

Smart Cities and Digital Transformation in Algeria: Challenges and Opportunities

المدن الذكية وأقطاب ابتكار لتسريع التحول الرقمي في الجزائر: الرهانات والتحديات



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Abstract:

This study explores the Algerian state's adoption of digitalization as a pivotal policy to reinforce its trajectory in creating smart cities. It has adopted a developmental strategy to modernize urban areas through the establishment of a legal arsenal and special devices for promotion, alongside the development of digital capabilities in new cities, and the initiation of various urban technological platforms.

The purpose of the article explore Algeria's smart city initiatives and the obstacles they face, this article concludes that the novelty of the Algerian experience in this regard still poses numerous challenges to embodying digitalization, which hinders the activation of the new city's provisions. This is primarily evident through the absence of effective electronic management and low rates of digital investment, as well as urban planning not keeping pace with digitalization advancements.

key words: Digitalization, Smart Cities, Electronic Management, Digital Investment, Urban Planning.

ملخص:

تحاول هذه الدراسة البحث في موضوع تبني الدولة الجزائرية خيار الرقمنة كسياسة محورية لتدعيم مسارها في انشاء المدن الذكية ، فانتهجت بذلك استراتيجية تنموية لعصرنة المدينة، من خلال استحداث ترسانة قانونية وأجهزة خاصة لترقيتها، الى جانب تطوير القدرات الرقمية للمدن الجديدة، وبعث عدة وسائط للتكنولوجيا في المجال الحضري.

الغرض من هذا المقال استكشاف مبادرات المدن الذكية في الجزائر والعقبات التي تواجهها، ويخلص هذا المقال الى أن حداثة التجربة الجزائرية في هذا الشأن، لازالت تطرح العديد من التحديات لتجسيد الرقمنة مما يحول دون تفعيل مقتضيات المدينة الجديدة، ويظهر ذلك أساسا من خلال غياب ادارة الكترونية فعالة، وتدني معدلات الاستثمارات الرقمية، فضلا عن عدم مساهمة التخطيط الحضري لمستجدات الرقمنة. الكلمات المفتاحية: الرقمنة، المدن الذكية، الادارة الالكترونية، الاستثمار الرقمي، التخطيط الحضري.

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Introduction:

The current era has reached an information pinnacle, where the last decades of the twentieth century witnessed a profound transformation in the systems of state operations, imposed by the globalization of technology and the steady development of information and communication technology. These have contributed to creating a modern space based on digital performance across various fields.

Modern technologies have radically changed the management model in the state, affecting all its facilities, bodies, institutions, and the mode of public service delivery. The effectiveness of management is no longer measured by material standards but is assessed by the efficiency of information exchange and the ability of technological infrastructures to meet public interests and adapt to the ongoing changes and emergencies affecting public services.

In view of the international achievements in this respect and influenced by the necessities of globalization that require enhancing urban performance levels, the Algerian state has bet on establishing smart cities. It initiated a strategy to renew the urban model and modernize it by elevating its cities to technological environments capable of keeping pace with the rapid and extensive changes witnessed globally.

This strategy hinges on the digitalization model, serving as a crucial pillar for adapting urban management to contemporary developments and aspirations aimed at enhancing the quality of public services.

However, the innovative nature of the Algerian experience in deploying the digitalization model as a means of transitioning to modern urban centers and achieving smart city standards illustrates the significant challenges and limitations still confronting the digitalization of cities. These obstacles underscore the complexities involved in the digital transformation journey and the realization of the anticipated smart city framework.

Consequently, the central issue of the study can be framed as follows: To what extent have Algeria's efforts been successful in implementing digitalization to manifest the smart city policy?

In response to this, the study seeks to analyze the policy of urban promotion and modernization in Algeria, aiming to delineate the systems and

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efforts employed for its digitalization. Additionally, it strives to identify the principal challenges and barriers that hinder the effective implementation of urban digitalization frameworks to elevate them to smart city standards. This study employs a descriptive analytical method to elucidate concepts pertinent to this topic, along with a SWOT analysis to ascertain strengths, weaknesses, opportunities, and threats.

The First Topic:

Nature of Smart Cities

The term "smart city" was first introduced in 1994 at the European Digital City Conference, which subsequently led to the initiation of smart city projects in several European nations as model cities in 1996. Nonetheless, the concept traces its origins back to the mid-19th century, initially used to describe the new, efficient, and self-governing cities emerging in the American West, epitomizing sustainable urbanization.¹

First Section: The Concept of Smart Cities

Smart cities are characterized as urban areas that leverage electronic technologies emerging from the information technology era, evolving from digital cities to electronic, virtual, and subsequently, knowledge cities. It is posited that knowledge forms the foundation of data and information frameworks.

Various researchers have proposed definitions for these concepts, outlining their characteristics, all of which depend on the digital technologies of the information technology era. These technologies provide interactive services to individuals and create virtual spaces through information networks and diverse applications.²

¹ Assia Belkheir, "Smart Cities: A Strategic Bet for Governing Local Development, What Opportunities for Algeria?", *Journal of Law and Political Science*, Volume 9, Issue 2, 2022, p. 922.

² Zahia Kouache and Kalthoum Wakli, "Experiences and Applications of Smart Cities in the Arab Region - United Arab Emirates and Smart Dubai," *Journal of Economy and Environment*, Volume 2, Issue 2, 2019, p. 10.

The definitions of the smart city concept vary widely due to the diversity of approaches, backgrounds, and the historical periods in which they emerged. Among the definitions, we highlight the following:

First Subsection: Definition from the Smart Community Forum

This forum defines regions as smart if they offer systems of innovation and information and communication technologies to the local community. These regions combine the intelligence of individuals and institutions to enhance learning, innovation, and digital spaces, thereby facilitating creativity and knowledge management. The forum has outlined several characteristics necessary for a city to qualify as smart, including:¹

- Provision of comprehensive broadband communication services.
- Effective education and training for community members.
- A balanced approach to digital service usage, ensuring equitable benefits from technologies for all individuals.
- Promotion of creativity in both the public and private sectors and the establishment of economic clusters to support development.
- Fostering of economic development that attracts skilled labor.

The term "smart cities" applies to regional systems that integrate educational and creative activities with institutions and digital spaces, enhancing interaction and communication, and thus augmenting the city's capacity for problem-solving.

The distinctive attributes of a smart city include its ability to innovate in addressing challenges. Smart cities are fundamentally based on three pillars: technological, social, and environmental. Thus, they embody three dimensions in one: the virtual/information or knowledge city, the environmental city, and the communal space, representing the nexus of virtual and real worlds.

Second Subsection: IDC Research Definition

A smart city is defined as a specific entity (be it a neighborhood, town, city, county, or municipality) possessing its own governance structure. It is

¹ Ibid, p. 11.

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constructed upon a foundation of telecommunications and information technology infrastructure that not only enables efficient city management but also bolsters economic development, sustainability, innovation, and citizen participation.¹

A smart city boasts an advanced system predicated on digital communication technology infrastructure. This system actively monitors and manages its various parts and components, including residents, infrastructure, services, facilities, networks, roads, and communication channels.²

Ultimately, it can be asserted that a smart city represents a developed urban area that fosters sustainable economic growth and a high quality of life. The planning and execution of such developments delineate the degree of intelligence a city aspires to achieve.

A smart city, which orchestrates such development, is characterized by several fundamental axes: economy, mobility, environment, population, living standards, and governance. The realization of these dimensions is contingent upon strong human capital, robust social capital, and a well-established information and communication technology infrastructure.

Second Section: Goals and Fundamental Characteristics of a Smart City

Smart cities are distinguished by possessing specific goals and characteristics that set them apart from conventional cities, which do not incorporate modern technologies into their operational frameworks. These goals and characteristics are as follows:

First Subsection: General Goals of Smart City Initiatives

General objectives of smart city initiatives encompass:³

- _ Reducing the rate of carbon dioxide emissions into the atmosphere.
- _ Enhancing efficiency in energy consumption.

¹ Zahia Kouache and Kalthoum Wakli, Ibid, p. 12.

² Abdel Hakim Al-Kadi Mohammed Ibrahim Iraqi Ahmad Najib, "Characteristics of Smart Cities and Their Role in Transitioning to the Sustainability of the Egyptian City," International Scientific Journal in Architecture, Engineering, and Technology, 2008, p. 13.

³ Zohia Kouache and Kalthoum Wakli, Op.cit, p. 13.

- _ Leveraging advancements in information technology and communications to foster industries specialized in multimedia and knowledge.
- _ Attaining the highest environmental quality that supports a conducive lifestyle for its inhabitants.
- _ Expanding and enhancing the city's green spaces.
- _ Developing and refining advanced infrastructure.
- _ Stimulating economic growth that parallels improvements in quality of life.
- _ Fostering the development of sustainable communities.
- _ Ensuring social harmony among various demographic segments.

Second Subsection: Fundamental Characteristics of a Smart City

The European Union has recognized six fundamental dimensions that define a smart city. A city that successfully integrates these six pillars can be considered a true smart city. However, depending on their resources, priorities, and the nature of public services, some cities may emphasize one or more of these pillars while merely touching upon the others, thus being recognized as a smart city in specific areas such as environment, energy, or others, depending on the pillars they focus on.¹

1. Smart Governance:

Smart governance involves developing suitable mechanisms for management and operation alongside crafting smart regulatory and legislative frameworks. This ensures the adoption of an appropriate electronic governance system for the smart city. It encompasses transparency and participatory decision-making processes, allowing citizens to contribute and develop ideas for smart applications.

2. Smart Community and Smart People:

A smart community reflects the extent to which the city's populace embraces applications and information technology, transitioning from merely

¹ Ibid, p. 14.

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using technology to becoming an innovative community capable of devising solutions for current and future challenges.

It enables them to fully participate in the information city's activities, access its services, and interact with its administrative apparatus, including engagement with government emails, e-commerce, e-books, electronic cards, and electronic marketing services. Smart people, or human and social capital, are paramount.

Regardless of the effectiveness of the city's design, infrastructure, and technology, the smart city's longevity is limited if the citizens are not aware of these elements or lack a culture of responsibility and commitment. It is essential for citizens to acquire electronic skills and occupy jobs reliant on information and communication technology, within a community that strives to foster creativity and embrace innovation.

3. Smart Living and Quality of Life:

Smart Living encompasses a series of activities that significantly contribute to providing a good quality of life. This includes cultural, educational, and tourist events, ensuring the availability of high-quality buildings, and employing smart technologies to render the lifestyle both comfortable and convenient.

Such initiatives directly influence behavior and social habits, alongside additional considerations that aim to empower citizens, thereby enhancing their participation and making them a principal source of feedback for the city government. Moreover, the availability of open data and emerging opportunities encourage citizens to innovate and share their ideas on how to simplify and enrich life.¹

4. Smart Economy:

The concept of a Smart Economy refers to the adoption and enhancement of various methods that leverage technology to bolster economic development, viewing technology as a tool rather than an objective in itself. In the realm of the smart economy, practices and applications such as e-commerce, e-business, and heightened productivity are considered fundamental targets.

¹ Abdellah Mohammed Al-Akil, "Smart Cities and Buildings," Journal of Science and Technology, Issue 111, 2015, p. 4.

It encompasses empowerment via information and communication technology, advanced manufacturing, innovative service delivery, and novel methods to stimulate and mobilize the economy through fast, reliable technological applications. The smart economy further entails the use of smart technologies to ensure both local and global connectivity, facilitating the flow of physical and virtual goods, services, and knowledge.

5. Smart Mobility:

Smart Mobility stands as one of the most emphasized and prioritized pillars within a smart city framework. This dimension specifically pertains to employing information and communication technology to bolster and integrate transportation and logistics systems, thereby enhancing the ease, quality, and efficiency of movement. This advancement is often referred to simply as smart mobility.

6. Smart Environment and Natural Resources:

The pillar of Smart Environment involves enriching the city's environment through intelligent policies and applications focused on environmental management.

Today, this is one of the most widely adopted pillars and includes initiatives such as smart energy solutions involving renewable resources, technologically enhanced energy networks, devices for precise measurement, pollution monitoring and control, renovation of buildings and facilities, green buildings, and green urban planning. Smart applications also strive to improve the efficiency of resource use and incorporate alternative resources that support the goals of a smart environment.

Third Subsection: Components of Smart Cities

Smart cities materialize through the integration of three fundamental levels: knowledge-based activities, institutions, and digital communication infrastructure. These levels include:¹

- **Individuals / City Community:** A prevailing culture of creativity and the use of information technology applications is essential.

¹ Ibid, p. 5.

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- **Institutions:** Serve as the medium through which services are delivered.
- **Digital Space:** Represents the informational infrastructure of the city, provided by institutions to individuals. The integration of all these elements creates a digital space where individuals and institutions interact through networks and information sharing.

The Second Topic:

Sustainable Smart Orientation in the Construction of Smart Cities

First Section: Smart Cities in the Balance of Urban Legislation

The Algerian legislature has developed a legal framework intended to guide Algeria's transition towards smart cities, underpinned by the belief that the natural environment can only be preserved through sustainable smart planning for urban development. This section will explore and analyze how certain urban laws reflect Algeria's ambition to build smart cities.

First Subsection: Framing Laws for Regional Planning and City Construction for Building Smart Cities

An examination of the provisions contained in Law No. 01/20, as well as Laws 02/08 and 06/06, reveals that while the urban legislator has not explicitly stated an intention to create a legal foundation for the construction of sustainable smart cities in Algeria, such an intent can be inferred from the objectives outlined within these laws. The following discussion will delve into these laws and their implications for smart city development.¹

Firstly, Law No. 01/20, pertaining to regional planning and sustainable development, is designed, as articulated by the legislator, to rebalance the urban structure and elevate the regional, national, and international functions of major cities and towns.

Specialists interpret this rebalancing of the urban environment as achievable only through sustainable urban development. This involves

¹ Mohammed Amin Oukil, Linda Boudraham, "Establishing Smart Cities in Algeria and the Necessity of Digital Transformation: The Bet and the Challenges?" *Journal of Construction and Building*, Volume 03, Issue 04, 2019, p. 33.

sustainable planning and design, the integration of clean energies into new urban environments, the utilization of technology, and the creation of new smart sustainable spaces aimed at addressing the challenges of random urban growth.

Secondly, Law No. 02/08, which governs the conditions for establishing new cities and their planning, along with Law No. 06/06, which encompasses the urban policy law, aligns with the objectives of Law No. 01/20 and follows a similar trajectory.

Law 02/08 states that the creation of new cities forms a part of the national policy aimed at regional planning and sustainable development. Law 06/06 is more explicit and detailed, specifying in its seventh article that city policy targets sustainable development as a comprehensive, multi-dimensional, and multi-sectoral framework, manifested across various domains including sustainable development, urban economy, cultural, social, management, and institutional spheres.¹

Through these legislations, it is evident that although the urban legislator has not explicitly declared an adoption of a direction towards building sustainable smart cities, the overarching city policy aims to achieve sustainable development. Sustainable smart cities emerge as an urban model that realizes sustainable development in all its dimensions, especially the environmental one.

The Algerian government has underscored its commitment to this vision with the issuance of Executive Decree 04/275, amended and supplemented², which facilitates the establishment of "the New City of Sidi Abdellah" as per Article 06 of Law 02/08.

Second Section: Digitalization of New Cities as a Necessity for the Transition to Smart City Systems

The city policy in Algeria has focused on embracing digitalization features as a pivotal pillar for establishing smart cities. This is achieved through modernizing new cities and mobilizing the requirements of modern technologies in the urban area.

¹ Awatef Boutarfa, "The Sustainable Smart City in Algeria Between the Reality of Urban Legislation and the Aspiration for Modernization," *Journal of Judicial Ijtihad*, Volume 13, Issue 02, 2021, p. 69.

² *Ibid*, p. 70.

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The issuance of legal or regulatory texts framing the policy of city sustainability has led to the adoption of modern mechanisms that promote the city and develop its elements in a manner that turns it into a digital space gathering various modern electronic means used by the information society.

We will first present the reality of the digital environment in Algeria, and secondly, review the examples of digitalization initiated by the state within the framework of the national strategy related to the establishment of smart cities.

First Subsection: The Reality of the Digital Environment in Algeria

Algeria did not have a clear strategy to provide a suitable digital environment to assist the digital transformation despite establishing a policy in 2000 for developing the telecommunications sector.

However, in 2008, it formulated a strategy named "Algeria Electronique 2013," whose main goals were: to accelerate the use of information and communication technology in public administration, economic institutions, and among individuals, to develop high-flow communication infrastructure, and to train and develop research and innovation in this area, as well as to qualify the legal framework for using this technology.¹

Algeria has also launched several projects to promote digitalization, including: the Your Family Project, the Smart City Sidi Abdellah Project, and the e-learning project for university students.

Algeria has endeavored to develop the information and communication technology sector by enhancing access to various telephone and internet services, and by accelerating the creation of economic entities within the sector, supporting their activity and competitiveness. These goals have particularly taken shape since the implementation of the Algeria Electronique strategy in 2008.²

The Algerian state sought to achieve these goals by developing the technological sector at the city level, starting with the enhancement of the telecommunications sector, which has seen significant expansions due to the successive reforms it has undergone since the 1990s.

¹ Salma Bouchareb, "Developing Digitization in Algeria as a Mechanism for the Post-Coronavirus (COVID-19) Era," *Les Cahiers du Cread*, Vol. 36, No. 03, 2020, p. 587.

² *Ibid*, p. 588.

These reforms have resulted in the restructuring and modernization of the sector, opening it up to both local and foreign investment to increase and diversify the offerings and services of post and telecommunications and to develop its networks. Algerian Post has launched several electronic services, including: e-service counters, electronic withdrawal cards, balance inquiry services, obtaining account statements, and requesting postal check forms.¹

In regulation of this, the Algerian legislator has enacted a specific legal arsenal for these types of transactions, similar to the laws on electronic signing and authentication and electronic commerce.²

The following table shows the development of the information and communication technology sector through structural and economic indicators, as well as global indices, for the years 2010 and 2018.³

Table 01: Indicators of the Development of the Information and Communication Technology Sector in Algeria

Type of Indicator	Indicator	2010	2018
Structural Indicator	Fixed telephone subscribers (million)	2.92	4.15
	Mobile telephone subscribers (million)	32.78	51.49
	Fixed internet subscribers (million)	1.15	3.06
	Mobile internet subscribers (million)	0.30	19.23
	Length of optical fiber network (km)	46231	145120
	Capacity of international lines	104.488	1050.00
Economic Indicator	Sector turnover (billion Dinar)	459 (2013)	458
	Number of economic entities in the sector	200903	266301
	Value of exports (billion Dinar)	0.076	1.129
	Value of imports (billion Dinar)	86.661	242.424
Global Indicator	Sector development (IDI)	2.86	4.67
	E-Government development (IDEG)	0.374	0.422
	E-Government development (IDEG)	0.374	0.422

¹ Law 18-04, dated May 10, 2018, defining the general rules related to postal and electronic communications, Official Gazette, No. 22, issued on May 13, 2018.

² Law 18-05, dated May 10, 2018, concerning electronic commerce, Official Gazette No. 28, issued on May 16, 2018.

³ Salma Bouchareb, Op.cit, p. 588.

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Source: Ministry of Post, Information Technology, and Communications,
Algeria 2019

The figures in the table show a significant development in the information and communication technology sector between 2010 and 2018, primarily due to public support and investment in the sector.

Foreign mobile operators also benefited from the facilitations offered by the state to increase their investments. However, it can be observed that the sector's turnover experienced growth from 2010 before declining in 2017 and 2018 to return to its 2010 levels.

This decline is attributed to two main reasons: firstly, the crisis involving the ORASCOM operator, which sold its stake to a Russian investor before the state repurchased it, and secondly, market saturation in Algeria, which caused some stagnation in the sector's activities, especially after the collapse of oil prices and the reduction of public investment.¹

Although the IDI and IDEG indices also show progress in the sector, from a relative or comparative perspective of global development, they indicate that Algeria still occupies low ranks in this field, ranking 102nd and 130th globally in 2017 according to IDI and IDEG indices, respectively. Here, it is evident that it is better to rely on other indices to provide a more accurate analysis of the development of this sector.²

Second Subsection: Examples of Digitalization in New Cities

The inadequacy of urban policies previously adopted by the Algerian state to effectively manage rapid urbanization³ was a significant catalyst in adopting the strategy of developing new cities. This approach emerged as a crucial solution to curb unchecked urban expansion and to enhance the effectiveness of regional planning.

In an effort to create urban environments that align with the aspirations of citizens and keep pace with the trajectory of development, responding to the demands of sustainable growth and addressing its challenges, it has become imperative to upgrade these cities.

¹ Ibid, p. 589.

² Ibid, p. 589.

³ Mohammed Amin Oukil, Linda Boudraham, Op.cit, p. 36.

This involves transforming them into digital spaces equipped with the latest technological advancements, which are essential for breaking down isolation barriers and rationalizing the management of public neighborhood services.¹

1- The New City "Sidi Abdellah"

Under the fourth master plan, included in the National Plan for Regional Planning and Sustainable Development titled "Qualification and Modernization of the Four Major Cities," Algeria has established technology hubs.

As part of this initiative, the new city "Sidi Abdellah" has incorporated two technology hubs: advanced technology and information and communication technology. This integration has positioned it as a pioneering model for the first smart city in Algeria, showcasing technologies that meet high-quality standards.

The operational framework of the city is supported by high internet traffic capabilities, including the use of magnetic cards, fiber optics, high-tech medical devices, and sophisticated administrative logistics. Additionally, it boasts an electronic park that equips it to fully leverage global connection equipment and excel in mastering advanced technology.

2- The New City "Bouinan"

The city of "Bouinan" is envisioned as an ecological city and an international business center specializing in the development of life sciences and biotechnology. Plans are underway to establish a national center for the environment and sustainable development, along with a regional environmental laboratory. This initiative is a component of the ongoing extended Algerian-American partnership projected to continue until 2020.

3- The New City "Bougzoul"

Similarly, the new city "Bougzoul" plays a crucial role in high-end and advanced technology sectors, positioning it as a hub for the digital economy. It paves the way for the exploitation of renewable energies and the development of non-polluting technologies, while also adapting technologies to combat climate change.

¹ Ibid, p. 37.

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Moreover, the new cities in the south, such as "Hassi Messaoud," have benefited from an accelerated pace of urban digitization. "Hassi Messaoud" is home to a technological institute focused on the exploration of new and renewable energies.¹

Overall, Algeria has adopted a strategy to modernize its new cities by strategically distributing technological hubs, taking into account the unique capabilities and characteristics of each city. This strategy aims to strike a balance between urban space and sustainable development by eliminating regional disparities and addressing urgent urban challenges that require swift and effective solutions provided by modern technologies.²

Third Section: Challenges of Digitizing Cities in Algeria

The creation of smart cities in Algeria initially requires a substantial investment in financial resources and, secondarily, in technical expertise. The process of urban digitization necessitates the foundation of cities grounded in information and communication technology, transitioning from traditional physical frameworks to networked organizations that integrate various facets of modern urban management.

These facets range from technical to administrative and legal requirements. However, the journey towards establishing smart cities necessitates a "radical reengineering" at the city level. Unfortunately, the course of digitizing urban policy in Algeria remains an unfulfilled promise, primarily due to the challenges and shortcomings that plague the Algerian initiative in this field.

These include the ineffectiveness of electronic administration, a scarcity of digital investments in Algeria, and the failure of urban planning to adapt to digital advancements.³

¹ Executive Decree No. 06-321, dated September 18, 2006, on the establishment, organization, and operation of the new city of Hassi Messaoud, Official Gazette No. 58, issued on September 20, 2006.

² Nassima Belaidi, "Legal Aspects of Urban Policy and Planning in Algeria," Master's thesis in Public Law, Faculty of Law, University of Constantine 1, 2014, p. 71.

³ Mohammed Amin Oukil, Linda Boudraham, Op.cit, p. 41.

First Subsection: Ineffectiveness of Electronic Administration in Algeria

The electronic administration initiative in Algeria was launched recently but has encountered numerous challenges before becoming fully operational, including:¹

1. The incapacity of the postal, information technology, and communications sectors to meet customer demands for telephone connectivity, which is crucial for internet communication.
2. Delays in completing the telecommunications infrastructure, which varies significantly from one region to another. This gap is particularly concerning as Algeria is on the verge of joining the World Trade Organization, and there is a considerable digital divide to bridge compared to advanced countries.
3. The limited spread and usage of the internet in Algeria, where the proportion of users of this globally widespread technology remains low compared to even neighboring countries.
4. Electronic financial transactions are still in their infancy and are progressing slowly, despite the widespread implementation of electronic transactions across various financial and commercial institutions.

This experience remains fraught with challenges; for example, many economic agents and citizens are reluctant to use magnetic cards for withdrawing money due to frequent errors from electronic withdrawal devices and significant delays in accessing their accounts.

5. The slow process of decision-making and integration and reform operations, compounded by a prevailing bureaucracy in administrative aspects and a low level of trust in the government and its transactions.
6. The educational and cultural level of the Algerian society is still low, despite a noticeable increase in recent years, in contrast to a modest information culture and electronic interaction.²

¹ Abdelkader Abban, "Challenges of Electronic Administration in Algeria," PhD thesis, Department of Sociology, University of Biskra, 2016, p. 103.

² Ibid, p. 104.

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7. Electronic administration in Algeria is still in its infancy, and its administrative development is growing slowly compared to Arab and foreign countries that pioneered the adoption of electronic administration as part of what is known as the administrative upgrading process. These countries have developed services and improved them in a manner that meets the aspirations of citizens and their continuously changing needs. Therefore, it is essential for Algerian administrations to keep pace with these continuous changes in the needs of citizens in a manner that aligns with them.

Second Subsection: Limitations of Digital Investments in Algeria

Investing in information and communication technologies holds strategic importance in expanding technological capabilities and accelerating the pace of digitalization, which contributes to intensifying electronic services and delivering them according to quality and efficiency standards.¹

However, the reality of digital investment in Algeria is at a low level, evidenced by the weak competitive market in the media and communications sector. Fixed telephony in Algeria has remained monopolized by a single public operator, and the annual report of the Regulatory Authority for Post and Telecommunications for the year 2014 indicates that information and communication technology contributes only 2.2 percent to the Gross Domestic Product, which is a testament to Algeria's delay in the technological field.

Additionally, Algeria suffers from a scarcity of programs and plans for electronic investment, which are active in banks and electronic stock exchanges relying continuously on video conferencing. This is due to the weak financing of the technological sector, which has become incapable of supporting research. The problem of access to information further discourages investment in the field of modern technologies.²

Third Subsection: Failure to Adapt Urban Planning to Digital Developments

¹ Mohammed Amin Oukil, Linda Boudraham, Op.cit, p. 43.

² Wasaf Saidi, Mohammed Quider, "The Reality of the Investment Climate in Algeria, Between Incentives and Obstacles," Journal of Economic Sciences and Management Sciences, Issue 8, University of Ferhat Abbas, pp. 44, 46.

The evolution of urban planning has shifted from a focus solely on the physical aspects of city development to a more comprehensive approach that considers the conditions, facilities, and needs of city residents. This shift has made urban planning a key tool for promoting the upgrading and modernization of cities through strategic visions that define a set of future plans. These plans aim to rejuvenate city policies and integrate them into current and emerging developments.

In the legal framework governing urban planning, the legislator has specified a range of tools for spatial and urban planning. These include the National Plan for Territorial Planning, the Regional Plan for the Program Area, Directive Plans for Planning Spaces of Major Cities, the Provincial Territorial Planning Plan, the Guiding Plan for Planning and Urbanism, the Land Occupation Plan, the New City Planning Plan, the Permanent Plan for the Conservation and Rehabilitation of Sectors, the Protection and Rehabilitation Plan for Archaeological Sites and the Associated Protected Area, and the General Plan for the Arrangement of National Parks.¹

Despite the comprehensive nature of these tools, there has been a stagnation in urban planning methods, failing to keep pace with technological advancements. Current urban space upgrading efforts are largely confined to traditional objectives such as dividing urban properties, rationalizing the use of urban resources, and achieving balance at the urban level.

However, these efforts often neglect the incorporation of frameworks and prospects for digitization that would allow Algerian cities to embrace modern technologies. Most plans only make cursory references to establishing wired and wireless communication networks and lack detailed strategies for implementing widespread electronic measures in the digital space.

This approach contradicts a fundamental principle of urban planning: flexibility. Effective planning methods should involve the continual recycling of tools to adapt to new circumstances, including technological changes. However, it is observed that the urban planning process in Algeria commonly suffers from delays in the issuance of legal texts.

Despite the formal approval of urban planning tools within the city's guiding laws, the regulatory framework for planning and preparation of these

¹ Article 19 of Law No. 06-06 contains the guiding law of the city, Official Gazette No. 15, dated March 12, 2006.

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tools often takes considerable time to establish. Moreover, once these plans are in place, they rarely undergo modifications to reflect developments in digitization.¹

Additionally, the urban planning strategy in Algeria has been critiqued for relying on long-term plans that do not align with the limited material and human resources available to the state.

This misalignment poses significant challenges in effectively responding to rapid technological and societal changes, thus hindering the ability to achieve a dynamic and responsive urban development strategy.

Conclusion:

Dealing with rapid urban growth necessitates the efficiency of urban areas in facing the multiple negative impacts resulting from traditional urbanization. The transition towards smart cities has become an urgent necessity rather than a luxury. This study has ultimately reached the following conclusions:

- _ Smart cities are entities that combine physical infrastructure (urban development), technological infrastructure (communication and information technology), and social infrastructure (population interaction).
- _ The transition from existing cities to smart cities depends on the communications and information infrastructure, including networks, databases, applications, aimed at providing services to smart citizens and enabling them to interact in a smart environment, achieving smart development through smart governance.
- _ Implementing smart city projects faces numerous financial, technical, social, and security challenges that can be mitigated with serious political will and raising citizens' awareness of the need for sustainable development and creating living opportunities for future generations.
- _ Diagnosing the reality of urban digital environment in Algeria confirms the state's struggle and efforts in this regard, as the reliance on digital approaches in city development policies still faces several obstacles, including ineffective e-governance and low digital investment levels in Algeria, as well

¹ Executive Decree No. 11-76, dated February 16, 2011, setting conditions and methods for the preparation, approval, and implementation of the new city plan, Official Gazette No. 11, issued on February 21, 2011.

as the rigidity of the urban planning system in updating its tools periodically in a manner that qualifies it to keep up with digital advancements.

Based on these findings, the study suggests several recommendations for advancing urban digitization policies in Algeria to meet the requirements of modern urban sustainability:

- _ It is imperative for the Algerian state to complete the promising reform path of urban digitization policies to upgrade them to the level of smart cities that truly respond to modern urban sustainability requirements, avoiding remaining merely an ambition or a delayed slogan.
- _ Adapting the city's legal system to meet the requirements of the information society and all relevant digital media, and developing the infrastructure of the information and communication technology sector to accelerate the flow of networked services for cities and urban areas as a whole.
- _ Generalizing the urban digital mobilization policy with frequent revision of urban planning tools and updating them in line with modern technological advancements.
- _ Increasing openness to the investment side by improving the business climate, adopting a promotional strategy for investment opportunities, and activating partnership contracts with the private sector to encourage digital investments in the urban field.

It is clear that the transformation towards smart cities, which incorporates comprehensive digital urbanization, necessitates a full commitment to leveraging human resources. This transformation begins with the thorough training of the public sector workforce in cutting-edge technological skills and equipping them with the expertise to manage and operate modern software systems, ensuring robust digital services within the urban landscape.

To accomplish this, it is essential to expedite technical training programs and draw on successful international and regional experiences and expertise in this field.

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