



Article

Administrative Legislative Requirements for the Transformation of State Departments of Artificial Intelligence Technologies and Their Readiness in Jordan

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Abstract

The study aimed to determine the effectiveness of administrative legislation in Jordan in activating the reality of artificial intelligence, given that legislation was considered the primary axis for implementing artificial intelligence technologies that the world had been witnessing in the modern technology fields, which had become widely used internationally in various areas, their administrative bodies, and the automation of their administrative transactions without human intervention. However, the problem lay in the application and the need for legislation, preparations, electronic administrative readiness, digital transformation, and infrastructure to facilitate working with artificial intelligence technologies. The study concluded that artificial intelligence techniques must be applied to the administrative system to enhance its efficiency in administrative transactions. The use of artificial intelligence technologies requires the presence of an integrated legislative and administrative system. It also emphasized the need to empower state administrations and their various facilities to perform their work using these technologies, establish clear policies and procedures to ensure effective governance of artificial intelligence applications, and designate the entities responsible for implementing and designing these applications.

Keywords: Artificial Intelligence, Administrative Legislation, State Administrative Bodies, Electronic Administrative Readiness.

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Introduction

The Twenty-First century has witnessed a major technological, informational, and industrial revolution, specifically within the framework of the concept of artificial intelligence, which is rapidly and remarkably evolving in various aspects of life, such as education, healthcare, entertainment, and administrative transactions in many state facilities and institutions, imposing a new administrative reality and modern administrative methods that are different from the previous ones. State administrations and administrative bodies are considered one of the most significant requirements of this era in its various aspects and fields. Therefore, there must be greater attention to these administrations and the adoption of advanced electronic administrative methods compatible with artificial intelligence technologies. So, this requires a strong will from the state for comprehensive modernization and development of its administrations to keep pace with the tremendous developments in the world of technology.

Thus, it is the responsibility of the Jordanian legislator to formulate and amend legal rules in general and administrative rules in particular, relating to a virtual reality that is compatible with variables, by establishing a framework policy in the digital environment of artificial intelligence to compete with its counterparts in leading countries in this field.

Study Significant

In this study, the researchers attempted to understand the foundations and legislative regulations of administrative law and governmental procedures related to artificial intelligence technologies. They are addressing the significant challenges facing administrative bodies in Jordan imposed by these technologies, to keep up with developments in this regard. Robots have become intelligent and are making all necessary administrative decisions, making it necessary for government administrations to update their administrative methods and benefit from other countries' experiences to enhance the efficiency of administrative bodies, regardless of their titles. It can be achieved through automating administrative transactions using technological programs with data and information to complete administrative transactions and issue appropriate decisions without employee intervention. Therefore, this study can contribute to the theoretical aspect of research and studies that have addressed this topic because most studies related to artificial intelligence have approached the subject from a technical perspective. On the other hand, studies from a legal perspective, especially in the administrative aspect, are limited.

Methodology

The study adopted the analytical-inductive method, which is based on identifying the nature of artificial intelligence technologies, and the extent of the readiness of Jordanian state administrations and their challenges, and examining, analyzing, and criticizing relevant administrative legislation while using the comparative approach in developed countries in artificial intelligence technologies. It was done to identify areas of deficiency and shortcomings to propose realistic legal solutions.

Results and Discussion

Artificial Intelligence

Artificial intelligence is considered one of the most modern topics because it is linked to all fields, especially administrative ones. It enables administrative entities to develop their infrastructure and make decisions to combat administrative slackness, employee overstaffing, inadequate administrative services, hindrances, and weak supervision of personnel in state administrative facilities. All these factors call for the digital transformation of electronic government using artificial intelligence technologies, which will be addressed in this study section. This section will be divided into two subsections: the first subsection will address the nature of artificial intelligence, and the second subsection will explore the connection between artificial intelligence technologies, electronic administration, and digital transformation.

What is artificial intelligence?

The concept of artificial intelligence first emerged at the Computer Conference held in the United States in 1946, organized by experts in mathematics and neuroscience. Artificial intelligence entered the market in 1955 (1) through digital machines capable of performing calculations and making decisions faster than humans. Its peak was reached in 2010, thanks to the rapid advancement of electronics and the widespread use of digital data. Artificial intelligence is considered one of the most outstanding achievements of the human mind at the end of the twentieth century. One of the significant and recent developments in software is artificial intelligence technology, which is considered a form of technology and an output of the Industrial Revolution. These technologies can perform tasks autonomously. Several definitions of artificial intelligence have been developed based on its use, including military, technological, medical, educational, and service-related purposes.

However, there is no universally agreed-upon comprehensive definition, but among the definitions proposed for artificial intelligence is that it is software systems, and perhaps devices, designed by humans with a complex purpose, operating in the real or digital world by perceiving the environment, obtaining information, interpreting collected structured or unstructured data, applying analysis to knowledge or processing information derived from that data, and determining the best action or actions to achieve a specific goal. Artificial intelligence systems can either use symbolic rules or learn a digital model. They can also adapt their behavior by analyzing how the environment was affected by their previous actions (2). Artificial intelligence technologies are designed to enhance the capabilities of workers rather than replace them. They establish connections between complex applications, workers, computers, knowledge, and the physical world. Among their capabilities are enabling applications to distribute and retrieve data, data mining, product design, manufacturing, and scheduling. Artificial intelligence can simulate human intelligence by learning from experiences, using logical reasoning to solve problems, making effective decisions, monitoring production lines, and performing maintenance when needed (3). However, mimicking human behavior through computer programs is not easy because computer programs must be capable of performing various and diverse tasks for us to consider them intelligent (4). It is also defined as the science and engineering of creating intelligent machines and brilliant computer programs. It is associated with a similar task involving using computers to understand human intelligence.

Nevertheless, artificial intelligence should not be limited to methods that can be observed biologically (5). It is worth noting that artificial intelligence is evolving rapidly every day. Despite the tremendous technological progress, some consider artificial intelligence technologies to still be primitive compared to human ambitions and futuristic visions. The inspiring question is whether artificial intelligence can simulate and perform the same tasks humans do in the future. Undoubtedly, current artificial intelligence applications perform their tasks with precise and rapid capabilities that surpass those of humans.

However, they are limited to single tasks. Researchers hope to achieve general artificial intelligence systems, including applications demonstrating intelligent behavior through a high degree of task perception simulation (6). Nonetheless, three main types of artificial intelligence can branch out:

Narrow Artificial Intelligence: This type of artificial intelligence can perform specific duties within a particular and precise scope, such as self-driving cars and drones.

General Artificial Intelligence: This type of intelligence can work with capabilities close to, or even resembling, human thinking and planning, as the machine focuses on all previous tasks. While no real examples of this system exist, it is transformed into a tangible, practical reality.

Superintelligent Artificial Intelligence: This type of intelligence surpasses human intelligence threefold, capable of performing tasks better than a specialized human professional, such as a knowledgeable surgeon. This type of intelligence can learn, plan, communicate autonomously, and make judgments and decisions quickly (7).

Artificial intelligence has numerous advantages, particularly in its ability to analyze problems. In the healthcare sector, its use enhances doctors' performance, as hospital staff can use specially developed systems to identify patients most at risk. Its precision in problem analysis and its ability to provide relevant information tailored to the situation achieve highly efficient results. Moreover, it contributes to decision-making processes and saves the time necessary for dialogue and discussion on various issues. Through computer systems, it is possible to guide and monitor the movement of thousands of goods worldwide, ensuring their timely arrival at the desired destination (8).

As a result, researchers have noticed that artificial intelligence entities are an unavoidable reality in many fields, performing tasks previously the exclusive domain of human intelligence. Conversely, it must be acknowledged that artificial intelligence may have greater capabilities in scientific research, taking the lead in achieving more discoveries, thereby becoming a significant factor in activating innovation across various fields. However, there are numerous cautions in relying solely on these entities and allowing their entry into all areas, as this may lead to many potential harms (9).

The connection between artificial intelligence technologies, electronic management, and digital transformation. To apply AI technologies, there must be a digital infrastructure for information and communication technology, enhancing the digital services of electronic government administrations and improving their quality, efficiency, and support. Achieving a digital society that keeps pace with this field's enormous and rapid developments is essential. We will address this requirement through the following sub-sections:

Electronic Management

The shift towards electronic management has brought about a series of changes in the concept of public service, leading to the end of traditional management. The model of electronic management provides many opportunities for success, clarity, and precision in service delivery and transaction completion, thus representing a

revolutionary conceptual shift and qualitative leap. Moreover, the transition towards electronic management has become a global trend (10). Hence, the importance of electronic management lies in its role as an integrated system based on modern technology to provide advanced services online, facilitating the exchange and accessibility of information. Consequently, this results from technological advancement encompassing all fields to keep up with ongoing developments.

Moreover, electronic management is defined as completing administrative transactions and providing public services over the Internet and intranet, without requiring customers to personally visit administrative offices to perform their tasks, thus saving effort, time, and money (Kurdi, 2010). It also involves using a combination of technologies to perform tasks and expedite their completion, as well as the development of advanced mechanisms for exchanging information within the organization and with other entities (11).

Therefore, electronic management entails the efficient performance of administrative transactions, including planning, directing, controlling, and delivering services, relying on information and communication technologies such as computers, software, and communication networks instead of paper-based methods. It facilitates task execution and enables efficient utilization of information through speedy exchange, thus facilitating appropriate decision-making (12).

In this context, technological choice has ceased to be a luxury (13) and has become primarily a developmental challenge. There is no longer an alternative for institutions wishing to achieve developmental breakthroughs in various fields. The knowledge and tools provided by information and communication technology contribute to increased productivity and improved quality. They also facilitate the development of government services and the achievement of excellence in their performance.

Furthermore, Electronic management is closely related to electronic governance, which refers to governmental activities that rely on the Internet and electronic communications across all layers and levels of government to provide all services and transactions to individuals and obtain information in various fields easily and conveniently (14).

It is a process of changing and transforming the relationships between institutions and citizens through information technology, aiming to provide the best for citizens and enable them to access information, thus enhancing transparency and reducing expenses (15).

As a result, the researchers can conclude that electronic management is a new methodology based on a comprehensive understanding, conscious use, and positive

investment in information and communication technologies to carry out its core functions in various government facilities and at all levels. It involves direct oversight of all decisions with confidentiality, privacy, accuracy, and speed in achieving stated objectives. All these electronic management and governance data contribute to providing the infrastructure, developing the supporting system, and preparing the ground for using artificial intelligence technologies. It facilitates and invests in various sectors, especially administrative ones, enhancing emerging and modern technologies to improve public services and automate administrative transactions in state administrations and their agencies.

Digital transformation

Technological advancement has contributed to the development of administrative work methods and provided an opportunity to enhance administrative communication means. It has led government administrations to shift from traditional decision-making and task completion to digital transformation and adoption of modern electronic methods using the Internet, computers, and various software.

This digital transformation is associated with creating suitable conditions and environment for implementing and embracing the principles and characteristics of modern electronic management, necessitating adopting a prudent strategy and gradual steps to achieve proper digitization of the administrative body (16). Delaying or underutilizing it will limit the potential benefits of the digital transformation process.

Further, digital transformation works on adopting digital technologies in vital sectors such as healthcare, education, justice, and others, through methodologies based on processing data, utilizing artificial intelligence technologies, innovating products and services, and providing new channels to enhance performance efficiency to unprecedented levels. It leads to time reduction, cost reduction, greater flexibility, and higher efficiency in production processes, improving quality, simplifying procedures, and creating new opportunities.

Moreover, digital transformation helps enhance transparency, reduce bureaucracy, corruption, and tax evasion on a broader scale, reaching a larger segment of beneficiaries (17).

In this regard, the name of the Ministry of Communications was changed to the Ministry of Digital Economy in 2019 to expand the tasks and responsibilities of the ministry and to be the supporting body for digital transformation in Jordan. Thus, artificial intelligence evolves and is influenced by the continuous increase in computing power, the availability of vast amounts of data, and the use of digital

technology to create systems capable of performing tasks that simulate human cognitive abilities, work patterns, and environmental analysis. So, it learns from mistakes to make predictions, recommendations, decisions, or actions that affect a real or virtual environment to a certain degree of autonomy. It supports administrative, organizational, and executive operations within and between government sectors to develop and improve easy and effective access to government services.

Besides, Digital transformation involves steps and pathways beyond just digitizing data. It requires the development of existing platforms towards an adaptable information technology environment that meets the changing needs of different institutions. Additionally, digital transformation requires broad innovation. It necessitates changes in policies and the general business culture, and adopting a new approach to benefit fully from the opportunities provided by advanced new technologies. It includes building a digital infrastructure, updating and maintaining it, adopting a culture of change and information management, and integrating government systems (18).

Administrative Legislation and The Readiness of State Administrations for Artificial Intelligence Technologies

The transition to artificial intelligence technologies requires an updated legislative system and the establishment of an ethical framework that defines best practices in the new artificial intelligence community. So, this necessitates the existence of administrative legal rules that regulate and achieve a balance between advancing to keep pace with development and modernity. While at the same time avoiding potential negatives from the application of such technologies.

Accordingly, this applies to the compelling presence of a strong and supportive administrative environment from the state, nurturing the artificial intelligence community and preparing its administrations to support developers, users, operators, or investors in this field. It will be addressed in this research and divided into two sections. The first section deals with the administrative legislation regulating artificial intelligence in Jordan, and the second section deals with the infrastructure and readiness of the electronic state administrations.

Administrative regulations governing artificial intelligence technologies in Jordan

Artificial intelligence systems have become more advanced and are often used in sensitive areas such as public transportation, medicine, military needs, public security, and automated administrative decision-making. Ignoring the profound disruptions caused by artificial intelligence systems in various social domains is

difficult. It undoubtedly requires the establishment of the necessary constitutional and legal frameworks to limit the use and possession of certain types of artificial intelligence systems (19).

Likewise, the field of artificial intelligence requires specialized legislation and modern independent regulations to comprehensively and accurately regulate its practices, ensuring that its objectives are achieved optimally and that its operations are conducted in a contemporary and practical manner. Additionally, existing legislation may need to be amended to align with this new and emerging approach, necessitating collaborative efforts from experts in the field and governmental administrations, and drawing upon the legislation of leading countries in this field. As of the preparation of this study, there are no standalone specialized laws in Jordan that regulate artificial intelligence technologies, their crimes, or the liability rules for damages resulting from their use. In this context, we will examine relevant legal regulations and administrative decisions that can be referenced.

The Jordanian Electronic Transactions Law permits electronic services to government departments and institutions. Among the prominent electronic ancillary services are the Electronic Government Portal (Sanad application), the Ministry of Interior's electronic services, the Income and Sales Tax Department's, and the Greater Amman Municipality (20).

Although the Jordanian government approved the Artificial Intelligence Policy in 2020, this policy focuses on several pillars, including legislative and regulatory environment, digital infrastructure, business environment, investment, and capacity building through awareness and education. Its main objective is to create the necessary infrastructure and environment to meet the needs of artificial intelligence technology. This policy applies to the public and private sectors, international and local organizations, civil society institutions, and individuals, whether they are developers of services or technologies based on artificial intelligence or providers of services based on artificial intelligence technologies in Jordan. Subsequently, the Jordanian Artificial Intelligence Strategy and its implementation plan (2023-2027) were approved.

Additionally, the Jordanian government also approved the National Charter for Artificial Intelligence Ethics in line with the guidelines of UNESCO on the ethics of artificial intelligence, which have been adopted by member states, including Jordan, totaling 193 countries. This charter represents the first global agreement defining common values and principles to ensure sound artificial intelligence development. It covers a range of principles and guidelines that address the ethical issues related to using artificial intelligence, and it calls for taking necessary legislative measures through constitutional procedures and the administrative infrastructure specific to

each country. On the other hand, several legal texts have indicated the permissibility of using electronic means in the transactions of government administrations and their administrative apparatus, such as the electronic intermediary, which is the electronic program used to execute an order or procedure or respond to a procedure automatically to create, send, and deliver information messages. Additionally, legal rules address the possibility of notifying stakeholders of administrative decisions using electronic means (Jordanian Administrative Judiciary Law No. 27, 2014). Additionally, there are several terms in the Electronic Crimes Law, such as “*data*,” “*information technology*,” and “*service provider*” (21), all of which refer to the possibility of using modern digital technology, criminalizing offenders, and protecting them. These legal rules create a fertile and suitable environment for using artificial intelligence technologies.

As a result, the researchers notice that there is interest and preparation by the Jordanian government for artificial intelligence technologies, whether through the approval of its policy and the Jordanian Artificial Intelligence Strategy or the National Charter for the Ethics of Artificial Intelligence.

This effort is commendable to the government. However, there is a necessity to establish independent, detailed, and comprehensive legislation essential for monitoring and regulating intelligent automation in all activities of state administrations and their decisions related to artificial intelligence technologies to keep pace with developments. Amending the scattered provisions in various laws to align with this new legislation is required, along with adhering to ethical guidelines for optimal use and setting boundaries for responsibility when using such technologies in all fields.

On the international level, the President of the United States issued Executive Order 13859 on February 11, 2019, regarding maintaining American leadership in artificial intelligence, aiming to consolidate efforts to enhance and protect technology and innovate artificial intelligence technologies in America. The European Industrial Policy for Artificial Intelligence and Robotics was adopted in 2019. Germany took the initiative in industrial automation and reducing labor at the beginning of the twenty-first century, relying on the digital revolution, mobile internet, remote sensing systems, and intelligent robots.

On the Arab level, no independent legislation has been related to regulating artificial intelligence. However, there is interest in artificial intelligence technologies in several countries, such as Saudi Arabia, which established the National Data and Artificial Intelligence Authority. Similarly, the United Arab Emirates (UAE) has shown significant interest by forming the UAE Artificial Intelligence Council to oversee the

integration of artificial intelligence technologies within all government departments. The council has been tasked with formulating policies, creating a digital infrastructure based on artificial intelligence, promoting advanced research in the digital sector, and fostering cooperation between the public and private sectors, including international institutions, to accelerate the adoption of artificial intelligence technologies. Additionally, the UAE has introduced the Ministry of State for Artificial Intelligence, the first ministry of its kind globally in this field. Furthermore, governments should develop legislative and regulatory environments compatible with artificial intelligence technologies. It involves ensuring that these technologies do not surpass human control and that they are secure and accurate against attempts to misuse them for illegitimate purposes.

It also prohibits individuals from accessing personal data obtained by artificial intelligence technologies and protects it from theft, unauthorized access, and misuse (22). The absence or delay in issuing laws may lead software developers or artificial intelligence technology programmers to operate without accountability or control, potentially leading to actions that lack neutrality and integrity. It underscores the importance of legislative regulation, especially when robots are involved and may cause harm to others, whether intentionally or accidentally. In such cases, it is necessary to determine who is responsible, whether the robot owner, the manufacturing company, or the robot itself (6).

Infrastructure and readiness of electronic government administrations

His Majesty King Abdullah II has shown great interest in digital transformation and the e-government program. He announced the program and tasked the Ministry of Digital Economy and Entrepreneurship with its implementation. This ministry is responsible for implementing the digital transformation strategy and working to support the digital economy by utilizing information and communication technology to provide integrated and reliable digital services that enhance the efficiency of the government sector. One of the main outputs of this strategy is the e-Government Gateway. The Jordanian government aims to improve the performance and quality of the public sector through the transition to e-government, creating an innovative and attractive technological environment in artificial intelligence (AI), and providing electronic services by enhancing administrative efficiency and consolidating government services on an official government website. The Electronic Transactions Law was enacted in 2001 and reissued in 2015.

Though, to achieve the mission of e-government, several pillars were relied upon, including the effective reengineering of procedures, prioritizing government

services within institutions, building and enhancing human capabilities, developing service delivery channels, facilitating the use of electronic services, ensuring the quality of electronic services, building and automating government services, and finally defining, creating, and developing a suitable legislative and regulatory framework (23).

Moreover, several national projects have been implemented by the Ministry of Digital Economy and Entrepreneurship to assess the readiness of public sector institutions to adopt artificial intelligence and to develop a roadmap for public sector institutions in line with Jordan's national vision for artificial intelligence. The project included 18 government agencies to identify gaps, weaknesses, and key challenges. Additionally, there was a project to alleviate traffic congestion using artificial intelligence in heavily congested areas in the capital, Amman, and a project to measure unemployment rates. Furthermore, the Minister of Digital Economy emphasized that artificial intelligence would permeate all sectors and would always be a constant companion for institutions and individuals to assist in prediction.

Nevertheless, Jordan advanced in the Insights Oxford Global AI Readiness Report for 2022 to the 63rd position, moving up 17 places in the overall index compared to the 80th position in the 2021 report. The report indicated that the United States topped the global rankings. At the same time, the United Arab Emirates ranked first among Arab countries, followed by Qatar, Saudi Arabia, and Jordan, which came in sixth among Arab countries.

Despite the evident attention given to the e-government application in Jordan, there is variation in readiness levels among some government institutions and their departments regarding infrastructure, skilled and qualified human resources, and technology (24). However, there is a lack of readiness in the field of culture and awareness (5).

Here, e-government administrations must enhance the individual skills of administrative leaders to perform their job responsibilities and duties using collaboration and integration with other departments, with a comprehensive vision and empowerment to work interactively. It includes collaborating with the private sector and directing research centers and universities to focus on studies on the reality of administrative leadership and methods of its development (26).

Researchers argue that artificial intelligence (AI) technologies have become an urgent necessity and an inevitable reality that will penetrate various sectors, especially administrative ones. It is imperative to have a pioneering legislative and technological environment that attracts talent and provides qualified and trained human resources, digital infrastructure, innovative incentives, support, and facilitation. It is also crucial

to collect, automate, and protect accurate and precise data and interconnect and integrate the systems used in all government departments, as they deal with vast amounts of data in a short time and record. However, Artificial intelligence does not operate alone; it requires a system that includes the Internet of Things (IoT), blockchain, autonomous vehicles, 3D printing, and other integrated tools. Some institutions in Jordan have started implementing AI in their administrative transactions, such as the Income Tax Department. Hence, it is necessary to expedite bridging the gaps and address the challenges that could delay the implementation of AI technologies within government administrations and various administrative bodies.

Conclusion

This study has demonstrated that artificial intelligence technologies potentially transform administrative operations within government institutions. Analyzing the current legal framework, technological readiness, and the strategic direction of the Jordanian government, it is evident that AI can enhance efficiency, transparency, and service delivery. However, the absence of comprehensive legislation, limited infrastructure, and various implementation challenges hinder the full realization of AI's benefits. Therefore, addressing these gaps is essential to ensure the effective integration of artificial intelligence within administrative systems.

Results

The findings of this study emphasize that artificial intelligence technologies represent a significant leap in modern technological advancements, evolving from the industrial and software revolutions. These technologies are increasingly capable of performing administrative tasks independently, simulating human intelligence, and are becoming an inevitable part of future governance. Integrating e-government and digital transformation efforts relies heavily on the efficient investment in information and communication technologies across state institutions. This digital infrastructure supports the foundation for adopting artificial intelligence, especially in the administrative sector. However, the successful application of AI requires a comprehensive legal and constitutional framework and updates to existing legislation.

Furthermore, the Jordanian government has firmly committed to adopting artificial intelligence through its digital transformation efforts, implementing e-government platforms, and endorsing national policies and strategies. These include the Jordanian national charter for artificial intelligence ethics. Nevertheless, AI technologies do not function in isolation. They require a robust ecosystem, including digital infrastructure, the Internet of Things, blockchain technologies, autonomous

systems, and other integrative tools. Despite these efforts, several challenges remain, such as limited financial resources, digital illiteracy, insufficient media education, and weak collaboration with the private sector.

Recommendations

Based on the study's findings, several recommendations are proposed to enhance the role of artificial intelligence in government administration. First, it is necessary to establish specialized administrative legislation regulating the use of AI technologies in public institutions. This legislation should define AI use's legal controls, rights, obligations, and responsibilities. It is also vital to benefit from the legislative experiences of technologically advanced countries.

In addition, existing laws should be continuously reviewed and updated to keep pace with rapid technological developments. Regular updates ensure that legal frameworks remain relevant and support AI growth. Alongside legal reforms, there is a pressing need to invest in supportive infrastructure, provide access to reliable data, establish dedicated AI research platforms, and attract expertise. Efforts must also include training civil servants and expanding digital transformation across all sectors, in cooperation with the private sector. Moreover, the development of administrative leadership is crucial. Raising officials' awareness about AI's benefits and encouraging its adoption in public services will significantly improve efficiency. Educating citizens on AI's value through the state's educational and media institutions is equally important, as is utilizing available human and financial resources to enhance government performance and accelerate service delivery.

Limitations of the Study

This study was limited to the role of artificial intelligence in raising the efficiency of departments and their various administrative bodies in Jordan, and to consult international administrative legislation related to this subject and compare it with Jordanian administrative legislation to achieve the desired benefit.

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Author Contributions

This study was carried out through the collective effort of the authors. Responsibilities encompassed: conceptualizing and designing the study; gathering, analyzing, and interpreting the data; and drafting and revising the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Ethics Approval

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