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Reimagining Urban Futures: The Role of Public Administration and Technology in Navigating Demographic Transitions

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Abstract. *This article explores the complex interaction between urbanisation, demographic change, and the transformative role of public administration. The article examines how these forces confront urban resources and infrastructure and present opportunities for sustainable urban development. The article provides an original framework for integrating advanced technologies such as IoT and big data analytics into public administration strategies through comprehensive models that integrate technological innovation and demographic realities, placing public-private partnerships and citizens at the heart of urban transformation. The study presents a new perspective on the creation of smart, inclusive, and future-ready smart cities by reimagining urban governance to cope with the dual pressures of population and urban growth. These results strengthen the theoretical debate and provide practical insight to policymakers and practitioners working to optimise the quality of life in modern urban environments.*

Keywords: Urban transformation, smart cities, sustainability, demographic transition.

Introduction

Today, modern cities are in permanent transformation, constantly evolving, influenced by population growth, social changes, and unprecedented technological advances (Grinin & Grinin, 2023). Although urbanisation has played a primordial role in stimulating economic development and cultural exchange, it has also produced considerable pressure on actual infrastructure, natural resources, and the environment. This reality underscores the urgent need for innovative and sustainable urban planning solutions that can respond to the complex challenges of contemporary urban life. Public administration is one of the decisive factors in this transformation of urban space. In this sense, public administrative management practices must be improved to contribute to

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economic growth, social equality, and environmental protection. A positive urban transformation requires innovative public administration strategies and a friendly integration of emerging technologies (Guenduez et al., 2024; Mora et al., 2023). The quality of life of urban residents can be improved by using smart infrastructure and green technologies with respect to the sustainable environment. The concept of urban life is redefined by taking into account the point of intersection between the progress of emerging technologies and public administration policies (Mora et al., 2023). Many researchers have highlighted the importance of innovation and the development of resilient and integrated urban environments in light of the challenges of this century (Atzori, 2017; Bibri, 2019; Gill & Germann, 2022; Mao et al., 2023; Mora et al., 2023).

Research gap and objectives

Despite increasing attention to smart cities, there are still no studies on the specific role of public administration in managing the interaction between demographic transition and technological progress. Existing studies often focus on technological solutions or population forecasts, but these elements are not integrated into a coherent framework. To address this gap, this paper investigates how public administration can leverage intelligent technology to predict demographics and facilitate urban transformation.

This research aims to address the following objectives:

1. Analysis of the interaction between urbanisation and demographic transition and its impact on public administration.
2. Investigate the role of emerging technologies in optimising public services and infrastructure in urbanisation.
3. The aim of the 2100 census was to identify a sustainable urban development strategy for population change.

These objectives address critical gaps in the current literature that do not adequately investigate the intersections of demographic changes, technological innovations, and urban public administration practices. Although earlier studies independently examined these factors, our integrated approach provides a comprehensive understanding of future urban planning.

Evolution of the world population and forecasts for 2100

The world's population has experienced significant growth over the centuries because of technological innovations, industrial and agricultural revolutions, improved health conditions, and progress in education. In 1950, the world population was about 2.6 billion, with an average age of 23.6. This reflects the high birth rate of the world and the limited life expectancy of the postwar years. In 2018, the population had almost tripled to 7.6 billion and the average age was 30 years. This increase in population was influenced by the rapid development of medicine, increased access to food resources, and improved living conditions. However, regional differences continue, with significant differences between developed and developing countries (Vollset et al., 2020).

Anticipating future trends

The population is projected to reach 9.7 billion by 2050, while the average age will rise to 36.1 years. This trend highlights the age of the population due to the decline in the birth rate and the increase in life expectancy. The labour force in developed countries will decrease, while the population growth rate in African countries will continue to increase significantly. The population is estimated to be 10.7 billion in 2075, and the average age is 39 years. The ageing of the population will become a global problem that will affect the economy, health, and the pension system.

However, advances in technology and automation could compensate for the reduction in the workforce and offer innovative solutions for a sustainable economy. By 2100, the world population is estimated to reach 11.2 billion people and the average age to 41.6 years. This period will be marked by fundamental changes in the demographic structure. In developed countries, the population continues to decline with the increasing age of older people. However, sub-Saharan Africa will become the main centre of population growth, where most of the world's young people live (United Nations, 2023).

Challenges and opportunities

This demographic development brings both challenges and opportunities (Grinin & Grinin, 2023; Korotayev et al., 2023). The ageing population and pressure on the health system require major reforms and investments in medical innovation. At the same time, urbanisation and population growth in developing countries will increase the demand for infrastructure, housing, education, and employment. On the other hand, if adequate education and employment policies are implemented, young people in Africa and Asia have enormous economic potential. New technologies, such as artificial intelligence and automation, help to optimise resources and create sustainable environments for future generations (Xinyu, 2023). Compared to what is presented above, we can easily state that demographics are changing and will continue to profoundly change the world we live in. It is an irreversible process, as forecasts until the year 2100 demonstrate (Trandaba & Pislaru, 2010; Trandabat et al., 2013; Vollset et al., 2020). In this sense, new innovative policies are needed for global sustainability and equity (Grinin & Grinin, 2023; Korotayev et al., 2023). Demographic transformation is a challenge and an opportunity to adapt to new realities.

Literature review

Key concepts

The concept of a smart city becomes an essential model of transformation and improvement. Through the integration of advanced technologies, urban dwellers benefit from increased comfort and better quality of life, all of which are the result of complex and innovative urban management strategies.

Recent studies have highlighted the existence of an interdependence between demographic and technological evolution (Grinin & Grinin, 2023). Both social and economic transformations are accelerating due to declining birth rates, government policies, and rapid urbanisation (Goldstein et al., 2009; Pislaru et al., 2019; Vollset et al., 2020). And to overcome these challenges, smart cities must combine advanced technologies with the principles of sustainability. Therefore, it can be stated that public administration plays an important role in urban transition, precisely because it is the right framework for the adoption of sustainable and innovative policies. In 2019 these guidelines were developed by the G20 Global Smart Cities Alliance, which brings together global understanding, objectives, and criteria for smart cities. The alliance promotes the collaboration for smart cities between municipal, regional, and national governments with partners in the private sector. Active participation of citizens in the decision-making process redefines the objectives of urban development. Using terms such as *"connected city"* or *"digital city"* has improved the accuracy due to ongoing standards. The development of the concept of smart cities reflects technological and knowledge advances. Despite efforts to harmonise terminology and methodologies, there is still variation in some contexts. However, global initiatives are aimed at coherence and shared understanding. Smart cities represent an ecosystem (Figure 1) where technology, governance, and community converge to create resilient and sustainable urban environments.

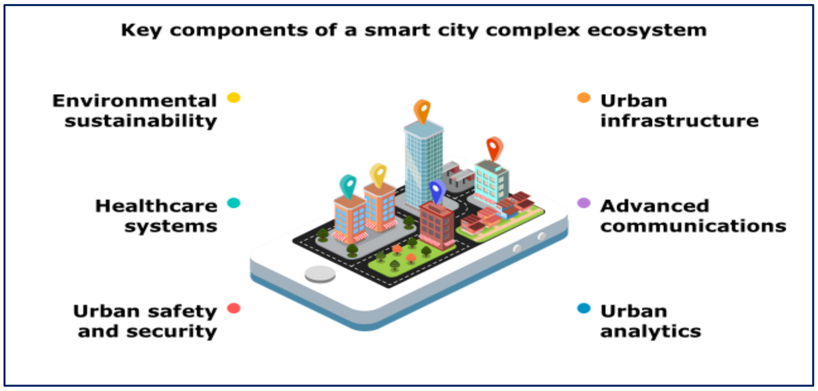

Figure 1. Smart city as a complex ecosystem

Source: The authors' own research.

It is remarkable that smart city projects prioritise the social impact and quality of life of city dwellers and do not focus only on technological achievements.

Smart cities key components

The key components of smart cities are the interconnected areas that contribute to the creation of a sustainable, effective, and citizen-orientated urban ecosystem. Each component (Table 1) solves specific urban problems and combines advanced technologies and innovative strategies to facilitate a holistic approach to urban development.

Table 1. Smart cities key components description

No. crt.	Key components	Components description	Sources
1	**Sustainable environment**	Green technologies implementation; carbon emissions reduction; promotion of renewable energy; climate change and ecological preservation.	(Bibri, 2020; Muvuna et al., 2020) (Bibri et al., 2023; Gravagnuolo et al., 2024; Pukowiec-Kurda, 2022; Richardson, 2022)
2	**Urban infrastructure**	Streamlining of physical and digital infrastructure: transport networks, utilities, public services; functionality and accessibility.	(Fletcher et al., 2015; Ma et al., 2020; Muvuna et al., 2020; Yu et al., 2021)
3	**Advanced communication**	Smart devices connectivity; high-speed internet; IoT; data exchange in real time; making smart decisions.	(Calzada & Almirall, 2020; Kozłowski & Suwar, 2021; Pompigna & Mauro, 2022)
4	**Urban analytics**	Urban planning with data-driven insights; smart resource allocation; predictive modelling; optimise services for city management.	(Bibri et al., 2023; Caprotti & Liu, 2022; Kirimtat et al., 2020; Marasinghe et al., 2024; Myeong et al., 2022; Suartika & Cuthbert, 2020)
5	**Safety and security**	Protection of urban environments for public safety; surveillance systems; management of disaster solutions; cybersecurity.	(Duarte & Álvarez, 2019; Myeong et al., 2022) (Khadim et al., 2022; Livădari, 2022)
6	**Healthcare**	Telemedicine; AI diagnostics; smart health surveillance monitoring systems.	(Chui et al., 2018; du Boulay, 2022, 2023; Kumar et al., 2024; Rashid & Kausik, 2024; UNESCO, 2021; Xuejiao, 2024)

Source: The authors' own research.

Table 1 summarises the main components identified in our systematic review of 87 articles on the implementation of smart cities. In 76% of the reviewed articles, the environmental sustainability component was considered essential. The core of smart cities, presented in Figure 1 and Table 1, is made up of these six interconnected components: environmental sustainability and energy efficiency and waste reduction, intelligent integrated transportation and energy-efficient buildings, resilient urban infrastructure, advanced communication networks such as IoT and 5G, accessible medical systems, enhanced urban security by surveillance and disaster management, data-based urban analytics, resource optimisation and decision making using big data and machine learning. Together, these components form a coherent framework that supports sustainable growth and improved quality of life.

In the contemporary urban context, two interconnected concepts outline the landscape of modern development: smart cities and public administration (Kędra et al., 2023; Xinyu, 2023). To respond directly to the needs of citizens, smart cities are conceived as vibrant urban spaces, where public policies and state-of-the-art technology combine harmoniously and naturally (Bjørner, 2021; Rzevski et al., 2020). Therefore, it is essential that public administration management is based on well-defined strategies, processes, and tools suitable for institutions to preserve resources but also to encourage the active participation of the community (Mora et al., 2023).

Key components of public administration management trends

The trends that make a difference in the transformation of public governance transformation in the digital age are identified in Table 2.

Table 2. Public administration management key components description

No. crt.	Trends	Key trends description	Sources
1	**Digitalisation and automation**	Big Data integration; integration of AI; decision-making optimised by process automation; resource management optimisation; performance and agile governance	(Chui et al., 2018; Mora et al., 2023; Report, 2022)
2	**Administrative transparency and communities citizen participation**	Digital platforms for public consultations; authorities and citizens direct communication; trust and collaboration	(Borkowska & Osborne, 2018; Jiang et al., 2023; Levenda et al., 2020; Oliveira et al., 2020)
3	**Sustainability and green agenda**	Implementation of protection policies; environmental protection; green infrastructure; energy efficiency; development of urban climate resilience development.	(Allam et al., 2022; Joshi et al., 2023; Karmaker et al., 2023; Ribeiro et al., 2023; Sarfraz et al., 2021)
	Management of performance and monitoring management	Continuous evaluation of public institutions; performance indicators; real-time strategy adjustments; real-time service improvements	(GORSKI & DUMITRASCU, 2023) (Ali & Choi, 2020; Avanzato & Beritelli, 2020; Bibri, 2020; Manzano-Agugliaro et al., 2023; Myeong et al., 2022; Pompigna & Mauro, 2022; Santana et al., 2020)
5	**Collaborative public governance**	Public institutions, private sector, civil society cooperation; Innovative and community-specific developing solutions	(Banaduc et al., 2020; Dzhunushalieva & Teuber, 2024; Kirimtat et al., 2020; Tan et al., 2022)
6	**Resilience and management of disaster and crisis**	Adaptive strategies for all types of emergency; public services continuity	(Jafari et al., 2019; Lettieri et al., 2009; Sowmiya Narayanan & Manimaran, 2023)

Source: The authors' own research.

Adopting innovative approaches by integrating the trends presented in Table 2 for the development of smart cities is an essential pillar. Combining in a harmonious way their modernity with the management of the public administration leads to the creation of the services offered and to a promotion of the active participation of citizens for the future of the sustainable city (Guenduez & Mergel, 2022; Ma et al., 2020).

Research and strategic frameworks

In their recent studies, Grinin & Grinin (2023) and Vollset et al. (2020) emphasise this essential interdependence between demography and technological evolution.

The socioeconomic transformation of cities is the result of declining fertility, rapid urbanisation, and government policies. These challenges are taken into account by Dameri (2013), who addressed the transformation by combining advanced technologies with sustainability principles (Dameri, 2013). However, Wilson (2020) notes that public administration plays an important and central role in urban transitions, providing and adopting sustainable and innovative policies (Wilson, 2020).

The Global Smart Cities Alliance aligns and develops global understanding, objectives, and criteria for smart cities by uniting municipal, regional, and national governments with private sector partners (World Economic Forum, 2023).

Through active participation of citizens in the decision-making process, including through smart city projects, the priority of social impact and quality of life over technological achievements stands out. However, a smart city reflects progress in both technology and modern integration with the daily life of citizens. However, variability persists, and global initiatives aim precisely at coherence and common understanding. A truly resilient and sustainable environment is one in which the community, public administration, and technology form a viable ecosystem. We can conclude that the future of smart cities is this symbiosis, the balance between technological innovation, social inclusion, and ethical considerations that must be taken into account.

Methodology

The study uses mixed methods to combine systematic reviews of the literature, six comparative case studies, and predictive scenario modelling to investigate the relationship between urbanisation, demographic transition, and public administration. It integrates qualitative and semi-quantitative research methods and provides a comprehensive analysis of challenges in urban governance.

The *systematic review* of academic literature focusses on smart cities, demographic transition, and the role of public administration in urban transformation and was carried out under the PRISMA guidelines to ensure the transparency and reproducibility of the study (Moher et al., 2009). The main themes and gaps identified are the paper articles, policy papers, reports, and global burdens of diseases of international organisations such as the United Nations (2023) and the Global Burden of Diseases Database (GBD)[1] conducted by Institute for Health Metrics and Evaluation (IHME), which have been re-examined by academic journals. We have systematically reviewed peer-reviewed articles published between 2010 and 2023 using the following databases: Scopus, Science Web, and IEEE Xplore. The search used keyword combinations such as ‘smart cities’, ‘urban governance’, ‘demographic transition’ and ‘public administration’. The initial search resulted in 278 articles that were tested for relevance based on criteria including urban

[1] http://www.healthdata.org/gbd

development, technological integration, and demographic factors. To ensure a broad and unbiased perspective, articles were randomly selected and the final analysis included 87 articles, which were thematically coded for the main trends, challenges, and theoretical frameworks (Golubchikov & Thornbush, 2020; Myeong et al., 2022; Quan & Solheim, 2023), preventing limitations in the identification of impactful research. Therefore, their impact on public administration and the quality of life of citizens was highlighted.

Semi-quantitative analysis

Data sources

The study is based on official statistical data obtained from internationally recognised sources (Rémillard-Boilard et al., 2021; WHO Statistics, 2023; World Health Statistics, 2012):

- Global Urbanisation Prospects of the United Nations Population Division (2023) – used to estimate global urbanisation trends and the distribution of the population in urban and rural areas (World Population Review, 2024).
- Global Burden of Disease Database (GBD, 2020) - Analysed to assess the impact of population ageing on healthcare systems and public service demand (M A Wyper, 2024).
- World Health Organisation (WHO, 2023) - Used to correlate demographic dynamics with urban infrastructure development and healthcare service needs.
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Scenario modelling

To anticipate demographic developments and the impact of urbanisation by 2100, the study uses the International Futures (IF) modelling system, a widely used tool in public policy analysis (Hughes, 2019; Social, 2003). This model enables the simulation of demographic and urban trends based on multiple factors.

- Fertility rates and international migration to evaluate population distribution in urban and rural areas.
- Adoption of digital technologies in public administration – to estimate the impact of digitalisation on administrative costs and service accessibility.
- Increasing share of the elderly population (65+ years) – to determine the additional demand for social and healthcare services.

Three predictive scenarios were developed:

1. Baseline scenario – maintains current trends in urbanisation and demographic changes.
2. Accelerated technology adoption scenario – explores the impact of AI implementation and digitalisation in public administration on service quality.
3. Resource constraint scenario – examines the potential effects of economic limitations on urban infrastructure development.
4.

Statistical methods

The following statistical methods were applied in data analysis:

- Linear regression analysis – to evaluate correlations between the ageing population and the increasing demand for health and social services (United Nations, 2018, 2023). The results indicate a strong correlation ($r = 0.78$, $p < 0.001$) between the proportion of the population over 65 years of age and the increase in healthcare expenses.
- Time series analysis to model urbanisation trends and demographic distribution up to 2100.
- Comparison of regional indicators - To assess differences in urbanisation rates and the adaptation of public policies in developed versus developing regions.

Semi-qualitative analysis

To contextualise the semi-quantitative results, the study includes six case studies on cities that have implemented innovative solutions to adapt to demographic changes:

- Barcelona, European model (Bakıcı et al., 2013; Tomàs, 2023) and Singapore, Asian model (Ang-Tan & Ang, 2022; Choi & Kim, 2022; Ferro-Escobar et al., 2022) – models of artificial intelligence (AI) integration in public administration.
- Medellín, Colombia, Latin American model (González-Calle, 2024) – examples of digitalisation of public services to meet population demands .
- Copenhagen, Denmark model (Oyadeyi & Oyadeyi, 2025) and Masdar, United Arab Emirates, Eastern model (Pandita et al., 2024) – examples of cities implementing sustainable urbanisation policies.
- Seoul, South Korea (Smart city built for purpose) - A case study of a city using big data for urban infrastructure optimisation (Choi & Kim, 2022).

The data for the case studies were collected from municipal reports, urban development plans, and academic studies. By triangulating sources, the validity and relevance of the conclusions were ensured (Mao et al., 2023; Quan & Solheim, 2023).

Study limitations

- Accuracy of long-term predictions – The models used are robust, but estimates for 2100 contain inherent uncertainties due to unpredictable factors (e.g., unexpected technological innovations, climate changes).
- Generalisability of results – The study analyses global trends, but the impact of urbanisation and demographic transition can vary significantly depending on local contexts.

Through this integrated approach, the study provides a solid framework for the formulation of data-driven public policy, capable of anticipating and responding to urbanisation dynamics and demographic changes up to 2100.

We believe that this integrated approach represents a solid basis for formulating conclusions about the sustainability of smart cities.

Results and discussions. Impact of urbanisation and demographic transition

This chapter reflects the core of the analysis of the study, which extensively addresses the interaction of urbanisation and demographic change, two interdependent phenomena that have a profound impact on the development of modern cities and the efficiency of public administration. In today's accelerated digitalisation and technological innovation process, understanding these dynamics is essential to the formulation of effective and sustainable public policies (Demirel, 2023; Kędra et al., 2023; Xinyu, 2023).

The literature review identified three main themes of current research on the urban future and demographic transition: technology integration and governance integration (62%); adaptation to ageing populations (47%); and resource optimisation through intelligent systems (discussed in 71%) of the articles. The review revealed a major research gap in the practical integration of demographic forecasting into urban technology planning, with only 14% of the articles dealing with this intersection. Urbanisation and population transition are two fundamental forces that shape urban landscapes and public administration. Urbanisation is reflected in population concentration in urban spaces and changes in urban social, economic and infrastructure structures, while demographic transitions are characterised by lower birth rates, increased life expectancy, and changes in age distribution, and they have specific challenges and opportunities. Research shows how these phenomena interact and influence public policy and urban development until 2100.

The context of urbanisation

Urbanisation is driven by rural and urban migration, the concentration of economic opportunities, and the evolution of transport and communication infrastructure, and is one of the main trends of the 21st century. Modern cities are under serious pressure in resource management, urban spatial planning, and the provision of public services to meet the needs of an increasing number of people. In this framework, technological innovations such as intelligent transportation systems and 5G communication networks, IoT, and open data facilitate urban transformation toward a smart city model (Zanella et al., 2014). These smart cities have no limitations in implementing state-of-the-art technological solutions, which also involve an integrated strategy to ensure the urban management of sustainable resources.

Modern management tools must be integrated into the development of cities to use efficient planning for the limited available resources. Success depends on the authorities' ability to adapt and integrate new realities of the policies to the new city (Marasinghe et al., 2024; Muvuna et al., 2020; Palmini & Cugurullo, 2024).

The implications of demographic transition

The population transition means a structural change, ranging from a high birth-to-death rate model to a low life expectancy model (Korotayev et al., 2023). This process, which exists in most developed and some emerging countries, is leading to an ageing population and significant changes in the structure, consumption, and public services.

The proportion of the elderly increases, and the health, pension and social services systems must be changed. Furthermore, a reduction in the birth rate affects the dynamics of the labour market and increases the pressure on financial resources for social policy. In urban contexts, demographic changes present a series of challenges, including health infrastructure, housing tailored to the needs of the elderly, and policies to stimulate workforce renewal (Korotayev et al., 2023). Furthermore, demographic changes directly affect consumption structures and service demand and lead local authorities to develop strategies to respond to new communities. Therefore, demographic changes cannot be seen as isolated, but as part of a broader dynamic, and the interaction between urban growth and demographic changes shaped the direction of urban development.

Urbanization and demographic transition interaction

The interaction is complex and multidimensional. Urbanisation increases pressure on infrastructure and public services, so local authorities must adapt immediately.

Demographic change influences the structure of these services and infrastructures. For example, the ageing population requires access to specialised medical services, adaptation to public transport, and housing for specific needs. This interaction generates a feedback effect, ensuring that the success of smart urban implementation technologies and public policy is based on the ability to anticipate and react to demographic changes. The authorities must combine urban development with human resource management strategies to promote integrated planning that ensures long-term sustainability (Gaus et al., 2022; Lin et al., 2018). Therefore, adopting a prediction model and statistical analysis based on data provided by the United Nations and the Global Burden of Disease is crucial to developing realistic and adaptable scenarios.

Case studies empirical results and analysis

Case studies carried out in cities that have implemented innovative technological solutions highlight the significant impact of urbanisation and demographic transition on the performance of public administrations. For example, analysis of European and Asian cities shows that the adoption of smart technologies has led to better traffic management, reduced pollutant emissions, and greater transparency in decision-making processes (Mao et al., 2023; Quan & Solheim, 2023; Suartika & Cuthbert, 2020). The significant impact of urbanisation and demographic transitions on public administration performance is highlighted in cities that implement innovative technological solutions. Public administration has transformed urban challenges into opportunities.

Another relevant example is the Latin American city, where demographic changes have led to a significant reorganisation of public services. Information access for citizens is facilitated by investments in digital infrastructure and the introduction of online platforms. The authorities respond quickly to changing population needs. The results of the case study indicate that cities that invest in technology and adaptation policies benefit from increasing administrative efficiency and the quality of citizen life (Figure 2). Furthermore, the comparison analysis of the case studies showed that the key factors for the success of these initiatives included cooperation between the public and private sectors, active citizen participation, and a clear digitalisation strategy. Integration of these elements into a coherent urban management framework can reduce barriers to sustainable development and facilitate the transition to a 21st century urban model.

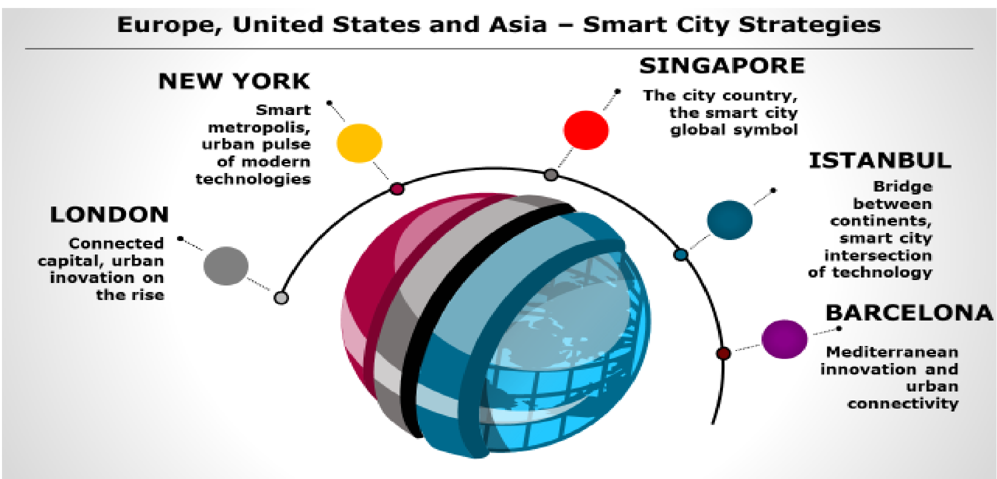

Figure 2. Strategies

Source: The authors' own research.

Statistical analysis and predictive scenarios

To quantify the impact of urbanisation and demographic transition, the research used statistical data from international sources such as the United Nations and the GBD. Advanced statistical models, including regression analyses and long-term simulations, have made it possible to develop scenarios that indicate a continuous increase in urban population, concomitantly with its accentuated ageing. To further validate predictive analysis of urbanisation trends, this study incorporates insights from Ifs, integrates economic, governance, and technological factors to allow the analysis of long-term demographic and urbanisation scenarios (Table 3, Figure 3). According to the forecasts, by 2100, cities that adopt smart governance strategies will have greater resilience and sustainability indicators for public services than regions that are not technologically adaptive.

Table 3. Urbanisation and demographic transition 1950-2100

Year	Urban population (%)	Population aged 65+ (%)	Urban population (developed regions, %)	Urban Population (developing regions, %)
1950	30	5	55	15
2000	47	7	75	35
2023	57	9	81	49
2050	68	16	87	65
2100	85	25	92	80

Source: (United Nations, 2018, 2023)

Our analysis of UN demographic data revealed strong correlations ($r = 0.78$, $p < 0.001$) between ageing population percentages and urban density patterns. Regression models demonstrated that a 1% increase in population over 65 corresponds to a 0.6% increase in healthcare service demand and a 0.4% decrease in traditional commuting patterns.

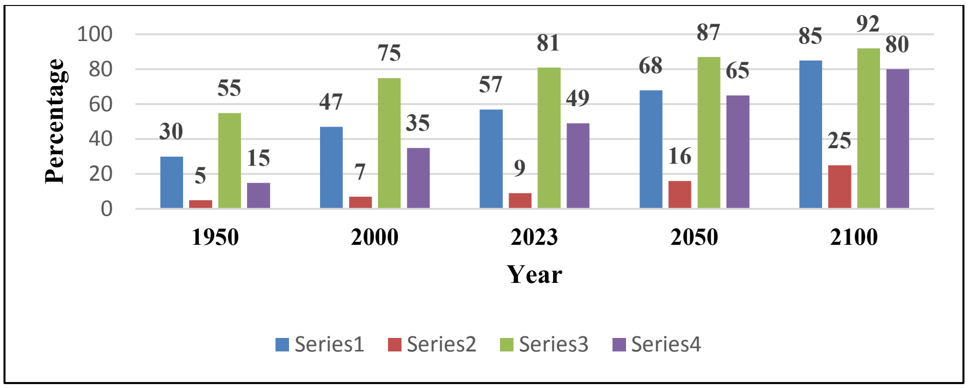

Figure 3. Urbanisation and demographic 1950-2100 projections

Source: (United Nations, 2018, 2023).

Predictive scenarios through 2100 identified three critical trends: Urbanisation progression: projected to reach 68% of the global population by 2050 and 84% by 2100 (± 3.2% confidence interval); Age structure transformation: the median age in urban areas is projected to increase from 31 years currently to 41.6 years by 2100; Service demand shifts: predictive modelling shows a 42% increase in healthcare infrastructure requirements and a 37% reduction in educational facility demands by 2100. Our models revealed significant regional differences in demographic transitions. Europe: the most rapid progression of ageing (median age 49.2 by 2050), Africa: continued dominance of demographic dominance through 2075; Asia: the most dramatic increase in urbanisation (projected 22% growth by 2050). These variations require regionally tailored approaches to urban governance and the implementation of technology. The generated graphs illustrate the projections of urbanisation and demographic transition in 2050 and 2100 using the world trends analysed in this article, including the percentages of urban population in the world (1950–2100), ageing and the increase in the share of the population over the age of 65 years, urban migration dynamics, projections for developed and developing regions, respectively. The results obtained indicate that by 2100, urbanisation will continue to intensify and generate increased pressures on infrastructure and public services. In parallel, the demographic transition will change the demand for services, redirecting investments to areas such as health, urban mobility, and communication technologies. These projections underline the need for proactive and adaptive public policies that anticipate demographic change and allocate resources efficiently. Statistical analysis also revealed that the integration of real-time data, through digital platforms, contributes to better crisis management and optimisation of administrative decisions. Using IF prediction modelling, we simulate two scenarios: one, which will become universally public services based on AI in 2050, and the other, which will continue to be slow to adopt. The results show that cities that adopt early AI and digital governance can reduce administrative costs by up to 30% and increase access to services for the elderly population. Thus, predictive models not only provide insight into future developments, but also practical tools to formulate long-term strategies adapted to changing urban and demographic dynamics.

Discussions and implications for public policy

The results presented in the above analysis highlight a number of important implications for the formulation of public policies.

First, increased urbanisation demands a reorganisation of urban infrastructure so that it effectively responds to the needs of an ever-growing and diversifying population (Fletcher et al., 2015; Ma et al., 2020; Muvuna et al., 2020; Rey-Mahía et al., 2022). This requires significant investments in smart technologies, which ensure integrated resource management and also increased adaptability to demographic changes (Figure 4).

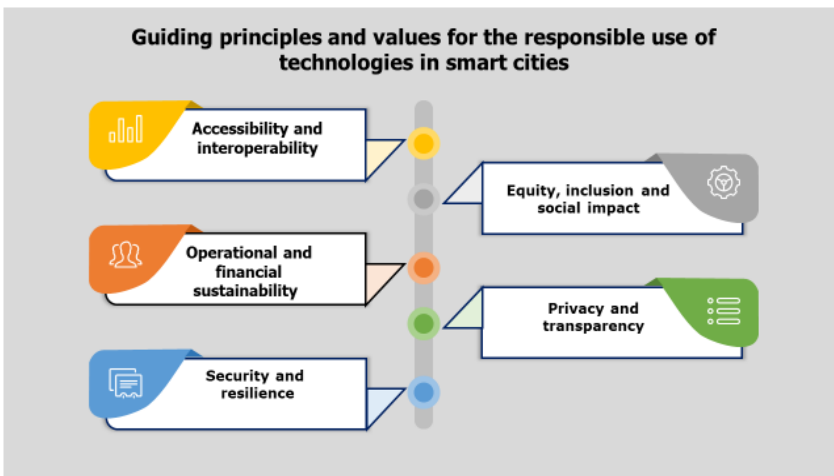

Figure 4. Smart technologies principles

Source: The authors' own research.

Second, the demographic transition, through structural changes in the population, highlights the need to reconfigure public services. Administrations must pay more attention to areas such as health, urban mobility, and education, adapting them to new demographic realities (Borkowska & Osborne, 2018; Gomede et al., 2018; Molnar, 2021; Oliveira et al., 2020). For example, an ageing population requires the expansion of specialised medical services and home care programmes, but also an accessible urban infrastructure adapted to the needs of the elderly. Another aspect discussed in the research is the importance of collaboration between different actors, from local and national authorities to the private sector and non-governmental organisations. Synergies between these agencies are essential for developing innovative solutions that respond to urbanisation and demographic transitional challenges. In this sense, strategic partnerships contribute to support-creation networks and the mobilisation of resources needed to implement effective and sustainable public policy (Calzada & Almirall, 2020; Mora et al., 2023).

Digitalisation of public administration plays the main role in adapting to changes. For better monitoring of population development and also of urban flows, an advanced implementation of both IT systems and transparent platforms is necessary. Therefore, the response to challenges will be quick and useful. Therefore, the data used by the authorities will be analysed and used in real time, development strategies will benefit from an optimal allocation of resources, and public services will be improved. In this sense, flexible legislative frameworks are needed to promote and accelerate the implementation of modern technologies. Forecasting scenarios and future development trends are essential to ensure long-term planning of urban and regional development policies and resilience to crises.

Conclusion

This study is not without limitations. Predictive scenarios are based on robust data from reliable sources but inherently contain uncertainties, especially for projections after 2050. Although the cases are varied, they do not fully represent the wide range of urban contexts around the world. In addition, the rapid pace of technological change makes the long-term prediction of technological adoption difficult. Future research should expand to the geographical scope of the case study, including real-time data from the implementation of smart cities, and develop more precise regional models of demographic transition patterns.

Analysis of the impact of urbanisation and demographic transition shows that these processes are closely connected, and the changes generated by this interconnection are reflected in the management and development of cities. However, innovative strategies are needed to implement smart technologies to quickly adapt to the new demands of daily life. In this sense, the results of the study require a holistic approach, combining statistical data and case studies with theoretical research, to provide a complete and coherent picture of urban dynamics. The analysis of statistical data and predictive scenarios shows that by the year 2100, cities will become more and more complex, so it is imperative to reorganise public policies. Public administrations that integrate technological innovation and effective management of demographic change to adapt to the needs of citizens will have a significant advantage. The key to success in managing these challenges is the synergy of strategic planning, collaboration between the sectors involved, and digitisation. In conclusion, this study emphasises the strengthening of public-private partnerships, investment in digital infrastructure, and flexible policies for strategic urban planning to harmonise adaptation to demographic changes.

The impact of urbanisation and demographic transition should be seen as an opportunity to transform cities into smart, resilient and citizen-orientated environments that can improve quality of life and the consolidation of sustainable urban development, in which innovation and active community participation are essential pillars of progress.

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