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ARTIFICIAL INTELLIGENCE AS A TOOL APPLICABLE TO PUBLIC ADMINISTRATION: A LOOK AT THE HUMAN RESOURCES AREA

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ABSTRACT

The main objective of the work is to analyze how Artificial Intelligence (AI) can be used to optimize processes and improve efficiency in people management in the public sector. The research adopts a qualitative approach, using semi-structured interviews with employees of the Undersecretariat for Human Resources Management and the Automatiza.MG project, allowing an in-depth understanding of the interviewees' experiences and perceptions about the use of AI. The results indicate that the implementation of AI in the Human Resources (HR) sector can bring significant benefits, such as the automation of repetitive tasks, improved decision-making, and the personalization of the services offered to servers. However, challenges were also identified, such as resistance to change and the need for training of professionals. The conclusion points to the importance of strategic planning and an organizational culture that favors innovation, emphasizing that the adoption of AI must be accompanied by a process of cultural change and continuous training, in order to maximize its benefits and ensure more efficient and effective public management.

Keywords: Artificial Intelligence. Human resources. Challenges. Opportunities. Public administration.

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INTRODUCTION

In the study conducted by Prikshat et al. (2023), a fundamental proposition is presented, given the growing relevance of Artificial Intelligence (AI) in public administration, which has aroused the interest of researchers and managers, especially with regard to its application in the area of Human Resources (HR).

Khan et al. (2023) emphasize that AI offers significant opportunities to enhance operational efficiency, automate repetitive tasks, and optimize decision-making. The authors' analysis highlights that the growing adoption of AI in the context of Human Resources Management (HRM) is invariably driven by the incessant search to improve the efficiency and effectiveness of processes related to personnel administration in organizations (Satispi et al, 2023).

This perspective is reinforced by highlighting that the integration of AI in HR management not only relieves the administrative burden, but enables the allocation of resources to higher-priority tasks, but also improves decision-making, accelerates service delivery, and helps reduce costs, consolidating itself as an effective approach in the contemporary organizational scenario (Khan et al., 2023).

In addition, authors such as Chilunjika et al. (2022) do not neglect the perspective that AI has great potential that can induce a profound and significant transformation in the way organizations conceive and, equally, in the way they manage their HRs, thus reinforcing the need to adapt to the emerging and constantly evolving scenario.

The reason that justifies the adoption of AI in the area of HR management lies in the remarkable ability of this technology to reduce the administrative burden that traditionally consumes a significant part of HR professionals' time and resources, as explained by Dias (2024). By introducing AI in this context, it opens up the possibility of freeing up time and human resources that would otherwise be allocated to routine administrative tasks, allowing them to focus on more urgent and strategic activities for the organization (Chilunjika et al., 2022).

Another relevant point is the impact of AI on accelerating the provision of services in the HR area. Process automation and real-time data analysis allow HR operations to be carried out more efficiently, saving time and resources (Chilunjika et al., 2022). According to Khan et al. (2023), AI can also contribute to cost reduction, making HR management more economical and accessible for organizations.

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As discussed by Silva et al (2021), another important factor about the use of AI in the public service involves overcoming a set of challenges and barriers. The cultural challenges associated with innovation in the public sector are linked to human resistance, which presents itself as significant barriers in this process. These resistances are observed among both civil servants and citizens and are largely motivated by distrust towards new approaches, especially those involving the integration of innovative machines and technologies (Prikshat et al, 2023).

Furthermore, as corroborated by Chilunjika et al. (2022), one can mention the shortage of skills and technical knowledge essential for a successful implementation of their tools, as another obstacle in the implementation of AI. The complexity associated with the integration and use of AI demands technical knowledge, including advanced programming skills, a detailed understanding of algorithms, and the ability to handle complex datasets (Yawalkar, 2019).

According to Mendonça et al. (2018), the increasing digitalization and automation of processes in Public Administration brings with it challenges and opportunities, especially with regard to HR management. In view of the rapid evolution of AI and its potential to optimize operations and decision-making, the question arises as to how managers and employees of the Minas Gerais State Department of Education (SEE MG) perceive and are prepared to adopt AI in their HR practices. Reflecting not only on the need to understand the expectations and challenges faced, but also on the importance of exploring how technological innovation can positively impact the efficiency and effectiveness of internal processes.

The general objective of this study is to analyze the possible challenges and opportunities associated with the use of Artificial Intelligence tools by public servants working in the Human Resources area of the Minas Gerais State Department of Education. The specific objectives include: (a) to identify if there are Artificial Intelligence tools, used by the Secretariat of State and Planning and Management of Minas Gerais (SEPLAG MG), as an opportunity for the implementation of new technological tools in the Human Resources sector; (b) analyze the opportunities for the use of Artificial Intelligence tools by public servants working at the Minas Gerais State Department of Education for the automation of processes in the Human Resources sector; and (c) to investigate the challenges faced by public servants working at the Minas Gerais State Department of Education for the automation of processes in the Human Resources sector. This work is

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structured in three main sections, in addition to this introduction and conclusions, the next one being dedicated to the theoretical framework.

THEORETICAL FRAMEWORK

The implementation of AI in the public sector is driven by the need for modernization and the search for greater efficiency. The adoption of emerging technologies, such as AI, is driven by the growing demand for more agile and responsive public services. In this context, the integration of AI into HR management can facilitate the personalization of services, allowing for a more citizen-centered approach (Dias, 2024)

HUMAN RESOURCES

Historically, the concept of Human Resource Management (HRM) can be considered relatively complex, having previously been known as Personnel Administration, where, in the early stages of this traditional approach, there was no emphasis on interpersonal relationship practices. Instead, there was an exclusive focus on the technical aspects related to salaries, evaluation, training, and compensation of employees, which resulted in the characterization of this function as merely support within organizations (Carvalheiro, 2011).

During the period known as Personnel Administration or Industrial Relations, as observed by Price (1997), People Management (PM) was characterized by a reactive approach, focused only on solving immediate problems, without a strategic vision. This practice lacked a solid theoretical basis to guide its actions, being mainly based on compliance with rules and regulations, in addition to the use of common sense. Ferris et al. (2004) observe that there was a mechanistic view in relation to employees, assuming that they were motivated by economic reasons.

The change in this perspective can be attributed, as pointed out by Araújo (2006), to the relationship between the development of HR and the emergence of the Second Industrial Revolution at the beginning of the twentieth century. This occurred because companies began to recognize the human factor as an element of production that needs to be managed, as well as the other factors present in an organization (Fischer, 2002).

With this, it is possible to say that the development of HR is associated with the second industrial revolution at the time when it started to adopt a renewed and more focused approach to caring for employees, as many companies began to show interest in

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their well-being. In this context, it is evident that, as changes occur in society, HRM follows management trends (Araújo, 2006).

In recent years, substantial changes have been observed at all organizational levels. Employees can no longer limit themselves to merely performing assigned tasks. Likewise, HR professionals are no longer restricted to conventional recruitment and selection functions. Currently, they play a more dynamic role in the strategic planning of organizations, recognizing the workforce as a primary resource for the success of the institution (Carvalheiro, 2011).

PM plays a key role in the functioning of administrative activities, promoting the development of available human capital and contributing to excellence in the provision of services to citizens (Silva et al., 2019). In this scenario, Cruz and Santana (2015) state that HR has been responsible for the success of organizations and for the recognition of the value of intangible capital in an era dominated by information. Being directly connected to people, based on this information, it is expected that their actions generate direct results for all members who make up the institution's workforce.

EVOLUTION OF INDUSTRY AND DIGITAL TRANSFORMATION IN ORGANIZATIONS

The Industrial Revolution, according to Romeiro (2021), had a profound and lasting impact on the material and social conditions of humanity. This period of historical change fundamentally changed the way people lived and perceived the world around them. According to Hobsbawm's (2000) considerations, the Industrial Revolution represents much more than simply a period of accelerated economic growth, being described as the most disruptive transformation of human life ever recorded.

Before the Industrial Revolution, the entire production process was manufacturing, as it took place manually and the worker had an artisanal capacity, through which he carried out his work (Romeiro, 2021). However, according to Decicino (2011), with the advent of the Revolution, characterized by the use of new sources of energy, the use of steam-powered machines and the development of the means of communication (telegraph), artisans had to reinvent themselves, because, in this capitalist period, work was divided into stages, leaving workers to participate in the manufacturing process as a whole to specialize in part of the process.

According to the observations of Lopes et al. (2020), around the second half of the nineteenth century, approximately between the years 1850 and 1870, the Second Industrial

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Revolution began. This remarkable process of economic and technological transformation persisted until the end of World War II, between the years 1939 and 1945. The mutual influence between science and technology provided a unique scenario for the significant development of industrial productive capacity. Advances in oil extraction, steel production, electricity and the chemical industry have allowed the creation of previously unimaginable items (Franco, 2011).

In the Second Industrial Revolution, the use of steam, which had previously served as a source of energy since the First Revolution, was replaced by electricity and oil. A factor that accelerated economic and industrial expansion and inaugurated an era of transformation of most human life on earth. Countries such as Italy, Germany, France, Japan, the United States, and Russia had their processes industrialized, causing energy substitutions that generated greater efficiency compared to the previous one (Lopes et al., 2020).

With this, not only technological advances, but also geographical advances, were perceived, at the moment when the revolution was no longer limited to England and extended to other countries. It was during this period that the mass production of consumer goods emerged, known for the implementation of the famous large-scale assembly line created by Henry Ford. This spread of the Industrial Revolution, beyond the borders of England, had a profound impact on the global economy, drastically transforming the industrial and commercial landscape of several nations around the world (Franco, 2011).

The Third Industrial Revolution, in turn, is approaching the current generations, since from the second half of the twentieth century, information has become a basic and valuable raw material for all countries. This phase was marked by the introduction of technological innovations, especially in relation to electronics and information technology in industrial processes, helping to achieve a significant gain in productivity (Rocha et al., 2020).

The first computers emerged, promoting an important acceleration in the realization of any process related to scientific development. This new revolution that emerged began exactly at the end of World War II, between the years 1950 and 2000. Technologies developed in the war were fundamental to the great advance of the Third Revolution, being known as the "Information Revolution" (Lopes et al., 2020).

In this context of global transformations, the Fourth Industrial Revolution emerged as Industry 4.0, a term coined by the Germans in 2011, introducing the concept of smart

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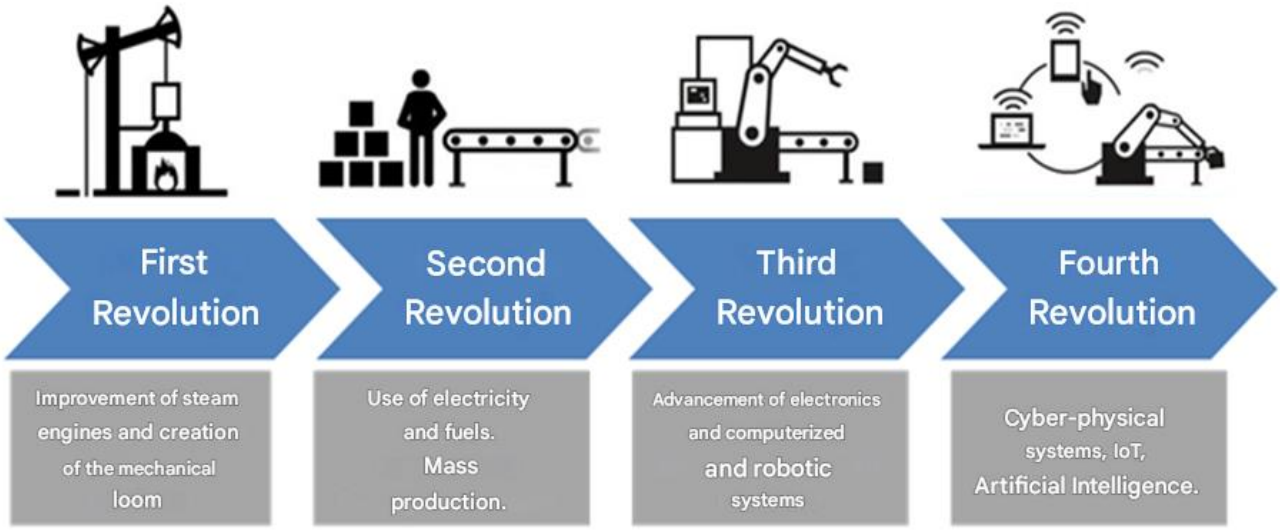
factories that use innovation and incorporate automation, control, and information technologies to refine manufacturing processes. This new approach means a major break with the traditional industry and strives to achieve maximum efficiency and flexibility through the convergence of various technological advances. As such, it marks a shift to a new era in modern industrial production (Lima & Pinto, 2019).

Figure 1. Industrial Revolutions Framework



Source: Firmin (2020)

The progressive adoption of digital technologies has led to significant transformations in society over time, the effects of which are clearly revealed in several sectors. This includes, for example, substantial changes in the way communication is established, work activities are developed and, according to some scholars, even in the configuration of forms of entertainment. This accelerated and constant process of modification has come to be often categorized under the concept of "digital transformation" (Van Veldhoven & Vanthienen, 2019).

It is important to note that digital transformation plays a relevant role in the ability of organizations to adjust effectively to the constant changes in the business environment. It allows businesses to adapt to new challenges and provides them with the opportunity to explore the innovations and benefits provided by advancing digital technologies (Kraus et al., 2022).

In summary, digital transformation is not an option, but a strategic imperative for organizations that seek only to survive, but to thrive in an environment marked by rapid and disruptive changes. It represents the key to optimization, efficiency and competitiveness, as

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well as a better end-user experience and the exploitation of new technological opportunities. In this context, digital transformation emerges as an essential means for organizations that want to follow a path of success in an increasingly digital organizational landscape (Kraus et al., 2022).

ARTIFICIAL INTELLIGENCE AND ITS APPLICATION

In the academic literature, there is widespread recognition and growing emphasis on the importance of the exploration of AI by organizations. Chatterjee et al. (2022) highlight the relevance of AI in organizational operations, improving the customer experience, and the ability to make data-driven decisions. This makes it a key strategy for the success of organizations in an increasingly competitive and technology-driven organizational environment.

AI marks a significant point in the trajectory of technological evolution, giving computers the ability to perform functions that were previously considered exclusive to human capacity. These technologies encompass a variety of advanced tools and techniques aimed at analyzing both structured and unstructured data, providing computational systems with the ability to learn from this information and subsequently make decisions based on that learning, as highlighted by Prikshat et al. (2023).

In addition, organizations have used AI in diversified ways, seeking to meet their primary objectives and comply with the various obligations related to their operational context. In this sense, the remarkable application of AI by commercial companies stands out, which, in a strategic way, have explored this technology as a fundamental instrument for optimizing sales operations and improving product dissemination (Ma & Sun, 2020).

By incorporating advanced algorithms, machine learning, and natural language processing techniques, organizations enhance their analytical capabilities and transcend traditional boundaries, exploring new perspectives and possibilities that AI offers. Thus, the strategic use of AI emerges as an essential component in the strategy of organizations, bringing significant benefits that contribute to the achievement of goals, the increase of competitiveness, and the continuous adaptation to the demands of the contemporary organizational landscape (Arora & Sharma, 2023)

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In the contemporary context, the presence of robots can be considered notorious, being widely used to establish dialogues and interact with people, especially in companies that are based on technological principles, as is the case of Startups. In the specific scope of financial startups and *fintechs* (companies that introduce innovations in financial markets through the intense use of technology), robots play varied roles, from attracting new customers to defining the profile of investors and selecting the most appropriate investment portfolios. It is noteworthy that, in this context, the interactivity of robots plays a fundamental role, directly influencing customer trust in the products offered by these companies (Hildebrand & Bergner, 2020).

IMPLEMENTATION OF AI IN THE PUBLIC SECTOR: CHALLENGES AND OPPORTUNITIES

The significant advance in the development of AI has provided a profound reconfiguration in the way we look at work and its management (Ertel, 2018). According to Chilunjika et al. (2022), AI is the ability of a digital computer or computer-controlled robot to perform tasks associated with intelligent beings. They also state that the concept of AI is often used to support the development of systems endowed with intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experiences.

Because of the technological reflexes mentioned, there is a need to change between traditional management practices and new public management, so public sector organizations have to seek to evolve in a global scenario, as technology advances rapidly. This imperative of adaptation and transformation can be understood as a result of the growing pressure to modernize and optimize public services (Ertel, 2018).

The use of AI in the public sector is not without challenges inherent in the process of implementation, acceptance and use. However, the importance of recognizing that the opportunities provided by the use of AI are vast and, by virtue of its strategic implementation, can trigger a far-reaching reshaping in the public sector, reverberating throughout society Chilunjika et al. (2022).

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As highlighted by Chilunjika et al. (2022), the significance of these opportunities transcends transitory obstacles, pointing to a transformative potential capable of redefining traditional public sector paradigms. AI's ability to optimize processes, improve operational efficiency, and promote transparency opens the door to more effective and responsive administration.

METHODOLOGY

Figure 2 presents in a consolidated way, the methodological path adopted for the development of this work, which aims to ensure the integrity and reliability of the research, providing a comprehensive and in-depth understanding of the processes that support the research undertaken.

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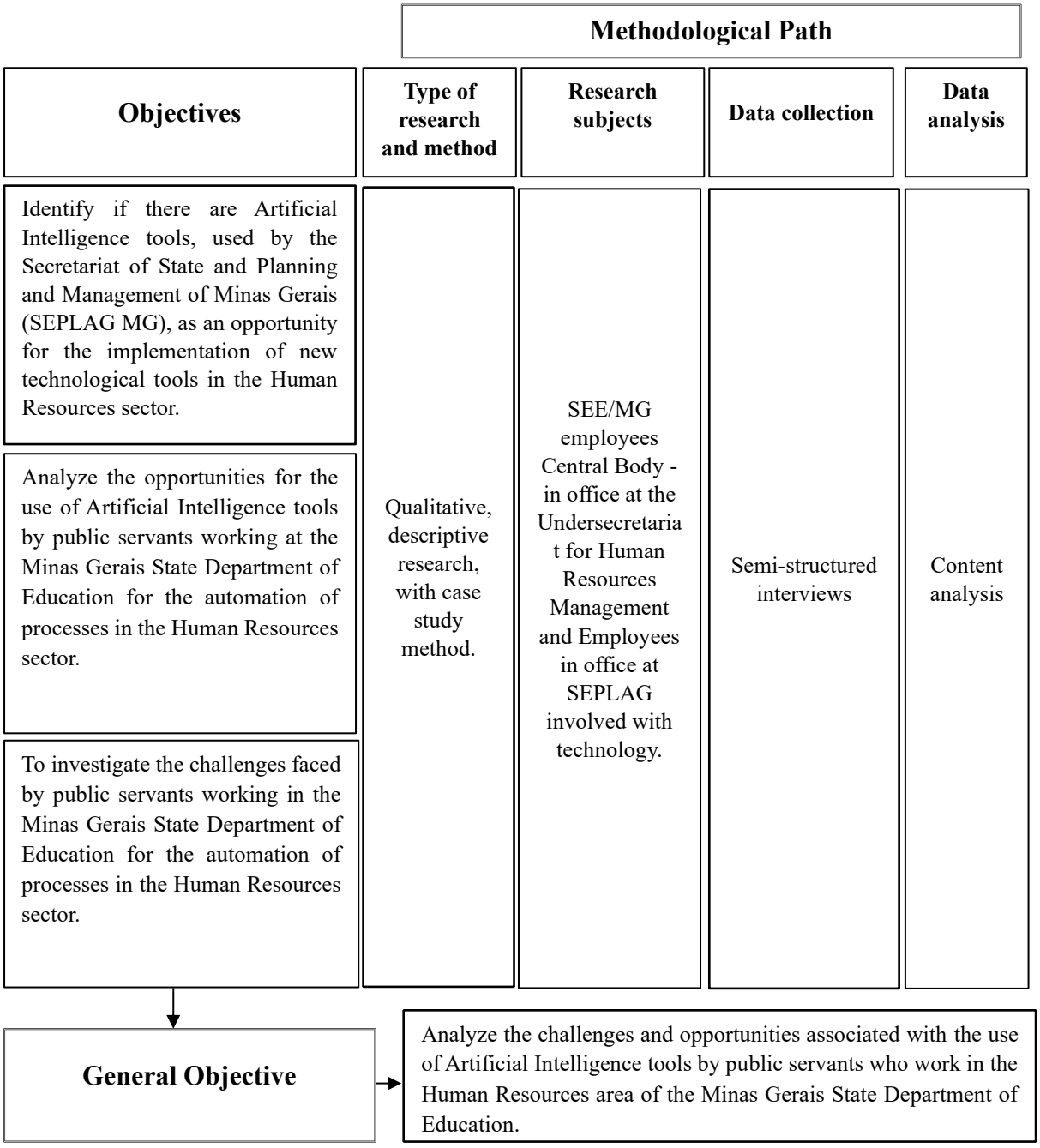
Figure 2. Methodological Path



Source: prepared by the author

The research was conducted using procedures based on the qualitative method of search and data analysis. It adopted a qualitative and descriptive approach, with the objective of analyzing the challenges and opportunities of the use of AI tools by public servants in the area of Human Resources of the Minas Gerais State Department of Education. The descriptive nature of the research aims to observe and detail the characteristics of the groups involved, the processes and the interactions that occur in the context of the implementation of AI. According to Vergara (2005), the descriptive method

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seeks to describe events and phenomena, providing a clear view of what is being investigated.

Data analysis was carried out in order to identify patterns and categories that emerge from the interviews, allowing a deeper understanding of the perceptions of civil servants about the implementation of AI. This methodological approach enables a comprehensive view of the factors that influence the adoption of innovative technologies in the public sector, highlighting both the barriers and the potentialities.

Data collection was carried out through semi-structured interviews, which proved to be an effective technique to explore the experiences and perceptions of public servants in relation to the use of AI tools in the area of Human Resources, allowing respondents to express their opinions and experiences more freely, enriching the understanding of the phenomenon under study. The flexibility of semi-structured interviews made it possible to capture valuable information that might not have been strictly contained in the initial script, allowing for a more comprehensive and contextualized analysis.

After collection, the audios of the interviews were transcribed with the help of an AI tool, ensuring accuracy in transcription. This step was important to ensure the accuracy of the material analyzed. The data analysis followed the phases of content analysis, allowing a controlled and systematic interpretation of the information.

The research participants were selected based on specific criteria that ensured the relevance and adequacy of the data collected. Civil servants working in the Undersecretariat of Human Resources Management of the Minas Gerais State Department of Education were included, as well as those who work in the State Secretariat of Planning and Management, especially those involved in the Automatiza.MG project (a project that aims to modernize and streamline administrative processes through the automation and digitalization of services). This choice was based on the need to obtain information directly related to the use of Artificial Intelligence tools for the automation of processes in the Human Resources sector.

The context of the research took place in the Presidente Tancredo Neves Administrative City, where the interviews were carried out virtually, as a result of a decree that authorized the exceptional telework regime, due to the interdiction of the complex's elevators. This situation allowed participants to contribute their experiences and insights on the implementation of AI, ensuring that data collection was carried out in an accessible and secure manner.

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RESULTS AND DISCUSSIONS

The objective of this section is to analytically expose the results of the field research, correlating them with the theory and concepts that underlie the study, seeking to elucidate the problem that guides the investigation, discussing and examining the data collected during the research with public agents. The analysis is guided by the interpretation of the data, based on the objectives defined for the qualitative study, aiming to confirm or question the ideas proposed in the existing literature.

DEMOGRAPHIC CHARACTERISTICS AND PROFILE OF THE INTERVIEWEES

To provide a better contextualization of the analysis, the following table offers a detailed view of the demographic characteristics and profile of the interviewees. The research involved 22 public agents, 16 of whom were working at SEE and 6 at SEPLAG, all of whom were teleworking full-time during the period in which the study was conducted. It was decided not to distinguish between these two groups in relation to demographic characteristics and their respective profiles, since, with such specifications, it would be possible to deduce the potential participants of the research, especially those who are working in SEPLAG.

Likewise, in order to ensure the protection of the privacy and confidentiality of the participants, all were identified in the table as "interviewees" and numbered sequentially from one to 22, according to the order of interviews. This approach ensures that participants' personal information remains anonymous, while allowing for an analysis of their characteristics and positions within the Agencies.

Table 1. Demographic Characteristics and Functional Distribution of the Interviewees

Interviewee	Secretary	Age	Gender	On-the-job experience (in years)	Schooling	Position/Function
Interviewee 1	SEE	43	F	1 to 5 years	Higher (studying)	Trainee
Interviewee 2	SEE	31	M	1 to 5 years	Graduate	EPPGG
Interviewee 3	SEE	64	M	26 to 30 years old	Graduate	ANE
Interviewee 4	SEE	46	M	6 to 10 years	Graduate	TDE
Interviewee 5	SEE	42	M	11 to 15 years	Graduate	TDE
Interviewee 6	SEE	48	F	11 to 15 years	Graduate	Administrative Assistant (MGS)
Interviewee 7	SEE	48	F	16 to 20 years old	Graduate	TDE
Interviewee 8	SEE	40	M	6 to 10 years	Master's Degree (Ongoing)	ANE
Interviewee 9	SEE	33	M	6 to 10 years	Graduate	TDE

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Interviewee 10	SEE	40	M	6 to 10 years	Graduate	TDE
Interviewee 11	SEE	46	F	21 to 25 years old	Master's Degree (Ongoing)	ANE
Interviewee 12	SEE	43	F	11 to 15 years	Graduate	TDE
Interviewee 13	SEE	44	F	21 to 25 years old	Graduate	ANE
Interviewee 14	SEE	47	F	6 to 10 years	Complete Superior	TDE
Interviewee 15	SEE	44	F	6 to 10 years	Complete Superior	Broad Recruitment
Interviewee 16	SEE	33	F	11 to 15 years	Graduate	Strategic Manager
Interviewee 17	SEPLAG	36	M	6 to 10 years	Complete Superior	Strategic Manager
Interviewee 18	SEPLAG	55	M	6 to 10 years	Complete Superior	Broad Recruitment
Interviewee 19	SEPLAG	36	M	11 to 15 years	Masters	Strategic Manager
Interviewee 20	SEPLAG	35	M	11 to 15 years	Graduate	Strategic Manager
Interviewee 21	SEPLAG	35	F	1 to 5 years	Graduate	EPPGG
Interviewee 22	SEPLAG	39	M	16 to 20 years old	Masters	Strategic Manager

Source: prepared by the author

Initially, it is noteworthy that the average age of the interviewees was 44 years, with the youngest being 33 years old and the oldest being 64 years old. The presence of interviewees of different age groups suggests that opinions and experiences may vary according to professional experience, allowing for a more contextualized analysis.

In addition, this diversity can contribute to identifying how different generations perceive the adoption of new technologies and their implications in the workplace. Thus, the inclusion of a broad age range strengthens research, enabling a more comprehensive understanding of the challenges and opportunities associated with the implementation of AI in the public service (Prikshat et al., 2023).

Similarly, participants were classified based on their gender to facilitate data analysis. Female individuals were identified by the letter "F", while those of the male gender were marked with the letter "M". From a gender perspective, the survey sample was composed of 12 men (55%) and 10 women (45%), ensuring a balanced representation of both genders.

AI EXPANSION PERSPECTIVE

This subsection is dedicated to the analysis of the expansion of AI in the HR sector, focusing on the tools currently available at SEPLAG and that have potential use in SEE. In

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addition, it seeks to understand the perceptions about the similarities and differences in HR processes between the departments analyzed.

SEPLAG, as the body in charge of modernization and innovation in the state's public administration, plays a central role in this context. Project Automatiza.MG, a flagship initiative within this strategy, aims to adopt tools that promote the automation of administrative processes, integrating AI whenever appropriate.

In this context, it is emphasized that the phenomenon studied in this subsection is based on the perceptions and experiences of participants working in SEPLAG, identified as Interviewees 17 to 22.

Table 2. Analysis of the phenomenon: Prospect of AI expansion

Construct	Construct Components	Archives	References	Relative frequency (% of mentions in relation to the category)
Prospect of AI expansion		6	56	100%
	Process Structure	6	20	35%
	Expectation and anxiety	6	12	21%
	Strategic Objectives	4	10	18%
	Modernization Initiatives	4	9	16%
	AI policies	2	3	5%
	Unaware of Tools in the sector	3	3	5%

Source: prepared by the author

The high number of references to the structure of HR processes among the departments reveals that this is a central theme in discussions about the implementation of AI. The variations in internal processes reflect different approaches and needs of each secretariat, and also highlight the complexity of the environment in which AI must be integrated. "I have worked at the Department of Education for a while. And there, it's a world apart. You have a lot of process, and very large processes. Everything there is thousands of people" (Interviewee 20). Other participants also corroborate this view, adding:

> SEPLAG's payroll is much leaner and simpler. Even because of the number of positions that exist and the type of position. Generally, SEPLAG servers work 40 hours a week, at a specific time, and there are no funds that vary over time. The same in education, there are additional payments that are for time, not for length of service, for length of work (Interviewee 17).

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Reinforcing this perspective, Mendonça et al. (2018) claim that the complexity of implementing AI in an environment with varied processes can hinder adoption and effective use, especially when the particularities of each process are not properly considered.

One of the interviewees highlighted this concern when he stated: "If we do not consider the particularities of each secretariat, we run the risk of implementing solutions that do not meet the real needs of users" (Interviewee 20). This statement emphasizes the need for a personalized approach to the adoption of AI tools, which must take into account the specifics of each industry. The implementation of generic solutions can result in failures, as they do not consider the unique particularities and challenges that each Agency faces (Prikshat et al. 2023; Mendonça et al., 2018).

AI OPPORTUNITIES IN THE PUBLIC SERVICE

This subsection analyzes the opportunities for the use of Artificial Intelligence tools by public servants working at the Minas Gerais State Department of Education for the automation of processes in the Human Resources sector.

Table 3 offers a view of the opportunities associated with the implementation of AI in the public service, from the perspective of the 22 interviewees, specifically in the context of the Minas Gerais State Department of Education. The analysis of the components of the construct "Opportunities of AI in the Public Service" reveals significant points about how the adoption of these technologies can transform public management and improve the efficiency of processes.

Table 3. Analysis of the phenomenon: Opportunities of AI in the Public Service

Construct	Construct Components	Archives	References	Relative frequency (% of mentions in relation to the category)
Opportunities of AI in the Public Service		22	62	
	Improved Efficiency	14	25	40%
	Task automation	11	14	23%
	Reduction of errors	10	12	19%
	Expansion of service capacity	5	5	8%
	Server Integration	2	2	3%
	Impersonality	1	1	2%
	System Integration	1	1	2%
	Cost reduction	1	1	2%
	Reduction of rework	1	1	2%

Source: prepared by the author

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The analysis of the efficiency provided by AI in the context of HRM in the public sector is a central theme, with 40% of the references highlighting the improvement in efficiency as the most mentioned component. This emphasis on efficiency is in line with the view that AI can be considered a powerful tool for optimizing operations and reducing the time spent on administrative tasks, as evidenced by several authors.

Prikshat et al. (2023) argue that adapting technologies to the needs of users is key to ensuring effective adoption of AI. This perspective suggests that efficiency is not only a matter of technological implementation, but also of how this technology is used by civil servants.

The literature also points out that the simple introduction of AI tools does not automatically guarantee efficiency, requiring a deep understanding of the needs of users and adequate training so that these professionals can use these tools effectively: "[...] so, I think the benefit is this: it is less time to work on tasks that are operational and more time to think about innovation" (Interviewee 16).

The statements of the interviewees corroborate this analysis. Interviewee 16 highlights that the reduction of working time in operational tasks allows civil servants to focus on more innovative activities. This shift in focus becomes critical, as innovation can often be viewed as the engine of organizational progress.

The ability to free up time for creative and strategic thinking becomes one of the main benefits of automation provided by AI, allowing public servants to perform their duties more efficiently and contribute to the evolution of the processes and services offered.

> [...] You can serve much faster and with much less human effort. You can save a lot of things on the HR team, putting IAS to work, you gain absurd productivity and, generally, HRs, at least here in the state and other federation agencies, they have liabilities on things, depending on what, of course. So, we can discharge this liability and still put the work there much faster (Interviewee 20).

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Interviewee 17 complements this view by stating that the mechanization of tasks, through AI and also management *software* , brings significant benefits both to civil servants and to the public service as a whole. This statement is in line with Khan et al. (2023), who discuss the importance of integrating management technologies with AI, emphasizing that the combination of these tools can result in more effective and responsive management. The automation of manual and repetitive tasks improves operational efficiency and contributes to the satisfaction of servers, who can dedicate themselves to activities that require greater creativity and critical analysis (Kraus et al., 2022).

In addition, Interviewee 9 reinforces the idea that AI can be beneficial to the public service in general, especially in routine tasks: "AI, it is important, yes, for the public service as a whole, right? In any body, in any sector. Mainly, as I said at the beginning, for routine work that they are doing every day. This gives a lot of agility in everyone's service (Interviewee 9)". This statement highlights the importance of AI in the agility of services by improving internal efficiency and positively impacting the citizen experience, who benefits from faster and more effective services (Satispi et al., 2023).

In short, the literature and the testimonies of the interviewees converge to the conclusion that the effective adoption of AI can transform HR management, allowing civil servants to focus on more value-added activities and contribute to the innovation and continuous improvement of public services. This transformation can be understood as a matter of operational efficiency and also of organizational evolution and adaptation to contemporary demands.

CHALLENGES AND BARRIERS

This subsection examines the challenges faced by SEE public agents in automating HR processes. Issues such as technical and operational difficulties are addressed, as well as cultural barriers, including resistance to change and the lack of adequate skills for the adoption of artificial intelligence.

For the analysis of this phenomenon, some components were identified and defined. These elements elucidate the complexities and challenges inherent in the implementation of artificial intelligence in organizations, as detailed in table 4.

Table 4. Analysis of the phenomenon: Challenges and Barriers

Construct	Construct Components	Archives	References	Relative frequency (% of mentions in relation to the category)

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Challenges and Barriers		22	179	
	Technical Difficulties	22	61	34%
	Resistance to Change	16	29	16%
	Need for Training	12	28	16%
	Security and Privacy	14	23	13%
	Impact on work	13	16	9%
	Labor force insufficiency	11	12	7%
	Skill Shortages	9	10	6%

Source: prepared by the author

With a relative frequency of 34%, "Technical Difficulties" were perceived as the most significant challenge identified. These difficulties involve practical and technical problems associated with the use of AI, such as integration with existing systems, software failures, difficulties in configuring tools, and the indisposition of more modern equipment. The complexity of the technologies involved can create substantial barriers to their adoption, as highlighted by Chilunjika et al. (2022). This component was the most frequently mentioned, underlining that overcoming these challenges still stands out as essential to ensure a successful implementation of AI.

To obtain a visual understanding of the linguistic data and the frequency with which certain words appear within this component of the construct, the "word cloud" technique was employed using the Nvivo software. This approach allowed us to identify the most recurrent and relevant words, highlighting terms such as "knowledge", "people", "data", "system" as the main elements mentioned from the interviewees' speech.

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Figure 3. Main technical challenges associated with the use of AI

Source: prepared by the author

As evidenced by the word cloud center, the expressions that emerge most frequently reveal the main challenges identified. At the core of the cloud, terms stand out that indicate various types of challenges associated with the implementation of AI.

Among these terms, "knowledge" occupies a central position, underlining the critical importance of expertise and specialized information as a tacit challenge, as exposed: "I think that today, let's say, what most hinders today is the understanding of the potential itself. We don't even know what we can do" (Interviewee 19). Thought validated by Chilunjika et al. (2022), who considers the lack of skills and technical knowledge essential for its adoption to be an obstacle in the successful implementation of AI.

"System", "tool", "data", and "machines" are present as structural challenges, evidencing the difficulties related to technological infrastructure and the integration of different components. As highlighted by Interviewee 10, "The biggest challenge is to ensure that the systems are up to date with the information", reflecting the complexity of the structural issue related to data updating and integrity.

> I think that, first, it's the equipment part, right? It's putting this, the tool itself, that is, in HR. That challenge is to put that tool there, it's the machinery. I understand that

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> would be it, right? That is, computers, improve the server's work tool (Interviewee 14).
>
> And we also have a question of the state's infrastructure, in terms of technological impact. We need, you know, to have, sometimes, some computers that are a little more robust to be able to run some things. And it is not always the reality of all sectors in the state. Sometimes, we have some computers that are a little ruinous (Interviewee 17).

"Processes" also appears frequently, indicating the complexity involved in restructuring and optimizing existing procedures to accommodate AI. In addition, "people" and "mistrust" emerge as significant human challenges.

> "Look, I think the distrust of the process. I think it's perhaps one of the most problematic. And there, distrust of the process in several senses, in a very broad sense. Both what will work and what I will do after this process is implemented" (Interviewee 17).

These terms reflect concerns about individuals' acceptance of the technology and the cultural and emotional barriers that can impact the successful adoption of AI. This understanding provides insight into the priority areas of concern, revealing both the technical and structural obstacles and the human issues that must be addressed to facilitate the effective use of artificial intelligence.

INNOVATION MANAGEMENT

This subsection explores the integration of AI into Innovation Management in the public sector, highlighting the new perspectives and approaches that emerge with the adoption of this technology. To understand this phenomenon, several components were identified and defined that elucidate the dynamics and implications of the implementation of AI in public management practices (Table 5).

Table 5. Analysis of the phenomenon: Innovation Management

Construct	Construct Components	Archives	References	Relative frequency (% of mentions in relation to the category)
Innovation Management		17	57	
	Culture of Innovation	10	17	30%
	New Approaches	9	15	26%
	Organizational Culture	9	14	25%
	Technology Integration	5	11	19%

Culture of Innovation: This component, with 30% of mentions, reflects the importance of creating an environment that encourages and values innovation. Innovation

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culture refers to the mindset and attitudes that prevail within the organization, promoting experimentation, creativity, and acceptance of new ideas. According to the survey, the presence of a culture of innovation plays a fundamental role in the success of innovation management, as an environment that supports creativity and innovation can facilitate the generation and implementation of new ideas. The literature also highlights that a culture of innovation promotes the engagement of agents and contributes to the creation of a competitive advantage (Grewal et al., 2017; Chatterjee et al., 2022)

> So, this strategic step has already been. And, above all, small deliveries. There is no need to talk about huge projects. You have to pick the fruits closest to the tree. You have to build small projects and demonstrate value. With this small project you can exemplify in practice what works and what doesn't, and learn. And then you open new doors for evolution, for other similar projects, for clients to show other clients that it worked (Interviewee 19).

The following excerpt highlights the importance of a *top-down* approach in implementing innovations within the organization. The success of any innovative initiative depends on the acceptance and support of the upper echelons which, in turn, influence the acceptance and buy-in of employees at lower levels. When leadership demonstrates enthusiasm and support for new tools and processes, it can facilitate acceptance and engagement from other members of the organization:

> So, when it reaches the top, if it is well accepted, the pyramid below will buy the idea that that there is good and that there is a tool that will contribute to everyone's work. In improvement, in development. So, I understand that this organization in the secretariat, it comes from the top to the bottom. So, this improvement has to be passed on to the civil servant, to those who are more in the pyramid below, that that is a tool that will improve their work (Interviewee 14).

The literature corroborates this view, indicating that an effective innovation culture is characterized by the ability to integrate new ideas and technologies in a way that all levels of the organization feel involved and supported. Chatterjee et al. (2022) state that the culture of innovation must be cultivated from leaders, who must promote and model innovative behaviors. This approach helps to build an environment where innovation can be seen as a top-down initiative and as a collaborative effort that involves all members of the organization.

Interviewee 19 reports: "[...] and to break this bureaucratic culture comes the projects, the AI projects, the new ones, the innovations. So, like this, we will always come

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up against a bureaucratic culture. We don't have a culture focused on innovation. AI culture is something even more difficult, right? ”

This observation can be confirmed by Khan et al. (2023), who emphasize the complexity involved in the cultural transformation required for AI adoption. They suggest that resistance to innovation can be overcome through a systematic approach that encompasses adequate training, ongoing support, and clear communication about the benefits of new technologies. This structured approach should be understood as essential to integrate innovations and promote a culture of effective innovation.

CONCLUSION

In the present research, several significant findings were identified that highlight the potential of AI in HR management in the public sector. The automation of administrative processes, as evidenced in the research, can lead to a decrease in time spent on manual tasks, allowing public servants to focus on more strategic and more value-added activities. This change improves the internal operation and enhances the satisfaction of citizens with the services provided.

In addition, the survey highlighted the relevance of the "Automatiza MG" project, which is a pioneering initiative in the modernization of public administration in Minas Gerais. The project aims to integrate digital technologies, including AI, to optimize administrative processes and improve the delivery of services to the population.

By promoting digitalization and automation, "Automatiza MG" facilitates the execution of the daily activities of civil servants and enhances the service capacity and quality of the services offered, reflecting a commitment to innovation and efficiency in the public sector. This initiative, a clear example of how the adoption of emerging technologies, can transform public management, making it more agile, responsive, and aligned with the needs of society.

By exploring how AI can be applied in HRM, the research enriches existing literature, offering new perspectives on digital transformation in the public sector. In addition, by identifying best practices and implementation experiences, the study serves as a reference for future investigations, stimulating academic debate on the effectiveness and ethics of using AI in government contexts.

The practical implications of the results are equally relevant, highlighting the urgent need for training public servants so that they can deal with the new tools and technologies

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that AI offers. This training becomes necessary to ensure that professionals are prepared to use AI effectively, maximizing its benefits and minimizing possible resistance to change.

Additionally, the importance of strategic planning was emphasized, as the successful implementation of AI requires a structured approach that considers the technology itself, organizational culture, existing processes, and the needs of citizens. Thus, the study contributes to theoretical knowledge and offers practical guidelines that can be adopted by managers and public policy makers, promoting a more efficient and innovative administration.

In addition, the implementation of AI in public administration faces several challenges and barriers that can compromise its effectiveness and acceptance. One of the main obstacles was resistance to change, which manifests itself at different organizational levels. Many civil servants may feel insecure about adopting new technologies, fearing that AI will replace their roles or that they do not have the necessary skills to use it properly. This resistance can be exacerbated by an organizational culture that values traditional methods of working, making it difficult to accept innovations.

Another significant challenge was the lack of adequate infrastructure. Implementing AI requires advanced technology and integrated, up-to-date data systems, as well as a solid foundation of technical expertise. Many public institutions, including those that are the subject of this study (SEPLAG and SEE), still face limitations in their technological infrastructures, which can make it difficult to collect, store, and analyze data necessary for the effective functioning of AI. The absence of qualified financial and human resources to manage these technologies also represents an important barrier.

It is considered important to overcome these challenges or obstacles to ensure a successful adoption of AI in public administration. Resistance to change can be mitigated through capacity building and awareness-raising programmes that demonstrate the benefits of AI for its operational efficiency and for improving the quality of services provided to citizens. In addition, investing in technological infrastructure and partnerships with the private sector can facilitate the integration of AI by providing access to resources and expertise. By addressing and overcoming these barriers, public institutions will be better prepared to harness the transformative potential of AI by promoting more efficient, innovative, and aligned management with society's needs.

In view of the rapid changes that characterize the contemporary digital landscape, it has become imperative to continue to investigate and discuss the intersection between

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technology and public administration, considering the specificities of each Agency. Readers are invited to reflect on the future of public management in an increasingly automated world, where the conscious and responsible adoption of artificial intelligence can improve the efficiency of services and promote a fairer and more equitable administration, aligned with the needs of society.

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