



## ARTIFICIAL INTELLIGENCE AND THE FUTURE OF MANAGEMENT: EVIDENCE FROM ALGERIA ON REDEFINING ROLES, SKILLS, AND HUMAN-MACHINE COLLABORATION

### *YAPAY ZEKA VE YÖNETİMİN GELECEĞİ: ROLLERİN, BECERİLERİN VE İNSAN-MAKİNE İŞBİRLİĞİNİN YENİDEN TANIMLANMASINA DAİR CEZAYİR'DEN KANITLAR*

Rania HAMDUCHE<sup>1</sup>

Mehdi BOUCHETARA<sup>2</sup>

Esin YORUK<sup>3</sup>

Messaoud ZEROUTI<sup>4</sup>

#### ABSTRACT

Artificial Intelligence (AI) is reshaping managerial roles across private and public sectors by altering responsibilities, competencies, and decision-making dynamics. This study investigates how managers perceive the impact of AI on their work and strategic orientation. Based on a survey of 109 professionals from public and private organizations in Algeria, the findings reveal that most respondents believe that AI improves task efficiency and could partially replace traditional managerial functions, yet human judgment remains essential. Private organizations are early AI adopters whilst

- 1- Institute of Management - INSIM SUP, raniahamdouche.h@gmail.com, ORCID: 0009-0007-6704-8331
- 2- Asst. Prof., National Higher School of Management, m.bouchetara@ensmanagement.edu.dz, ORCID: 0000-0001-9826-8985
- 3- Assoc. Prof., Centre for Resilient Business and Society - Coventry University, esin.yoruk@coventry.ac.uk, ORCID: 0000-0001-5795-2369
- 4- Prof. Dr., National Higher School of Management, m.zerouti@ensmanagement.edu.dz, ORCID: 0000-0001-9802-5334

**Submitted/Gönderim:** 19.10.2025 **Revised/Revizyon:** 23.03.2026 **Accepted/Kabul:** 23.03.2026

**Corresponding Author/Sorumlu Yazar:** Bouchetara, M.

**To Cite/Atıf:** Hamdouche, R., Bouchetara, M., Yoruk, E. ve Zerouti, M. (2026). Artificial Intelligence and the Future of Management: Evidence from Algeria on Redefining Roles, Skills, and Human-Machine Collaboration. Sayıştay Dergisi, 37(140), 1-34. <https://doi.org/10.52836/sayistay.1805720>

public organizations show cautious approaches. Despite challenges, most managers reject full replacement, emphasizing a collaborative model where human judgment complements machine capabilities. The study points toward hybrid managerial roles blending technical literacy with ethical oversight. Recommendations include investing in comprehensive training programs, redefining leadership development, and ensuring that the adoption of AI aligns with governance values.

## öz

Yapay Zeka (YZ), sorumlulukları, yetkinlikleri ve karar verme dinamiklerini değiştirerek özel ve kamu sektörlerinde yönetsel rolleri yeniden şekillendirmektedir. Bu çalışma, yöneticilerin YZ'nin çalışmaları ve stratejik yönelimleri üzerindeki etkisini nasıl algıladıklarını araştırmaktadır. Cezayir'deki kamu ve özel kuruluşlardan 109 profesyonelin katıldığı bir ankete dayanan bulgular, çoğu katılımcının YZ'nin görev verimliliğini artırdığına ve geleneksel yönetim işlevlerinin kısmen yerini alabileceğine inandığını, ancak insan muhakemesinin önemli olduğunu ortaya koymaktadır. Özel kuruluşlar YZ'yi erken benimserken, kamu kuruluşları temkinli yaklaşımlar sergilemektedir. Zorluklara rağmen, çoğu yönetici tam ikameyi reddederek, insan muhakemesinin makine yeteneklerini tamamladığı işbirlikçi bir modeli vurgulamaktadır. Çalışma, teknik okuryazarlığı etik gözetimle harmanlayan hibrit yönetim rollerine işaret etmektedir. Öneriler arasında kapsamlı eğitim programlarına yatırım yapmak, liderlik gelişimini yeniden tanımlamak ve YZ benimsenmesinin yönetim değerleriyle uyumlu olmasını sağlamak bulunmaktadır.

**Keywords:** Artificial Intelligence, Managerial Roles, Human-AI Collaboration, Public Sector, Digital Leadership.

**Anahtar Kelimeler:** Yapay Zeka, Yönetsel Roller, İnsan-YZ İşbirliği, Kamu Sektörü, Dijital Liderlik.

## 1. INTRODUCTION

In today's digital economy, Artificial Intelligence (AI) is not just a technological innovation but a transformative force reshaping organizational operations and competition. Its most profound effects are seen in management, where AI is redefining roles, decision-making processes, and the skills required of modern leaders (Brynjolfsson & McElheran, 2022; Bughin et al., 2019). Managers increasingly collaborate with intelligent systems, leveraging data-driven insights and automation to enhance strategic and operational outcomes (Hossain et al., 2025; Davenport & Ronanki, 2018). This shift demands dual adaptation: technical proficiency in AI tools such as machine learning and analytics, and human-centered competencies including ethical reasoning, empathy, and interdisciplinary collaboration (Wilson & Daugherty, 2018). Integrating AI into managerial functions has thus become a necessity, with studies showing that organizations adopting AI in management report substantial gains in productivity, innovation, and decision quality (McKinsey, 2020).

While AI adoption is more visible in the private sector, public institutions are experiencing a quieter but significant transformation (Wirtz et al., 2019; Hossain et al., 2025). AI tool predictive systems, data platforms, and process automation are changing how decisions are made, tasks allocated, and leadership exercised. However, implementation in the public sector faces unique challenges, including bureaucratic structures, regulatory constraints, and political factors, which distinguish it from private sector dynamics. Despite this, research on AI in public management remains limited, particularly in terms of comparing perceptions and practices between public and private sectors (Damar et al., 2024a: 21; Mergel et al., 2024).

Addressing these gaps, this study investigates the central question: "How does AI impact the role of managers in contemporary organizations?" It examines how managers perceive AI's influence on their work, the emerging skills needed in AI-integrated workplaces, and whether AI is viewed as complementary or disruptive to managerial authority. Focusing on Algeria, the study compares perceptions between public and private sector managers, exploring whether AI is experienced as a threat, an opportunity, or a natural evolution of organizational life, and which leadership competencies are developing alongside AI.

To complement the research question and strengthen the analytical framework of this study, a set of research hypotheses is formulated. These hypotheses are grounded in the existing literature on AI and managerial transformation, while also reflecting the expected dynamics in the Algerian organizational context. First, prior research consistently highlights the positive impact of AI on productivity and decision-making efficiency. AI-enabled tools are known to automate routine tasks and enhance data-driven managerial processes. Therefore, the following hypotheses are proposed:

**H1** : AI positively influences the efficiency of managerial tasks.

Second, although early debates suggested a potential substitution of managers by intelligent systems, more recent studies emphasize a complementary relationship between humans and AI. Managers are increasingly expected to work alongside AI systems rather than be replaced by them. Accordingly:

**H2 :** AI is more likely to augment managerial roles than to replace them.

Third, while sectoral differences are often emphasized in the literature, particularly regarding the pace of digital transformation, it can be expected that managers share broadly similar perceptions of AI regardless of organizational context, especially in emerging economies where AI adoption is still evolving. Thus:

**H3 :** There are no significant differences between public and private sector managers in their perceptions of the impact of AI.

Fourth, differences between sectors are more likely to appear at the level of implementation rather than perception, as private organizations tend to adopt innovations more rapidly, while public institutions often face structural and regulatory constraints. Therefore:

**H4 :** The level of AI implementation differs significantly between public and private sector organizations.

Finally, the literature emphasizes the importance of skills and training in enabling successful digital transformation. In contexts where training remains limited, it is expected to constitute a major barrier to effective adoption. Accordingly:

**H5 :** The lack of AI-related training negatively affects the integration of AI in managerial practices.

The paper is structured as follows: Section 2 reviews literature on AI and evolving managerial roles; Section 3 details the sample, data collection, and analysis methods; Section 4 presents the findings; Section 5 discusses the results; and Section 6 concludes with key insights, theoretical Implications, practical Implications and limitations and Future Research.

## **2. LITERATURE REVIEW**

### **2.1. AI and the Transformation of Managerial Roles**

AI is increasingly reshaping managerial roles by transforming decision-making processes, task allocation, and required competencies. Unlike the previous waves of automation, AI extends beyond routine task execution to support complex cognitive functions such as prediction, pattern recognition, and strategic analysis (Brynjolfsson & McElheran, 2022; Davenport & Ronanki,

2018; Bughin et al., 2019). This transformation affects the core functions of management planning, organizing, leading, and controlling by embedding data-driven tools into managerial practices. Managers are no longer limited to information processing but are expected to interpret algorithmic outputs and supervise intelligent systems (Hossain et al., 2025; Hadid, 2021). The literature highlights the emergence of hybrid competencies combining technical capabilities—such as data literacy and AI tools—with human-centered skills including ethical reasoning, creativity, and interpersonal communication (Wilson & Daugherty, 2018). This evolution has led to the concept of the “augmented manager,” who collaborates with AI systems to enhance decision-making and performance (Dejoux, 2020a; Dejoux, 2020b; Giraud, 2021; Lingam & Vanishree, 2024).

## **2.2. Augmentation versus Substitution: A Central Theoretical Debate**

A central debate in the literature concerns whether AI substitutes or augments managerial roles. The substitution perspective suggests that AI technologies may replace certain managerial functions, particularly those related to routine decision-making and information processing (Quaquebeke & Gerpott, 2023). Advances in automation have reinforced this concern, raising questions about the future of managerial work. In contrast, the augmentation perspective emphasizes complementarity between human and AI. AI enhances managerial effectiveness by providing analytical capabilities, while human actors retain responsibility for judgment, ethics, and contextual interpretation (Jarrahi, 2018; Nojonen, 2019; Damar et al., 2024c). Recent studies increasingly support this second perspective, highlighting the importance of human–AI collaboration in organizational settings (Rane et al., 2024). However, the empirical validation of this perspective remains limited, especially in developing countries.

## **2.3. Managers’ Perceptions and AI Adoption**

Managers’ perceptions are a key determinant of AI adoption. Positive attitudes toward AI as an opportunity tend to facilitate its integration, whereas concerns related to job displacement, ethical risks, or loss of control may hinder adoption (Cao, 2021; Ferguson, 2019). Moreover, empirical studies reveal a gap between perception and implementation. While AI is often recognized as beneficial, its actual use remains uneven due to organizational,

cultural, and technical constraints (Damar et al., 2024a; Mergel et al., 2024). AI applications across sectors—including finance, transport, healthcare, and public administration—demonstrate its potential to enhance efficiency and decision-making processes (Sinapin, 2020; Hadid, 2021; Damar et al., 2024d). However, the extent to which these capabilities are effectively integrated into managerial practices depends largely on managerial perceptions and organizational readiness.

#### **2.4. Public versus Private Sector Contexts**

The adoption of AI differs significantly between public and private sector organizations. Private organizations tend to adopt AI more rapidly due to competitive pressures and innovation incentives (Bughin et al., 2019). In contrast, public organizations face regulatory constraints, accountability requirements, and institutional inertia, which may slow down adoption (Wirtz et al., 2019; Mergel et al., 2024; van de Wetering et al., 2024). Despite these differences, existing research suggests that managers across sectors may share similar perceptions of AI's opportunities and risks. However, differences are more pronounced at the level of implementation, where organizational structures and governance models play a key role.

#### **2.5. Skills, Training, and Barriers to AI Integration**

The literature consistently highlights the importance of training and skill development for successful AI integration. However, a mismatch often exists between technological investment and human capacity development, referred to as the “digital skills paradox” (Figueroa, 2024). Managers frequently lack formal training in AI-related tools, limiting their ability to effectively use these technologies (Damar et al., 2024b). This lack of preparation may lead to resistance, uncertainty, or superficial adoption. Beyond technical skills, managers must also develop ethical and critical competencies to evaluate algorithmic outputs and ensure the responsible use of AI (Rees & Müller, 2023; Stahl, 2022). The absence of such capabilities represents a major barrier to effective AI integration.

#### **2.6. Human–AI Collaboration and Ethical Challenges**

Human–AI collaboration is increasingly seen as the dominant model for the future of management. AI enables faster data processing and improved decision support, while human actors provide contextual understanding

and ethical oversight (Rane et al., 2024; Damar et al., 2024c). However, this collaboration raises significant ethical concerns related to transparency, accountability, and governance. In public sector contexts, these issues are particularly critical, as automated decisions may directly impact citizens (Wirtz et al., 2019). Cases such as the Robodebt scandal illustrate the risks associated with poorly supervised AI systems, highlighting the need for strong ethical frameworks and human oversight (Michael, 2024). Managers thus play a key role in mediating between technological capabilities and societal values.

## **2.7. Research Gap and Theoretical Positioning**

Despite the growing body of literature on AI and managerial transformation, several gaps remain. First, while existing studies extensively discuss AI-driven changes in managerial roles, skills, and decision-making processes, most contributions remain either conceptual or focused on single-sector contexts, predominantly within private organizations. Comparative empirical analyses systematically contrasting public and private sector managerial perceptions and practices remain limited, particularly in developing-country contexts.

Second, the literature reflects an ongoing theoretical debate between automation-as-substitution and augmentation-oriented perspectives. Although recent studies increasingly emphasize human–AI collaboration and the concept of the augmented manager, empirical evidence capturing how these theoretical positions are reflected in managerial perceptions and organizational practices across different institutional settings remains scarce. Little is known about whether public and private sector managers converge or diverge in their views regarding AI efficiency, task replacement, risk, and training needs.

Third, while prior research highlights the importance of ethical governance, digital leadership, and training for AI integration, especially in public administration most studies treat these dimensions in isolation. Few empirical works examine how organizational structures, governance cultures, and risk perceptions jointly shape managers' attitudes toward AI adoption and implementation.

In response to these gaps, the present study positions itself at the intersection of the augmentation substitution debate and the literature on human–AI collaboration in management. By adopting a comparative approach between public and private sector organizations, the study contributes empirically to understanding how similar perceptions of AI coexist with markedly different organizational practices. Moreover, by focusing on a developing-country context, this research offers contextual insights that complement existing findings largely derived from developed economies. In doing so, the study aims to extend current theoretical discussions by highlighting the role of institutional and organizational factors in shaping AI-augmented managerial work.

The literature reveals two dominant perspectives regarding the impact of AI on management: a substitution perspective, which emphasizes automation and potential replacement of managerial tasks, and an augmentation perspective, which highlights human–AI collaboration and the transformation of managerial roles. While recent studies increasingly support the augmentation view, empirical evidence remains limited, particularly in developing-country contexts and in comparative analyses between public and private sectors. This study addresses this gap by examining both perceptions and practices of managers, with particular attention to the relationship between AI adoption, training, and organizational context.

### **3. METHODS**

This study employs a quantitative, exploratory design to assess managerial perceptions of AI, automation, and digital transformation, with a particular focus on the Algerian public sector.

Data were collected via a French-language online questionnaire created on Google Forms and distributed through LinkedIn to professionals in both public and private sectors. The survey was approved by an ethics committee, enabling a comparative analysis of perceptions and practices. The survey was based on established frameworks (Giraud, 2021; Cao, 2021) and informed by the Axys Consultants study “From Manager to Augmented Manager”, which examines AI, automation, digital skills, and managerial adaptation.

The questionnaire consisted of four sections with 30 closed-ended and Likert-scale questions covering:

1. Respondent demographics,
2. General perceptions of managerial work,
3. Perceived impact of AI on managerial tasks,
4. The future role of managers in the context of AI.

Its goal was to capture the perceived effects of AI on task relevance, strategic involvement, skill development, and ethical considerations. The survey was distributed in March 2024 and received 120 responses, of which 109 were validated. Eleven responses were excluded because the respondents did not hold managerial roles, as determined by the screening question: "Are you a manager, senior executive, supervisor, project/team leader, administrator, director, or general manager?" Only those who answered "Yes" proceeded; those who answered "No" were directed to submit the form without completing the rest of the survey. The final sample included administrators, project leaders, auditors, and executives, with over 55.00% from public institutions and 45.00% from private organizations, allowing for sectoral comparisons.

Data was processed and analyzed using SPSS 22.00. Descriptive statistics (means, frequencies, and standard deviations) were used to explore trends in perceptions, while cross-tabulations and chi-square tests were conducted to identify significant associations between managers in public and private organizations in terms of professional background, digital exposure, and attitudes toward AI. The study targeted a specific population, namely individuals occupying managerial positions. Respondents were selected based on this predefined professional criterion, rather than through random selection. Consequently, the sampling approach can be characterized as a non-probability sampling method, more specifically a purposive (or convenience) sampling strategy. This approach was chosen to ensure that participants possessed relevant experience and insights related to managerial practices and AI adoption.

## **4. RESULTS**

### **4.1. Descriptive Analysis**

The first step in the analysis involved the presentation of sample and conducting a descriptive statistical analysis (frequency distribution and cross-tabulation) on the collected data. Here, we do not differentiate between public and private organizations' managers but present the results for the whole of the sample.

#### **4.1.1. Characteristics of the Sample**

Table 1 informs about the sample characteristics. A slight majority of respondents (55.00%) work in the public sector, while 45.00% are employed in the private sector. Gender distribution is balanced, with 49.50% women and 50.50% men. In terms of age, 22.00% of respondents are under 30 years old, 48.00% are between 30 and 45 years, and 30.00% are above 45 years.

Regarding seniority, 18.00% of participants have less than five years of experience, 52.00% between five and fifteen years, and 30.00% more than fifteen years, indicating a high level of experience among the participants. With respect to job roles, 28.00% are executives, 47.00% are middle managers, and 25.00% are operational staff with managerial roles comprising three quarters of the sample. In terms of education level, 25.00% of participants hold a PhD or DBA degree, 63.00% a Master's or MBA, 10.00% a university degree, and 02.00% a high school diploma. The data, despite representing managerial roles with a high level of work expertise and with 98.00% of the highly educated participants, also show that access to digital training remains limited: only 16.00% of respondents reported having received digital training, whereas 84.00% did not.

**Table 1:** Characteristics of the Sample

	Category	Percentage (%)
Sector type	Public sector	55.00
	Private sector	45.00
	Total	100.00
Gender of respondent	Men	50.50
	Women	49.50
	Total	100.00
Age of respondent	Age < 30	22.00
	Age 30–45	48.00
	Age > 45	30.00
	Total	100.00
Seniority of respondent	Seniority < 5 yrs	18.00
	Seniority 5–15 yrs	52.00
	Seniority > 15 yrs	30.00
	Total	100.00
Job role of respondent	Executives	28.00
	Middle Managers	47.00
	Operational Staff	25.00
	Total	100.00
Digital training received	Received digital training	16.00
	No digital training	84.00
	Total	100.00
Level of education	PhD/DBA degree	25.00
	Master's/MBA degree	63.00
	University degree	10.00
	High school diploma	02.00
	Total	100.00

**Source:** Prepared by the Authors.

The study included a total of 109 validated responses, with 55.00% from public sector managers and 45.00% from private sector managers. While the sample size may be considered modest, it is sufficient for an exploratory analysis using descriptive statistics and non-parametric tests (Chi-square and Wilcoxon) given the study’s focus on managerial perceptions. The sample captures a diverse range of managerial roles, seniority levels, and educational backgrounds, providing a representative cross-section of decision-makers in Algerian organizations.

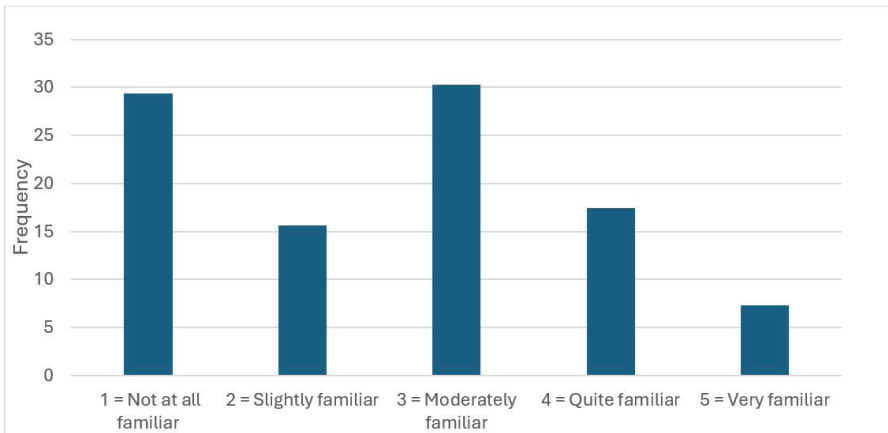
Accordingly, the dataset allows for meaningful comparisons between public and private sector contexts while acknowledging that the findings are not fully generalizable to all organizations or countries.

In the following sections, we present perceptions of managers regarding the impact of AI on their work and managers' opinions on the role of AI training.

#### 4.1.2. The Impact of AI on the Traditional Tasks of Managers

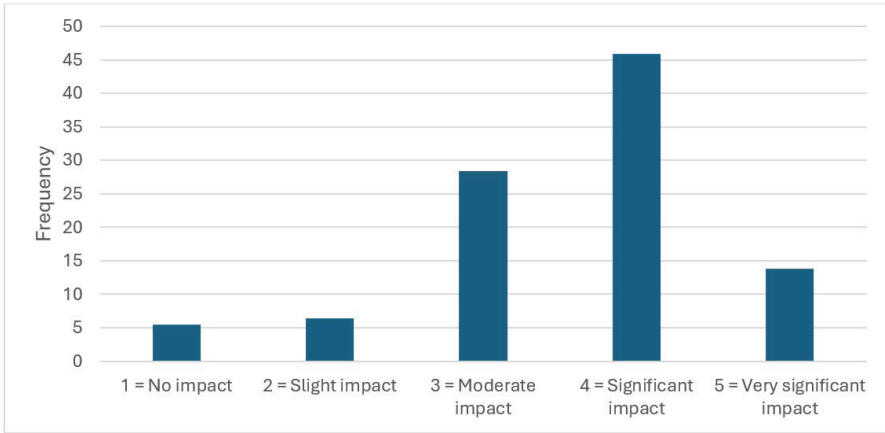
The respondents were asked about the concept of 'augmented manager' (Axys Consultants, 2021) without giving them the definition of 'augmented manager'. Majority of the respondents stated that they are either not familiar with the concept of augmented manager (30.00%) or they have some knowledge of the concept (15.00%). Around 30.00% of the respondents stated moderate familiarity, whereas 25.00% stated that they are quite familiar or very familiar with the concept (Figure 1).

**Figure 1:** The Concept of the Augmented Manager



**Source:** Prepared by the Authors.

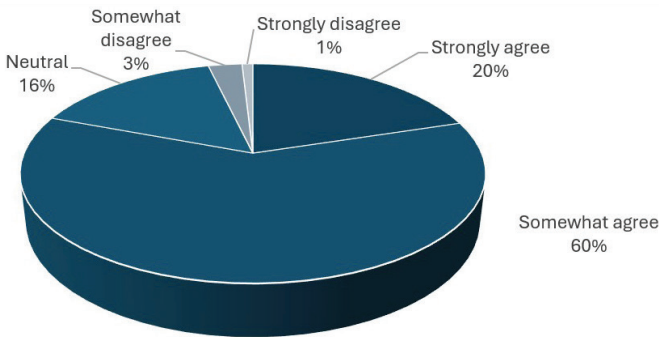
**Figure 2:** Perceived Impact of AI on Managers' Traditional Tasks



**Source:** Prepared by the Authors.

The respondents were asked to assess the impact of AI on managers' traditional tasks. Figure 2 shows that only a small proportion reported no impact (5.00%) or a slight impact (6.00%). The largest share of respondents considered the impact to be significant (46.00%), followed by a moderate impact (28.00%). A further 14.00% stated that the impact is very significant.

**Figure 3:** AI Improves the Efficiency of Managerial Tasks

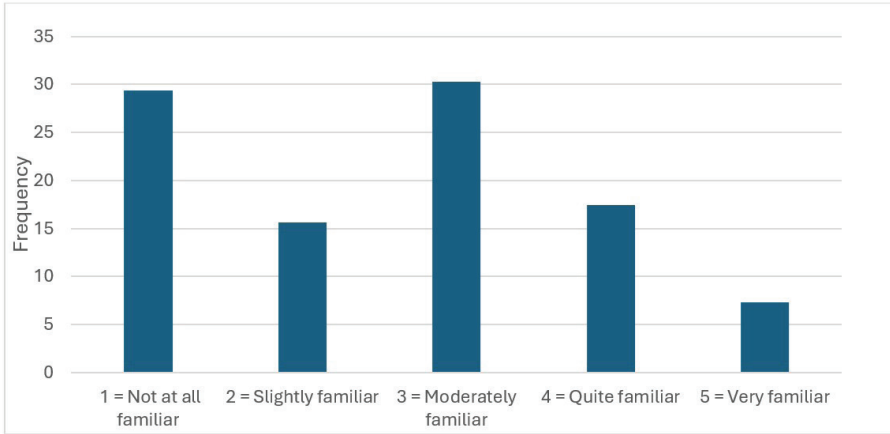


**Source:** Source: Prepared by the Authors.

Figure 3 demonstrates when the respondents were asked to assess whether AI improves the efficiency of managerial tasks, 60.00% of the respondents somewhat agreed with the statement that AI improves the efficiency of managerial tasks, followed by 20.00% who strongly agree with

the statement, and 16.00% who remained neutral. Only 4.00% somewhat or strongly disagreed, suggesting a high level of awareness of the changes affecting organizational managerial operations.

**Figure 4:** AI can Replace Traditional Managerial Tasks



**Source:** Prepared by the Authors.

Moreover, 63.00% of the respondents believed that, to some extent, AI can replace traditional managerial tasks, followed by 17.00% who think AI can replace traditional managerial tasks to a great extent. There was an equal split of 09.00% between 'not at all' and 'to a small extent,' and finally, only 02.00% believe that AI can completely replace traditional managerial tasks (Figure 4).

### 4.1.3. AI Training

Digital and AI training have been provided in the organizations. Table 2 showed the distribution of responses to the question: "Have you received specific training to use tools or technologies based on AI in your managerial practice?"

**Table 2:** AI Training

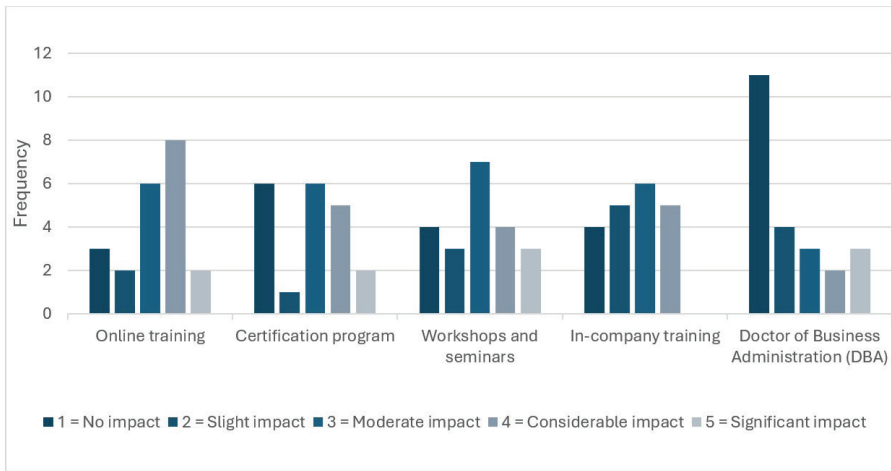
Answers	Frequency	Percentage
Yes	19	16.00
No	90	84.00
<b>Total</b>	109	100.00

**Source:** Prepared by the Authors.

The results showed that 16.00% of respondents have received training to use AI-based tools or technologies in their managerial practice, while 84.00% reported that they have not received any training in this regard.

For those who answered Yes, the type of training they received has been further enquired and the impact of training has been assessed as shown in Figure 5.

**Figure 5:** Type of AI Training Received



**Source:** Prepared by the Authors.

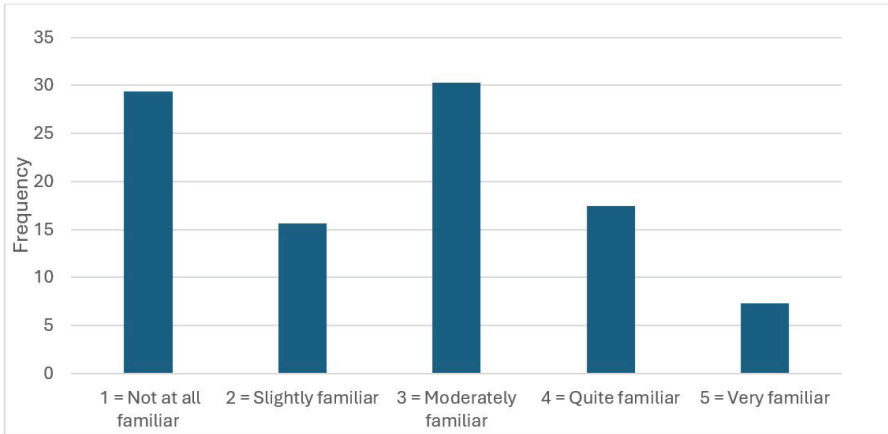
Figure 5 showed that opinions on the Doctor of Business Administration (DBA) program were divided: 44.00% saw no impact, while smaller groups rated it slight (16.00%), moderate (12.00%), considerable (8.00%), or significant (12.00%). In contrast, in-company training and certification programs were more positively received, with 24.00–28.00% rating them moderate and 20.00–24.00% considerable. Workshops and seminars followed a similar pattern, and online training was also well regarded (32.00% considerable, 24.00% moderate).

Overall, respondents favor structured, practical training formats, whereas the DBA program provokes mixed reactions.

Regarding AI-related training (Figure 6), a clear majority support targeted preparation for managers: 54.00% strongly agreed and 25.00% agreed that such training is necessary, 16.00% were neutral, and only 06.00% disagreed.

These results highlight strong consensus on the importance of equipping managers to work with AI systems.

**Figure 6:** Views on the Importance of Training Managers to Work with AI



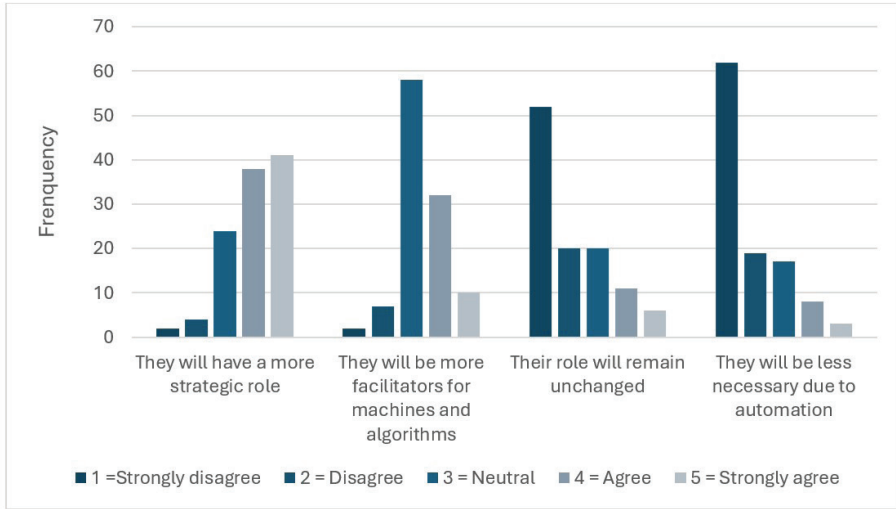
**Source:** Prepared by the Authors.

#### 4.1.4. Perception of the Future Role of Managers in the Context of AI

The respondents were also asked about their perceptions of the future role of managers in the context of AI seeking to understand the evolution of managers' role with the rise of AI in the coming years. To this respect, Figure 7 shows that a large majority of the respondents expected managers to assume a more strategic role, with 79.00% agreeing or strongly agreeing, while only 06.00% disagreed. Similarly, 42.00% agreed that managers will act increasingly as facilitators for machines and algorithms, though 58 respondents (almost half of the sample) remained neutral on this statement.

By contrast, the view that the managerial role will remain unchanged was not widely supported: over two-thirds of the respondents disagreed or strongly disagreed, and only a small proportion (14.00%) agreed or strongly agreed. An even stronger rejection was expressed regarding the idea that managers will become less necessary due to automation. Here, 81.00% disagreed or strongly disagreed, while only 11 respondents (around 10.00%) showed agreement. These findings suggest that respondents foresee a future in which managers remain essential, but with stronger emphasis on strategic functions and collaboration with AI systems

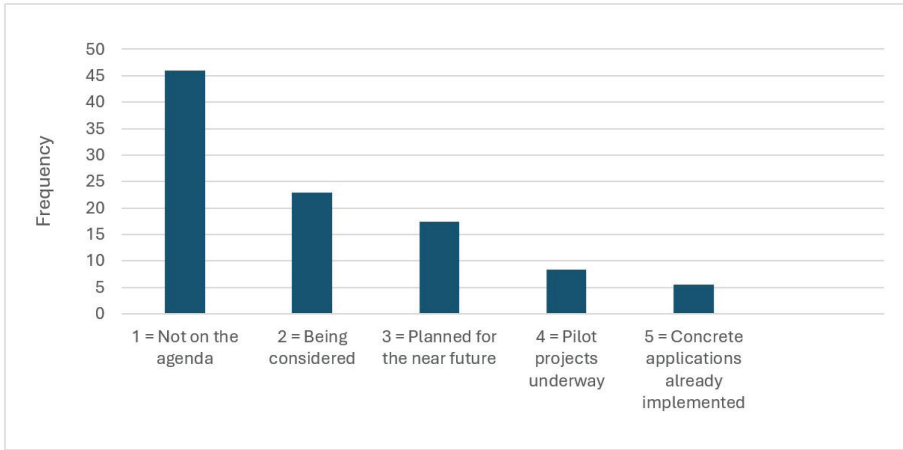
**Figure 7:** The Evolution of Managers' Role with the Rise of AI in the Coming Years



**Source:** Prepared by the Authors.

Respondents were then asked whether AI has already been integrated into their organizational practices or not. The results in Figure 8 showed that for almost half of the respondents (46.00%), the integration of AI into the managerial function was not yet on their organization’s agenda. Around one-fifth (23.00%) indicated that the topic was being considered, and 17.00% reported that it was planned for the near future. More advanced stages were much less common: 08.00% noted pilot projects underway, and only 06.00% confirmed that concrete applications have already been implemented. Overall, these findings suggest that while AI integration into management is increasingly recognized as important, it has not yet become a priority in most organizations.

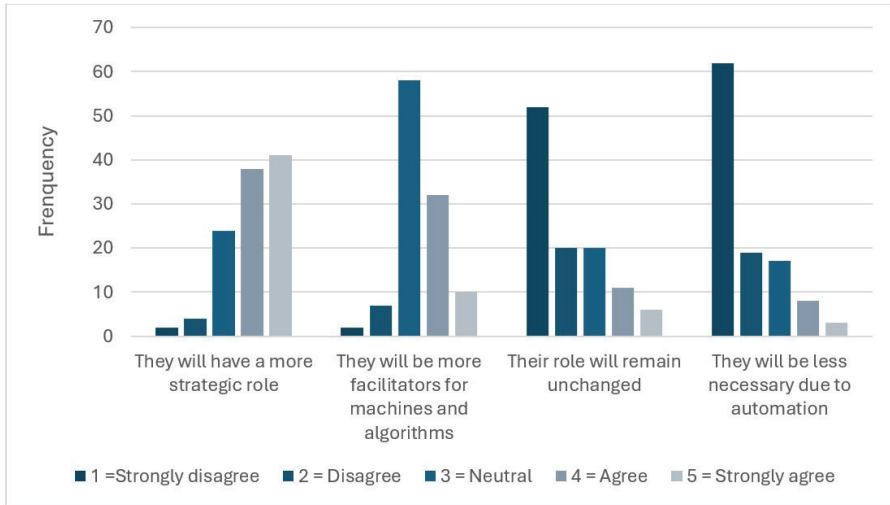
**Figure 8:** The integration of AI into the Managerial Function



**Source:** Prepared by the Authors.

Figure 9 showed that managers largely viewed AI as an opportunity in the future regarding their roles as managers. Most responses fell at levels 4 and 5 on the Likert scale, indicating strong agreement on AI's potential. The highest rating was for automation of tasks (58 responses at level 5), followed by anticipating risks and supporting decision-making. While options like suggesting actions or establishing correlations received more balanced scores, the overall trend highlights that AI is primarily perceived as a strategic enabler for efficiency, foresight, and creativity in managerial roles.

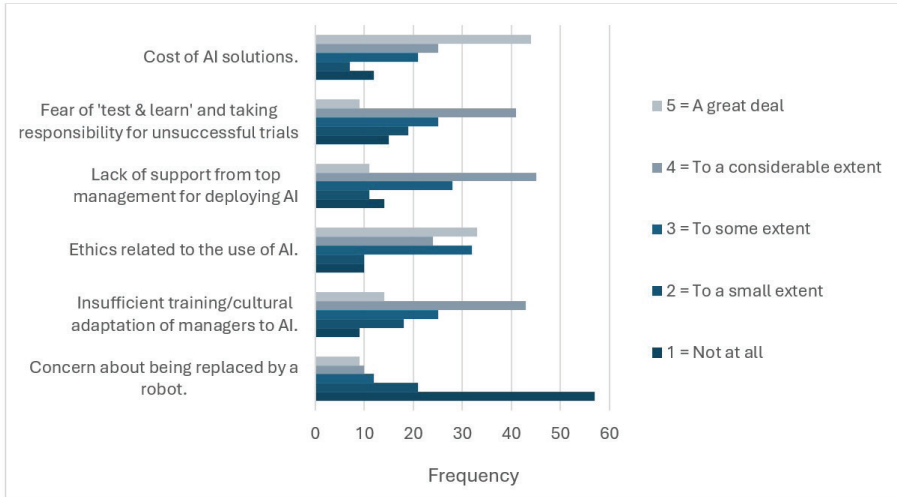
**Figure 9: AI as an Opportunity**



**Source:** Prepared by the Authors.

Respondents were also asked whether they thought the deployment of AI represents any threats to their jobs and if so in what areas that would be realized. Figure 10 highlighted the main threats managers perceived in the deployment of AI. The most significant concerns were the cost of AI solutions and the fear of “test & learn” failures, both receiving high levels of agreement (scores 4 and 5). Other notable barriers included insufficient training and cultural adaptation, as well as ethical issues. Interestingly, the fear of being replaced by robots was less prominent, suggesting managers were more concerned about implementation challenges than about job substitution.

**Figure 10: AI as A Threat**



Source: Prepared by the Authors.

## 4.2. Public versus Private Sector-Based Differences in the Perception and Application of AI in Management

This section presents results for the differences between respondents who work in public and private sector organizations. For that reason, we used the subsamples of managers who worked in private sector organizations (45.00% of the sample, see Table 1) and the public sector (55.00%). Based on the type of variable (i.e. ordinal (Likert scale) or categorical) we conducted Wilcoxon tests or Chi-Square tests to compare the two sub-samples and report statistical significance values.

### 4.2.1. Tests for Ordinal Variables

Wilcoxon (Mann–Whitney) test was used to compare public vs. private sector for the variables of interest operationalized in Likert Scale format (1-5 order) A p-value lower than 0.05 stated a statistically significant difference between the two sectors. Table 3 informed us about these differences and similarities.

Most representations such as managerial functions, management styles, familiarity with the augmented manager concept, perceived impact of AI on managerial roles, mastery of AI-based tools, perception of opportunities

that AI offers, as well as the threats AI poses on managerial tasks were similar across public and private sectors.

The differences, however, emerged in the means that managers rated the importance of AI and the AI practices implemented in the organization. For instance, the analysis revealed that public and private organizations differed in how they perceived the importance of AI skills for managers, as well as the extent to which an MBA was seen as contributing to the enhancement of such skills. These differences were observed at the 10.00% significance level, suggesting that while not significant, there was a tendency for the private sector to place greater emphasis on the practical value of AI-related managerial skills, whereas the public sector appeared less aligned on this point. Moreover, highly significant differences were observed for the application of AI in management operations, the vision of the future management practices and the perception of risk brought about by AI. The private sector seemed more engaged and somewhat enhanced in the practical adoption of AI. The private sector also paid more attention to the efficient technological management of AI whilst the public sector remained more attached to the human dimension.

Concerns about “test & learn” approach to risk management was stronger in the public sector which seemed more cautious and concerned with the risks of experimentation and the potential loss of the human dimension.

**Table 3:** Results of Wilcoxon (Mann–Whitney) Tests for Ordinal Variables

Interpretations	Variable	p-value
<p><b>No significant differences (<math>p &gt; 0.05</math>)</b></p> <p>This indicates that in most dimensions studied, the sector (public vs. private) does not significantly change perceptions.</p>	Managerial functions (Planning, Organizing, Directing, Controlling)	> 0.05
	Management styles (Authoritarian, Delegative, Participative, Hands-off)	> 0.05
	Familiarity with the concept of the augmented manager	> 0.05
	Perceived impact of AI on managerial tasks	> 0.05
	Mastery of AI-based tools	> 0.05
	Opportunities offered by AI (risk anticipation, decision support, creativity, etc.)	> 0.05
	Perceived threats of AI (ethics, training, cost, etc.)	> 0.05
<p><b>Near significance (<math>0.05 &lt; p &lt; 0.10</math>)</b></p> <p>These results suggest that the sector (private or public) may slightly influence the importance given to managerial skills and MBA training, but without reaching the conventional 0.05 threshold.</p>	Importance of managerial skills with AI	0.0665
	Impact of MBA on AI mastery	0.0618
<p><b>Significant differences (<math>p &lt; 0.05</math>)</b></p> <p>Here, the public and private sectors truly differ:</p> <ul style="list-style-type: none"> <li>In some cases, the private sector appears more advanced in the concrete application of AI.</li> <li>The public sector seems more cautious and concerned with the risks of experimentation and the potential loss of human dimension.</li> </ul>	Application of AI in managerial functions (planned vs. already implemented)	0.045
	Vision of future management (technological vs. human-centered)	0.0059
	Perception of risk: fear of “test & learn” failure and accountability	0.043

**Source:** Prepared by the Authors.

Statistical tests were conducted using a significance level of  $\alpha = 0.05$ . All results were interpreted based on a 95.00% confidence interval. P-values between 0.05 and 0.10 indicated marginal significance.

#### **4.2.2. Tests for Categorical Variables**

For categorical variables Pearson's Chi-squared tests were used to compare response distributions between public and private sectors. Table 4 informed us about these differences and similarities.

Regarding the sociodemographic variables (gender, age, education, residence), no significant differences were observed between public and private sectors. This indicated that the respondents' personal characteristics were relatively homogeneous across the two groups.

In contrast, strong and highly significant differences emerged in the structural variables. The public sector was characterized by large national structures with institutional status and administrative anchoring. The private sector, on the other hand, was more represented by smaller companies, often multinational, and operating with commercial legal forms. Clear differences were thus found in industry sector, legal status, type of organization, company size, and geographical scope.

Finally, with respect to AI-related variables, such as training, perceived efficiency, and replacement of managerial tasks, no marked differences were observed. This suggests that, at this stage, public- and private-sector organizations shared broadly similar perceptions concerning AI adoption and its managerial implications.

**Table 4:** Results of Chi-squared Tests for Categorical Variables

Interpretations	Variable	$\chi^2$ (df)	p-value
<p><b>No significant differences (p &gt; 0.05)</b></p> <p>This means that the two sectors (public/private) show no notable differences on these aspects.</p>	AI improves efficiency of managerial tasks	4.095 (4)	0.3933
	Received specific AI-related training	0.1027 (1)	0.7486
	Gender	0.1653 (1)	0.6843
	Age	8.6263 (5)	0.1249
	Highest level of education	5.8876 (5)	0.3173
	Place of residence	16.889 (16)	0.3928
	AI can replace traditional managerial tasks	9.0207 (4)	0.0606
<p><b>Significant differences (p &lt; 0.05)</b></p> <p>Here, strong differences are observed between public and private sectors in terms of:</p> <ul style="list-style-type: none"> <li>Nature of organizations: private sector represented more by SMEs/SEs, while the public sector is dominated by large organizations/administrations.</li> <li>Legal status: private companies → corporate forms (LLC, Ltd, etc.); public sector → public institutions/administrations.</li> <li>Geographical scope: private sector is more often multinational, while the public sector is more national.</li> <li>Industry sector: clear differences between economic domains covered by public vs. private.</li> </ul>	Industry sector	29.142 (10)	0.00118
	Legal status of the company	26.136 (7)	0.000476
	Type of company (public vs. private)	98.213 (1)	< 2.2e-16
	Company size (SE, SME, LE)	22.475 (2)	1.3e-05
	Geographical scope of the company	15.803 (2)	0.00037

**Source:** Prepared by the Authors.

### **4.2.3. Interpretive Summary**

Overall, the results indicate that managers predominantly perceive AI as a transformative factor rather than a substitute for managerial roles. Across the sample, AI is mainly associated with improvements in efficiency, automation of routine tasks, and enhanced decision-making support, while concerns about the complete replacement of managers remain limited. This suggests that AI is widely seen as an augmenting technology that reshapes managerial responsibilities rather than eliminating them.

A detailed examination reveals a clear correlation between managers' perceptions of AI and its reported impact on managerial efficiency. Respondents who perceive AI as an opportunity consistently report stronger gains in productivity and task automation, whereas those viewing AI as a threat express higher concern regarding role redefinition or loss of control. Although precise statistical coefficients are not reported in this study, the observed pattern aligns with prior research indicating that managerial attitudes significantly influence AI adoption and effectiveness (Huang & Rust, 2021; van de Wetering et al., 2024). This link between perception and operational outcome strengthens the analytical validity of the study.

The results also indicate a general convergence in perceptions between public and private sector managers. Despite differences in organizational context, both groups recognize similar opportunities and threats associated with AI and anticipate the need for closer human-AI collaboration in the redefinition of managerial roles.

However, sectoral differences become more pronounced when considering organizational practices and implementation. Private sector organizations demonstrate a more advanced adoption of AI in managerial functions and a stronger focus on technological efficiency. In contrast, public sector organizations show greater caution, particularly regarding experimentation, accountability, and the preservation of human-centered decision-making. These differences likely reflect contrasting governance logics, institutional constraints, and risk tolerance, highlighting that the perceptions of AI do not always translate into immediate operational changes (Figueroa, 2024; van de Wetering et al., 2024).

In summary, AI in management is best conceptualized as augmenting and collaborative, reshaping roles rather than replacing them. Realizing this potential requires targeted training, ethical oversight, and institutional support, particularly in public organizations, to bridge the gap between positive perception and effective implementation.

## **5. DISCUSSION**

The findings reveal a structural gap between positive perceptions of AI and its actual implementation within organizations. While managers widely recognize AI as a driver of efficiency and strategic support, its integration into managerial practices remains limited. This paradox suggests that AI adoption is not only a technological issue but also an organizational and institutional challenge, requiring alignment between capabilities, training, and governance structures. In this sense, the results contribute to the ongoing debate on AI in management by highlighting that acceptance does not necessarily translate into transformation, particularly in emerging economies.

Recent literature highlights that AI is profoundly transforming the roles of managers. By automating complex decision-making functions and altering organizational dynamics, AI presents new challenges in terms of skills and managerial practices (Huang & Rust, 2021). In accordance with the extant literature, the findings of this study highlight several key dynamics at the intersection of digital transformation and public management in Algeria. While most respondents acknowledge the operational benefits of automation, their responses also reveal areas of concern, hesitation, and institutional inertia mostly observed as in the differences between public and private organizations. The latter seem to be more opportunistic and early pioneers of AI implementation whereas the former are more cautious. These mixed perceptions confirm that digital tools alone are not sufficient to transform public administration, leadership, training, and strategic framing remain crucial.

### **5.1. Between Efficiency and Redefinition of Roles**

One of the clearest results is that many respondents associate the replacement of traditional managerial tasks through automation with increased productivity. This finding is consistent with international literature, which identifies automation as a reliable tool for enhancing repetitive workflows.

However, overall, only 43.00% of managers consider that these tools significantly transform their roles and there are not statistical differences between public and private organizations to this respect, a result that suggests a limited strategic repositioning of both private and public leaders. This reluctance to redefine managerial identity may stem from the rigidity of public institutions and the persistence of hierarchical cultures, as highlighted by van de Wetering et al. (2024). In Algeria, this could also reflect that a disconnect between infrastructure deployment and leadership empowerment automation is introduced, but its potential for managerial innovation remains underused. Yet, the cautious approach led by public organizations may influence private organizations to set their background in AI robustly. In other words, experiences gained in private and public organizations are highly likely to complement each other for the best practice.

## **5.2. Unequal Access to Training and Skills Development**

The issue of training emerged strongly in our results. Only 16.00% of respondents have benefited from structured learning related to digital tools or automated systems. Managers with no prior training expressed greater concern regarding job displacement and the loss of control.

This lack of preparedness reflects what Figueroa (2024) calls the “digital skills paradox”: institutions invest in tools but neglect the parallel investment in human capabilities. Without this double effort, digital reform risks reinforcing resistance rather than enabling transformation. In our sample, many respondents saw the absence of training as a structural flaw, not a personal failing. In that sense, we find that public organizations seem to embrace human involvement in the AI practices more broadly than their private counterparts. The synergy between public and private organizations in Algeria may prove to be fruitful in this aspect of humanized AI driven by public organizations.

## **5.3. Ethical Ambiguity and Managerial Discomfort**

Beyond skills, ethical discomfort was a strong undercurrent in several responses. Over a third of participants expressed concern that automation might erode the ethical and human dimensions of decision-making, particularly in sensitive areas like performance evaluation or citizen services. This aligns with Michael (2024), who warned that algorithmic opacity in public decision-making can undermine democratic legitimacy a danger illustrated by Australia’s

Robodebt case. Respondents in our study frequently mentioned a lack of clarity on who would be accountable for decisions generated by automated systems, revealing a vacuum in ethical oversight.

#### **5.4. Toward A Collaborative and Augmented Public Leadership**

Despite these concerns, most respondents (over 60.00%) indicated that they do not fear being replaced by technology. Instead, they anticipate a redistribution of tasks, where automation handles routine processes and humans focus on coordination, ethics, and complex judgment. This vision resonates with Rane et al. (2024), who describes future public leaders as hybrid actors, capable of interpreting data while preserving human-centered values.

In short, our findings support the idea of complementarity rather than substitution. Public managers are not being made obsolete; they are being repositioned. But for this to succeed, they need a robust support system: ethical frameworks, training opportunities, and institutional recognition of their evolving roles.

### **CONCLUSION**

This study sheds light on how digital transformation and automation are perceived and experienced by public and private sector managers in Algeria. While most respondents recognize the benefits of these technologies in terms of task efficiency and information processing, their integration into strategic management and ethical decision-making remains partial.

This gap reflects a broader issue that affects many public institutions: the introduction of digital systems without sufficient investment in human capacity, ethical reflection, or organizational redesign. The lack of structured AI training (reported by over 80.00% of respondents) highlights a critical vulnerability. Without accompanying frameworks for learning and reflection, automation risks reinforcing inertia rather than enabling progress.

Nevertheless, the study reveals promising signs. Managers do not see automation as a direct threat to their roles; rather, they perceive it as a tool to support decision-making, provided that human judgment, discretion, and leadership are preserved. These insights echo recent academic contributions

that advocate a hybrid model of public leadership, one that balances data-driven precision with the irreplaceable value of human reasoning and ethical awareness.

This research aligns with contemporary debates in management science on the digital augmentation of leadership and the reconfiguration of human-machine collaboration. By grounding the study in the extant literature and recent empirical data, it aims to inform organizational policy, training strategies, and ethical considerations for responsible AI adoption in management.

Key recommendations include:

1. Developing comprehensive AI training programs tailored to managerial needs and sectoral contexts.
2. Establishing clear ethical guidelines for AI use in decision-making, particularly in public administration.
3. Redefining leadership development to include both technical AI literacy and enhanced human-centered skills.
4. Creating institutional frameworks that support the emergence of hybrid managerial roles.

### **Theoretical Implications**

This study contributes to the literature on AI and managerial transformation by empirically supporting the shift toward augmentation and hybrid leadership models, where AI complements rather than replaces managerial roles. It also highlights a persistent gap between technological adoption and its strategic and ethical integration, particularly in the public sector. By providing comparative evidence from a developing-country context, the study addresses an important research gap and emphasizes the role of institutional factors in shaping AI-related practices and perceptions.

### **Practical Implications**

The findings underscore the need for a more holistic approach to AI integration, combining technological adoption with organizational and human development. In particular, the lack of AI-related training calls for structured programs that integrate both technical and ethical competencies. Additionally, organizations should establish clear governance frameworks and adapt leadership development to support hybrid managerial roles and effective human–AI collaboration.

### **Limitations and Future Research**

This study has several limitations that should be acknowledged. The sample size limits the generalizability of the findings, and the focus on a single country constrains external validity. In addition, the reliance on self-reported perceptions may introduce response bias. Future research could address these limitations by adopting longitudinal designs, incorporating qualitative methods, or extending comparative analyses across countries and administrative systems to further examine how institutional contexts shape managerial responses to AI.

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## YAPAY ZEKA VE YÖNETİMİN GELECEĞİ: ROLLERİN, BECERİLERİN VE İNSAN-MAKİNE İŞBİRLİĞİNİN YENİDEN TANIMLANMASINA DAİR CEZAYİR'DEN KANITLAR

Rania HAMDUCHE  
Mehdi BOUCHETARA  
Esin YORUK  
Messaoud ZEROUTI

### GENİŞLETİLMİŞ ÖZET

#### Arka Plan ve Amaç

Yapay zekâ (YZ) tarafından yönlendirilen dijital dönüşüm, örgütlerin işleyiş biçiminde ve yöneticilerin rollerini yerine getirme şekillerinde köklü bir değişime işaret etmektedir. Özel sektörde YZ'nin benimsenmesine ilişkin kapsamlı bir literatür bulunmakla birlikte, özellikle gelişmekte olan ülkelerde kamu sektörü yöneticilerinin bu dönüşümü nasıl algıladığı ve deneyimlediğine dair önemli bir boşluk mevcuttur. Bu çalışma, söz konusu boşluğu gidermeyi amaçlayarak, Cezayir örneğinde YZ'nin yönetsel roller, beceriler ve insan-makine etkileşimi üzerindeki etkilerine ilişkin yönetici algılarını incelemekte ve kamu ile özel sektör perspektiflerini karşılaştırmaktadır.

Araştırma, "Yapay zekâ çağdaş örgütlerde yöneticilerin rolünü nasıl etkilemektedir?" ana sorusu etrafında şekillenmektedir. Bu soru, şu alt amaçlar doğrultusunda detaylandırılmıştır: (1) yöneticilerin YZ'nin sorumlulukları üzerindeki etkisini nasıl algıladıklarının ortaya konması, (2) YZ ile bütünleşmiş çalışma ortamlarında öne çıkan kritik becerilerin belirlenmesi, (3) YZ'nin tamamlayıcı mı yoksa dönüştürücü/bozucu bir unsur olarak mı görüldüğünün tespit edilmesi ve (4) kamu ve özel sektör yöneticileri arasındaki farklılıkların analiz edilmesi.