional decision-making
	Prediction and identification of problems	Identifies problems, inconsistencies, administrative errors and potential fraud based on data analysis, enabling prompt interventions	Imposes a rigid logic that affects how decisions are made, creating difficult adaptation and resistance from those accustomed to traditional analysis processes
	Territory modeling and regional needs analysis	Supports territory modeling and regional needs analysis for more effective planning	It gives wrong results if the algorithms are not properly configured and managed and the databases are not complete and interoperable. AI application need to learn historical and ecosystem peculiarities of the territories
2. Improving data accuracy and precision	Fast and accurate data analysis	Increases the ability to process large volumes of data in seconds. Ensures superior accuracy compared to human analysis and reduces the error rate	Perpetuates possible errors and inaccuracies in processed data that could affect results and analyses. Checking and correcting these errors is essential to maintaining quality and ensuring audit rigor
	Reducing subjectivism	Eliminates subjective influence in the assessment and allocation of resources, eligibility check, determination of certain risk situations, etc., ensuring fair treatment	Treats things non-empathetically and without knowing the elements of context that can change the fit into predefined archetypes
3. Streamlining processes by optimizing resources and costs	Automating repetitive tasks	It takes over repetitive tasks, allowing staff to focus on more complex activities	Generates system-wide bottlenecks to identify new roles and responsibilities for employees whose tasks are being automated, ensuring a smooth and efficient transition
	Process standardization	Ensures the standardization of decisions and interpretations in program evaluation and monitoring	It leads to a faulty and inefficient implementation of programs because the personnel does not have the skills that allow the proper use of data and tools so that a standardization of processes is obtained (there are

Category	Criteria	Benefits	Challenges or fears
			major differences between infrastructure projects in relation to those related to investments in human capital)
	Providing staff assistance	Supports staff in monitoring and evaluation, providing assistance in administrative tasks and process management	Difficult adaptation of employees to new roles. Difficulties related to the redistribution of tasks and responsibilities. Fear of change and adaptation to new technologies generates reluctance and common actions to push back the adoption of AI technologies
	Cost reduction	It reduces administrative and personnel costs and optimizes effort	Reduces jobs, generates the permanent reorganization of human resources, which represents a source of permanent tension in organizations
	Helpdesk Improvement	Leads to the automation of support processes and program promotion, improving the answers to frequently asked questions of beneficiaries	Offers non-sensitive answers in relation to the real needs of the beneficiaries (examples of banking systems or mobile phone operators were cited as examples)

Source: author's representation based on primary data analysis

During the interviews, arguments were made regarding the early stage of AI use at the national and regional levels, as well as the necessity for personnel work and direct interaction in planning fund allocation in order for AI tools to learn in detail the economic and social characteristics of the regions. However, there is a consensus that AI can be useful in managing and analyzing information, in indicating clues that facilitate the selection of operations relevant to each type of territory, and thus contribute to the efficiency of public services. Some of the interviewees mentioned that for analyses, modeling, ex-ante evaluations, or foresight based on generative AI solutions, support is currently provided by the World Bank Group (WB), as well as by the European Investment Bank (EIB). Nevertheless, it was not observed that these organizations would encourage the adoption of AI at the level of the European funds management system.

According to the assessment of the majority of the interviewees, the data and results generated by AI solutions can be reliable and of high quality if they come from consistent administrative data sources and are constantly checked. In most interviews, it was highlighted that the current administrative databases do not meet the readiness requirements to ensure, at the very least, an efficient framework for the

use of RPA. Under these conditions, a recent attempt to use an RPA solution for verifying reimbursement requests submitted by beneficiaries was abandoned.

During the interviews, it was unanimously stated that the current normative and procedural framework regarding the use of AI is underdeveloped and variable, both at the European and national levels. Although there are strategic planning documents at the European level and more recently a specific Regulation, the implementation of these into national legislation is still incipient, incomplete, and incoherent. This limits the applicability and efficient integration of AI in various fields, including public administration and the management processes of public programs, including those funded by the EU budget. Additionally, in several interviews, the importance of regulating aspects related to liability for generated results was emphasized. In the absence of explicit normative guidance and clarifications from a legal liability perspective, it will be difficult to adopt AI solutions on a large scale.

Most interviewees underlined that the decision to adopt AI technologies should be taken at the governmental level, considering that it requires centralized coordination and regulation. This approach is supported even by representatives of regional structures, who emphasized that without close collaboration between various ministries, authorities, and other collectors of administrative data, the adoption of AI solutions at the regional level is practically impossible.

To date, there have been no clear official recommendations from the services of the European Commission suggesting the use of AI solutions in the programming, implementation, and evaluation of European funds in Romania. However, it was mentioned that within certain meetings and pilot projects, there are initiatives and unofficial suggestions encouraging the use of AI solutions at both the central and regional levels, especially for analytical activities or impact evaluation. Yet, these suggestions are not officially integrated into guiding documents and are not regulated as such within the specific European legislative framework for EU funds. Additionally, the interviews revealed that the services of the European Commission, as well as certain international financial institutions, provide a range of applications or facilities that use specific AI technologies (such as text translation, generation of analytical content, verification and interpretation of large volumes of data, etc.).

During the interviews, it was highlighted that there is a clear consensus on the need for additional clarifications and guidance for the effective use of AI solutions. These guidance needs would specifically target the following aspects:

a) Regulation and norms - aiming at the proper implementation and mitigation of potential consequences, especially those concerning contractual liability;
b) Institutional strategies and methodological guidance - that clearly define the methods of implementing AI at the level of each structure or operation. Thus, the existence of standardized platforms or templates at the governmental level would facilitate the uniform and efficient use of AI at both central and regional levels;

c) Careful and ethical use - emphasis should be placed on the fact that, with the use of AI, decisions regarding program management must ultimately be made by people, not by RPA or AI, in order to avoid risks related to liability and potential ethical issues;
d) Best practices and case studies - that demonstrate how AI can be successfully applied in managing EU funds. This could help clarify the benefits and challenges associated with AI. Some opinions explicitly stated that successful examples have a much greater transformative power at the organizational level than top-down regulations or impositions. At this moment, there are no relevant examples of efficient use of AI solutions in the central public administration of Romania that could inspire others. Solutions applied in the private sector, for example, those in the banking sector, demonstrate that AI technologies do not meet the rigors of managing programs funded by public funds.

The interviews reveal that in almost all the structures that were the subject of the research, specific resources for the implementation of AI solutions are not foreseen, thus limiting their use. Although technical assistance funds for digitalization and automation are available, they have not been directed towards AI projects, but rather towards improving basic logistics (such as computers, servers, and software) or for the acquisition of RPA implementation services. However, there are intentions and plans to allocate resources for AI solutions in the future, but their implementation is still in its infancy and will depend a lot on what happens in other organizations that implement similar public programs (such as those in agriculture and rural development, environment, or energy). In this regard, all interviewees emphasized the need for substantial investments, both in training human resources to ensure digital competencies and in technology, including updating equipment and software and improving information interoperability between organizations (interoperability should be at least level 4). It is essential that staff be well trained in the use of new technologies, and that equipment be advanced enough to support the widespread adoption and use of AI technologies.

The analysis of the collected data indicates that in the next decade, the processes of programming, monitoring, and evaluation of programs will be significantly and rapidly transformed through the integration of AI technologies within the structures responsible for managing EU-funded programs for regional development in Romania. It is anticipated that the services of the European Commission will play a larger role in setting the parameters and conditions for adopting AI solutions in the management of programs aimed at reducing territorial disparities. The table below provides an overview of the main factors that can facilitate or hinder the adoption of AI technologies in the management of EU-funded programs for regional development in Romania.

Table 3. Enabling factors and barriers in the adoption of AI technologies in the management of EU-funded programs for regional development in Romania

Category	Enabling factors	Potential barriers
1. Support and openness	High openness on the part of decision makers	Resistance to change
	Explicit requirements of the EU institutions	Maintaining current audit approaches
	Strategies and appropriate regulatory framework	The negative influence of the political factor
	Implementation of adjacent systemic and structural reforms, accompanied by substantial investments	Failure in implementing the territorial-administrative reform
	Completion of interoperability processes to allow compliance with data readiness requirements (at least level 4) as well as the guvernamental cloud	Maintaining the current approach of parallel and divergent administrative data repositories, as well as fragmented and dysfunctional government cloud
2. Information and awareness raising	Comprehensive approach	Dispersed actions
	Awareness of advantages	Not knowing the pros and cons of AI
	The power of example and organizational contagion	Administrative inertia and fear of replacement
	Functional and diversified public-private partnerships	Reluctance to turn to the private environment for the transfer of relevant solutions
3. Resource allocation	Periodic and consistent allocation of resources	Insufficient and fragmented resources
	Superior quality technology	Technological limits in relation to the capabilities of human intelligence
	Advanced professional training	Continued shortage of advanced digital skills
	The speed of technological change	Lack of time for innovation and experimentation

Source: author's representation based on primary data analysis

Several interviewees underlined that by completing the reforms and investments in the field of digitalization included in the NRRP, the premises for an easier and faster adoption of disruptive technologies are established. Therefore, under the influence of EU regulations, as well as available resources, it is expected that the change will first occur at the central level and then trickle down to the regional level. In this regard, a few essential aspects regarding the identified state of affairs are analyzed in the following section.

4. Discussions and perspectives

The empirical data collected reveal that within the national system for managing EU-funded programs for regional development in Romania, there is a high level of awareness regarding the potential of AI technologies. However, internal technical expertise in the field of efficient use of AI solutions is still quite limited. Firstly, the state apparatus in the field of European funds management has remained far behind what is happening at the level of EU institutions, as well as in the specialized private sector, such as large consulting firms. Secondly, even within the system of managing EU funds, RDAs, in their capacity as non-governmental organizations within which the Managing Authorities of the regional programs operate, have so far not taken the initiative to adopt and extend AI solutions in their current program management activities.

With reference to the first research question, the analysis of empirical data shows that from an institutional perspective, AI technologies are not yet used in the management of EU-funded programs for regional development in Romania. However, in fulfilling analytical tasks, officials informally and recurrently turn to various publicly accessible generative AI applications. The structures most open to automation and the appropriate use of AI solutions are those under significant time pressure to complete the implemented projects, such as the specific directions for coordinating and implementing of the Romania's NRRP or those that have managed support schemes for enterprises affected by the pandemic.

The centralized/partially decentralized from 2021 system for managing European funds at the national level used in Romania should have favored the application of AI solutions aimed at initially applying RPA solutions and subsequently those of machine learning. The results of implementing such technologies would target, within a framework of deconcentrated governance (national and regional), data analysis, trend presentation, error or problem detection, and other types of information derived from intensive data analysis necessary for current needs of planning, monitoring, evaluation, and evidence-based decision-making. Thus, at least within MEIP, there is a noticeable phenomenon of contagion and mimetic isomorphism regarding the use of RPA and AI solutions for intensive data processing.

There is no pressure from the government center for the implementation of AI solutions on an experimental basis and their extension to other operations specific to the management of EU funds. Although significant steps have been made in ensuring the interoperability of administrative databases, there are still many logistical inconsistencies that do not allow the application of RPA and AI. Another cause of this situation lies in the fact that, to date, the European Commission has not provided enough examples or applications to inspire national and regional managing authorities to use emerging technologies. As noted by the European Court of Auditors in a thematic report published in 2023, AI technologies are much better

integrated and advanced in the direct management system of grants that use the European Commission's eGrants informatic system. In contrast, in the specific informatic system for shared management, which includes the European funds allocated to member states through the EU's cohesion policy, the process of integrating emerging technologies has lagged behind (ECA, 2023).

Under these circumstances, the comprehensive integration of processes in the field of EU funds management will take place over time at a pace similar to other economic sectors/areas of activity. A good example in this regard is how banks determine the risk level of loans granted to enterprises, taking into account multiple variables, including those related to the territorial specifics where the investment for which the loan is requested will be made. Thus, within the European funds management system, the algorithms used by banks can be utilized for better targeting of support granted to enterprises that request financing within the specific calls of regional programs or, as appropriate, national ones. Such a comprehensive action strategy between the EU funds management system and the banking sector is also justified by the fact that from one financial framework to another, the weight of financial instruments (types of support that are very similar to the lending services offered by banks) intended to support enterprises increases at the expense of non-reimbursable grants. Therefore, for an effective implementation of financial instruments and also for maximizing the effect of financial leverage, the pooling of the same AI algorithms is essential and would directly contribute to reducing territorial and regional disparities through targeted modeling of interventions. In other words, such a strategy helps to apply the "place-based" principle, which according to the opinion of the European Commission services (2024a, pp. 278-282), becomes essential for the EU cohesion policy for the post-2027 period in the sense of targeted application at a subsidiary and proximate level to the real needs of citizens and enterprises.

Regarding the second research question, the analysis of the empirical data collected shows that although there is a high degree of curiosity and openness, the fears and impediments of traditional bureaucracy contribute to slowing down or even abandoning initiatives to adopt and develop AI solutions. Thus, the essential challenge in adopting and expanding AI technologies in the management of EU funds refers to legal liability. Even if AI is used in data analysis and in generating opinions and treatment solutions, the actual legal liability will continue to be borne by the staff involved in the entire procedural flow. In areas of activity related to the allocation, monitoring, auditing, and evaluation of investments financed from public funds, the aspects of contractual and non-contractual liability in the case of using AI technologies are not yet addressed from a legal standpoint. In administrative systems characterized by a strong culture of legal compliance, the lack of clarification on these two types of liabilities means that in the public sector, the use of AI solutions is still quite limited and only exploratory in nature, with expansion occurring latently and in small steps. Additionally, it is necessary for the Romanian Court of Accounts

to modify its auditing approaches and procedures so that they align with the new procedural flows resulting from the adoption of AI technologies. Therefore, for the coming years, it is necessary at the EU level and within member states to intensify actions related to establishing a common framework that will facilitate the exchange of practices and legal approaches, provide ethical guidance, and establish common regulatory benchmarks.

The second challenge that stands out refers to the fact that the adoption of AI solutions in the management of European funds depends greatly on the functioning of the governmental cloud and the interoperability between institutions that collect and manage administrative data, as well as with the databases of the private sector. One of the prerequisites for the efficient use of AI refers to the centralization and concentration of data in a single silo. In the case of managing EU funds, a significant part of the data (those related to the implementation of submitted and financed projects, as appropriate) are progressively accumulated in a centralized form in the MySMIS informatic system managed by MEIP. However, another part of the data is taken from other public systems for collecting and storing data through inter-institutional interoperability protocols. Even though the interoperability law came into force in 2023, parallel data silos or divergent administrative processes are still being developed and maintained, which makes the data inconsistent and not compliant to readiness requirements. At the same time, there is still a high degree of reluctance to interconnect with the databases of private operators or big-data providers. The recurrent explanation extracted from interviews was related to ensuring the security of informatic systems, but also to the procedures applied at the level of the Special Telecommunication Service, the authority designated for the development and maintenance of informatic systems for managing European funds for regional development, including those specific to the NRRP.

Another challenge lies in the fact that, in the case of activities related to the design of programs for the judicious allocation of resources with the aim of reducing territorial and regional disparities, there is still a missing essential component related to data resulting from statistical research. The practice of interactive dashboards is still quite incipient in official statistics in Romania. This limitation of national statistics makes it difficult and impedes the proper use of AI solutions in the processes of designing intervention logic and in the substantiation of the theory of change, especially at the subsidiary level. In the context of the next post-2027 programming period, which emphasizes place-based resource allocation (at subsidiary territorial level), this limitation of national statistics will represent a significant challenge for the upcoming regional programs. This would mean evident changes in the bureaucracies specific to the public sector, especially in aspects related to decision-making regarding resource allocation and the implementation of public interventions. For example, algorithms designed to determine the strategy for allocating EU funds for investments in the major transport network, taking into account the Territorial Accessibility Index (TAI) proposed by Teclean and Drăgan

(2021, pp. 32-33), would certainly lead to the elimination of the influences of political factors at the local and regional levels. Designed as a composite index, TAI was conceived based on eight non-discriminatory variables to counteract the premeditated preferential allocation of funds and to pursue strategic allocation with the aim of effectively reducing territorial disparities. An AI application could be used for rapid calculation and presentation of results in neutral and ordered parameters according to the ranking of existing territorial disparities. Such a method of resource allocation significantly diminishes the partisan virtues of political decision-makers. However, in the administrative and political context of Romania, this approach represents a strong impediment to political control of the center over local administrations (especially at the county level – NUTS3).

According to the analysis of the empirical data collected, the positive aspect regarding potential challenges is that the adoption of AI solutions will lead to a change in the job descriptions and a reduction in workforce contingents. These are not perceived as a significant threat. Resistance to change is rather perceived as a possible barrier for the future in the expansion of AI use, not as a challenge for the current process flow. On one hand, in contexts where organizations, especially at the regional level, are understaffed and there is a lot of work to be done, there is still a long way to go before reaching a situation where labor can be replaced. This allows for the revised duties following the adoption of AI solutions to be more oriented towards citizens and organizations, rather than on processing huge quantities of data. Moreover, the use of AI will require the introduction of a validation step for the results. Under these conditions, even if investments in high-quality technology will contribute to more robust results, final validation remains essential to ensure accuracy, robustness of results, and especially to comply with the audit and control rigors of European funds.

Regarding the third research question, it is highlighted that at the regional level, the prevailing view is that disparities are often the result of centralized policies for the allocation of funds. Therefore, the adoption of AI and the expansion of its use in program management would be a good opportunity to change the paradigm of allocating public funds, whether from state budget sources (at the central or local level) or from the EU budget.

Even though the potential utility of AI solutions for the programming, implementation, and evaluation of EU funds for regional development is recognized, these solutions cannot be used effectively, especially by regional-level structures, until certain enabling conditions are met, such as: the completion of the territorial-administrative reform, the finalization of the development of the planning system through the actual implementation of the Code of Spatial Planning, Urbanism, and Construction (which is currently under analysis in the Chamber of Deputies), the operationalization of the governmental cloud, as well as the completion of interoperability processes between administrative databases, which should reach at least level 4 of interoperability. The concurrent fulfillment of these enabling

conditions will create a conducive framework for the rapid adoption of AI technologies.

Significant investments are necessary in developing the competencies required for the proper use of AI tools. The most obvious constraint in this regard refers to the existence of suitable human resources for the proper and efficient handling of AI technologies. As for investments in logistics and software, they have been and will continue to be substantial, especially since funding is ensured from European funds related to the EU cohesion policy, as well as through the NRRP. It is important, however, for management structures to anticipate in their administrative budgets specific expenses for the acquisition and development of AI technologies.

There is a rather limited willingness to develop and implement specific AI solutions together with other governmental authorities, organizations from the private sector, and civil society. Sharing through the public-private partnership method will generate a convergence effect between public and private sector. This is essential because organizations from the private sector and civil society collect and produce a substantial amount of data and analyses through intensive and extensive exploration of AI tools. The results obtained are of high quality and robustness, sometimes even higher than that of official statistics.

From the data collected and analyzed, a recommendation emerges that the process of adopting AI technologies should begin with a pilot initiative at the level of a development region, specifically – RDA / MA. This way, viable examples of AI integration into current management processes can be developed. This approach could lead to the establishment of standardized procedures for using AI in program management and will allow for a gradual expansion to other regions, as well as programs managed at both central and regional levels.

The following perspectives for further exploration are highlighted by research. Firstly, there is a need for the research to be extended to organizations/structures that manage EU funds allocated through the European Agricultural Fund for Rural Development (EAFRD) and the European Agricultural Guarantee Fund (EAGF). Secondly, as it has also emerged from the analysis of empirical data, the adoption of AI technologies in the management of EU-funded programs for regional development in Romania is also conditioned by changing approaches at the level of certain public authorities in Romania that have responsibilities in defining and implementing public policies that intersect with the implementation of EU-funded programs for regional development in Romania or in the audit and control of public programs. Therefore, the research needs to be extended to other organizations and structures, such as the Ministry for Development, Public Works and Administration, the Ministry of Transport and Infrastructure, the Romanian Court of Accounts, etc.

Conclusions

In the context of the adoption in July 2024 by the Romanian Government of the National Strategy in the field of artificial intelligence for 2024-2027, it is expected that the use of AI technologies in public sector organizations, especially at the central level, will accelerate significantly for the coming years. Additionally, the preliminary approaches and positions of EU institutions regarding the post-2027 EU cohesion policy cycle, aspects related to the impact of digital transformations, including those related to AI, are more nuanced compared to previous cycles. Consequently, the governments of the member states will in turn have to transpose these priorities at the subsidiary level, either through European funds or through their national budgets. It is expected that the next digital transformations will prioritize the delivery of public services through the widespread use of AI.

The case study shows that the use of AI in the management of EU-funded programs for regional development in Romania is currently in an initial and exploratory stage. According to the criteria specified in Table 1, all the management structures of the EU-funded programs for regional development in Romania are only at the first level of AI deployment. Even though there is a high degree of openness regarding the adoption of AI technologies in various stages of the decision-making process and the implementation of programs, the latency of processes affect the judicious allocation and monitoring of resources intended to reduce territorial disparities. In the last two years, there has been a move towards the intensive use of RPA due to a very large volume of operations that need to be processed in a very short time and against a background of a lack of specialized personnel. Therefore, the introduction of emerging technologies is due to the accelerated fulfillment of essential functions specific to program management related to the implementation stage (submission and evaluation of funding applications and processing of payment requests).

The organizations that manage EU funds aimed at reducing territorial and regional disparities are not yet at the forefront of adopting emerging technologies, such as AI, even though they develop and use high-performance informatic systems. Therefore, at the moment, they cannot be examples of good practices that inspire and mobilize other organizations in the public sector to adopt AI technologies. In their case, the requirements and guidelines of the European Commission's services take precedence over those of other national authorities in the field of digitalization or management of public interventions. Furthermore, the structures that are part of the EU funds management system coordinated by MEIP have not set out to become sources of inspiration for other systems and organizations in the public sector. As a source of inspiration for the central public administration, including MEIP, in adopting and expanding disruptive technologies, the National Agency for Fiscal Administration currently stands out. Under these circumstances, at the moment, the research hypothesis is not validated.

According to the data collected and analyzed, currently, isomorphic processes are occurring within the system of managing EU-funded programs for regional development in Romania. The pace of change will depend both on the express requirements of EU institutions, which indicates the importance of compliance, as well as on critical conjunctures (as was the case of the pandemic).

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