☐Urban governance and Smart Cities: Using AI to boost quality

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Abstract

A smart city is an area having urban projects that use AI and machine learning-based solutions to manage infrastructure efficiently and sustainably, such as in the optimization of waste collection routes and reducing carbon emissions by transport that ferries waste etc. Similarly, urban services, production, and economies can also be managed by MIS and AI tools. Studies in the Saudi context on such applications are negligible. Thus, the present study aims to address this gap. The research questions center around the role of AI integration in smart cities to enhance MIS for better urban management and business management, and governance. Further, case studies from across the globe are included to explore how urban production systems can be optimized with AI, also applying the model to two urban centers in the Saudi context. Lastly, the study examines the barriers in ensuring the effectiveness of AI in the ecosystems of smart cities. The study adopts a mixed methods approach. The data were collected data from two cities in the country and collated from municipal MIS data for energy and traffic. Focus group discussion with a convenience sample of end users comprising teachers and students at Qassim University adds other dimensions to the findings. Efficiency outcomes are analyzed alongside thematic analysis to identify administrative and governance challenges.
Keywords: Artificial intelligence; Decision making; Machine learning; Smart city; Policy making; Urban governance

Introduction

Smart cities those areas of urban projects that use AI and machine learning-based solutions to manage infrastructure efficiently and sustainably, such as in optimization of waste collection routes, reducing carbon emissions by transport that ferries waste (Gomstyn & Jonker, n.d.). These, in turn are fed by immense amount of data, an invisible superpower in the contemporary relationship between humankind and machines. AI applications use the force of data for a great deal of problem solving that makes these indispensable as tools in our existence. Yet the true potential of data lies deeper and untapped: The consumer and the citizen stand to gain from its monitoring role over corporations and governments as it encrypts and makes available to the seeker information on the fair treatment and optimum utilization of what belongs to the former. Data can thus enrich the AI experience to make the world a better place.

In terms of modern living, AI has shifted humanity's focus from operational to strategic thinking. In other words, since they work with data, AI driven tools can be adjusted to meet human needs. As human pressure is mounting on urban areas, planned urban development is becoming necessary both to ensure quality of living experience and safety of human life. This is where AI plays a central and active role. Infrastructure and civic amenities and citizens' expectation of a baseline of living standards exceed those of traditional urban areas. The urban cities integrate smart cities like technology and AI. They have become technology-driven urban spaces that center around several fundamental features: (i) housing and inclusiveness; (ii) preservation and development of open spaces; (iii) variety of transport options with provision for seamless switches; (iv) citizen-friendly and cost-effective governance; (v) integrating a variety of spaces for enhanced living experience; (vi) developing an identity for the urban center and most importantly; and (vii) applying smart solutions to infrastructural and services sectors for enhanced living and occupational experiences.

Saudi Arabia has been witnessing rapid urbanization in the past few decades owing to the administration's responsiveness to changing geopolitics which also has far reaching impact on the country's economy. Natural population growth and movement of the rural populace to urban areas for better education and work opportunities have burdened the civic systems and it is mandated to focus on urban development as sustainable and integrated projects. Given Saudi Arabia’s fast paced urbanization, major cities are expanding to accommodate the numbers, a realization that is not lost on the government which developed the Future Saudi Cities Program with sustainability, quality of life, and efficient infrastructure as its key features for as many as 17 major cities of varying population sizes, capacities, economic potential and geographical dynamics. Green spaces, energy-efficient living and work conditions, and global environment compatibility figure in the national development plan outlined in Vision 2030. With about 85% of the population living in cities (in 2024 from just 31% in 1960), cities are truly the engines of economic growth also reflected in the GDP: Riyadh, Jeddah, and some cities in the Eastern Province alone contribute about 60% of the total GDP.

Literature Review

The implementation of artificial intelligence (AI)-driven systems in the framework of smart cities and smart governance is examined in (Kumar et al., 2024). The study looks at how artificial intelligence (AI) is changing urban settings and how governments interact with the public, manage resources, and deliver services. AI-driven technologies are used in smart cities to improve metropolitan areas' sustainability, livability, and efficiency. To facilitate real-time decision-making, optimize resource allocation, and enhance general city operations, it investigates how AI algorithms analyze enormous volumes of data from sensors, gadgets, and inhabitants. It further explores the idea of smart government, which uses AI technologies to improve public service delivery and boost citizen participation. It looks at how governments might make data-driven policy decisions, expedite administrative procedures, and offer individualized services using chatbots, virtual assistants, and data analytics tools driven by artificial intelligence. Governments may improve resource management, build sustainable and effective urban ecosystems, and improve the quality of life for inhabitants by carefully and cooperatively utilizing AI technologies.

In the Global South, many nations work to match sustainability objectives with urban development. As a result, the concept of smart sustainable cities—which combines the concepts of sustainability and smart cities—has arisen. Financial limitations and the region's fast population increase are just two of the many difficulties it faces. These difficulties are exacerbated by infrastructural shortcomings, particularly in the areas of digital infrastructure and AI adoption. Thus, investigating AI and digital technology is crucial to creating intelligent, sustainable cities in the Global South. The study looked at the advantages and disadvantages of AI and digital technology (Das 2025). Additionally, it looked at the consequences for policy and offered a paradigm for smart, sustainable cities. Case studies and a thorough literature study are part of the qualitative methodological approach. The study illustrates the obstacles to their adoption as well as the ways in which digital technology and artificial intelligence can be used to address a range of urban concerns. The study suggests a conceptual framework with three main pillars: identifying application areas, removing obstacles, and embracing digital technologies and artificial intelligence as the crucial component to turn cities into smart, sustainable cities. The study also addresses the consequences for policy and makes recommendations for future lines of inquiry.

In contrast to earlier research, the review provides a nuanced perspective of AI's involvement in urban systems by tying technological innovation to governance situations. The results demonstrated that Africa and Central America are underrepresented in AI research in urban government, with most of this research occurring in Europe, North America, and Asia. Due to smart city efforts, AI research has exploded since 2020, although it is still primarily theoretical with few real-world applications in urban government. Furthermore, there is little integration of AI with urban studies and public administration, which raises questions regarding openness and equity in algorithmic decision-making. The present study offers practical insights for scholars, policymakers, and urban planners by highlighting these gaps and difficulties. To guarantee that AI-driven urban development fosters fair, effective, and sustainable results, inclusive governance frameworks that strike a balance between technological innovation and ethical and sociopolitical considerations are advised.

Successful projects are highlighted in case studies from top smart cities like Singapore, Barcelona, and Amsterdam (Solano et al., 2017; Nguyen et al., 2022; Sta, 2017). They shed light on how scalable these technologies are. In conclusion, even if AI and Big Data provide revolutionary possibilities for urban development, creating resilient and sustainable smart cities require careful planning, ethical concerns, and stakeholder participation. Cities worldwide are facing previously unheard-of difficulties with infrastructure, sustainability, mobility, and governance as urban populations continue to rise. The emergence of what are today referred to as "smart cities” urban regions that use digital technology to increase operational efficiency, disseminate information to the public, and improve the quality of life for residents—has been spurred by urbanization and technological breakthroughs.

The idea of smart cities is a promising answer to the problems that urbanization is posing to cities worldwide, and artificial intelligence (AI) is a key component of this change. With emphasis on its six primary domains, smart environment, smart governance, smart living, smart economics, and smart people, this study reviews the literature on AI solutions used in smart cities. The Scopus-available publications from 2021 to 2024 are included in the analysis. This study looks at how AI is being used in each field and highlights its challenges, developments, and potential paths forward (Wolniak, 2024). The analysis's objectives were as follows: (1) to find applications and solutions that use AI in smart cities; (2) to find the obstacles that prevent AI from being implemented in smart cities; and (3) to investigate potential future directions for AI use in smart cities.

To support sustainable urban planning, Almulhim's (2025) study conducted a systematic review of research on the application of artificial intelligence (AI) to infrastructure management in three main areas: energy optimization and predictive maintenance, traffic and mobility systems, and ethical public participation. Results from 30 peer-reviewed research highlight how AI-driven models improve governance, sustainability, and operational efficiency in smart cities [1]. By improving resource efficiency and predictive maintenance, AI-driven smart infrastructure can revolutionize urban design. This includes 15% energy savings, 25% congestion reduction, 25% cost reductions, and 18% travel time reductions.

In a similar vein, citizen-centric strategies like interactive digital twins have been shown to improve public involvement and aid in resolving moral dilemmas. The results also show that deep learning and hybrid models can anticipate traffic with up to 92% accuracy, while AI-based predictive maintenance frameworks increase system resilience. However, there are still barriers to fair implementation, such as algorithmic prejudice, privacy violations, and the digital divide. Transparency, accountability, and inclusivity must thus be promoted by establishing moral and participatory frameworks that are based on responsible AI governance (Bengio, 2025).

The study shows how improving efficiency, sustainability, and social responsiveness using AI-enabled smart infrastructure management fortifies urban planning. It concludes that creating smart cities that are both socially and sustainably acceptable requires finding a balance between inclusive government, ethical responsibility, and technological innovation.

Democratic and sustainable urban government requires that municipal AI systems incorporate the legal "reasonable person" criterion (Mushkani, 2024). Concerns about normative validity, accountability, and equity are intensifying as cities use artificial intelligence (AI) systems more frequently. Adapting the legal "reasonable person" norm for supervisory supervision in municipal AI systems, including possible future implementations of Artificial General Intelligence (AGI), this article presents the Urban Reasonableness Layer (URL). The study investigates how legal and community-derived norms might guide AI decision-making in urban settings using historical analogies, scenario mapping, and participatory norm-setting. The URL is suggested as an exploratory architecture for resolving conflicting ideals, balancing automation with democratic processes, and challenging the boundaries of technology alignment rather than offering a definitive solution. This work emphasizes plurality, contestability, and the intrinsically political nature of socio-technical systems, which adds to the current discussions on urban AI governance.

Artificial Intelligence (AI) has revolutionized urban governments by improving decision-making, infrastructure management, and public service efficiency in smart cities. However, there are serious issues with privacy, algorithmic bias, transparency, and public trust brought up by the extensive use of AI for data collecting and analysis. AI systems run the risk of worsening inequality, violating citizens' rights, and decreasing accountability in automated decision-making if they are not properly governed. Mastrogiovanni (2025) investigated how AI-driven frameworks may improve data governance while guaranteeing algorithmic fairness, privacy protection, and public empowerment. Important tactics include explainable AI to make automated judgments more transparent, differentiated privacy to safeguard individual identities, and federated learning to facilitate decentralized data processing. To stop discrimination in AI-driven urban systems, bias detection tools and algorithmic audits are also crucial. In smart city projects, public trust is essential, necessitating transparent data-sharing rules, participatory AI councils, and citizen engagement methods. The study suggests a thorough governance architecture that combines fairness-aware algorithms, privacy-centric AI, and public engagement tactics to guarantee AI-driven urban ecosystems that are accountable, transparent, and sustainable. According to the findings, integrating technology innovation with inclusive policies and capacity-building enhances urban resilience and efficiency while also fostering public empowerment and confidence. Smart cities may maximize AI's promise while preserving public confidence and regulatory compliance by coordinating technology breakthroughs with moral and legal protections.

A forward-looking view on the convergence of geospatial technology, smart city development, and ecological integration is provided by the book's last chapter, which summarizes the major ideas discussed throughout (Gholve, 2025). The use of digital twins, AI-driven Geographic Information Systems (GIS), and real-time spatial analytics have revolutionized environmental sustainability, infrastructure optimization, and urban planning as urban settings change quickly. The chapter highlights the use of geospatial intelligence in addressing urgent urban issues including resource management, climate change, and resilient city-building while revisiting significant developments in smart city technology, data analytics, and eco-synergy. This chapter highlights how cities are using geospatial technologies to improve land use planning, mobility solutions, and disaster preparedness by considering international case studies and urban renaissance projects. The conversation also covers new developments that will shape the next stage of smart city innovation, such as blockchain for urban administration, the geospatial metaverse, and AI-powered spatial intelligence. In order to provide fair access to geospatial innovations, the chapter also highlights the necessity for scalable solutions, interdisciplinary cooperation, and ethical data governance. The smooth integration of geospatial intelligence with environmentally friendly regulations and inclusive technology is critical to the development of smart cities.

In support of open geospatial platforms, AI-integrated urban management, and smart city frameworks that put social and environmental equity first, this chapter offers researchers, policymakers, and urban planners' strategic proposals. To create resilient, habitable, and future-ready urban environments, this synthesis seeks to stimulate further research and innovation in geospatial applications by bridging the gap between technology and ecological sustainability. Finally, the last chapter summarizes the main ideas discussed in the book and provides an outlook on how geospatial technology, smart city development, and ecological integration meet Ujang (2025). The use of digital twins, AI-driven Geographic Information Systems (GIS), and real-time spatial analytics have revolutionized environmental sustainability, infrastructure optimization, and urban planning as urban settings change quickly. This chapter highlights the use of geospatial intelligence in addressing urgent urban issues including resource management, climate change, and resilient city-building while revisiting significant developments in smart city technology, data analytics, and eco-synergy. The chapter highlights how cities are using geospatial technologies to improve land use planning, mobility solutions, and disaster preparedness by considering international case studies and urban renaissance projects.

Research questions

With an eye on the rapid developments in technology that is involved into all spheres of human existence, this study aims to center its inquiry around the following key questions:

1. Which are the domains where AI can impact the development of smart cities and aid urban governance in KSA?
2. What are the best practices and factsheets pertaining to smart cities that have already incorporated AI solutions in urban planning?
3. What are the experiences and perceptions of the users towards smart technologies in the civic setting and what threats do they perceive post their adoption?

Hypothesis

In the context of the smart cities and urban governance, AI technologies and their applications can significantly act on i. Management efficiency, ii. Environment maintenance, iii. Optimization of resources in terms of allocation and utilization, iv. Scaling down of costs, and v. Providing a better life-work environment to the citizens. The study therefore tests the following hypothesis that also align with the research questions:

1. Domains such as waste management, efficient energy consumption, traffic management, and other public services are better managed with AI-driven algorithms and analytics.
2. Being data-driven, smart city governance promotes transparency, accountability, and responsiveness of administrations.
3. Challenges such as global warming, sustainable resource management, better air and water for all, and data security can be addressed with AI driven governances.
4. AI powered urban systems are geared to meet the needs of citizens, thus ensuring their viability in bringing about satisfaction and quality experience for residents.

Methodology

This study follows a mixed methods approach with qualitative data coming in from a two-pronged data collection model: Focus group discussions with a convenience sample were held and the data was thematically analyzed to identify recurring themes to enable creation of patterns of preparedness, acceptance, and impact of AI integrated smart cities and governance. Quantitative data in this study comes in from civic observations from Qassim metropolitan area, KSA, which utilizes data over a four-week period from traffic management cameras, energy records, waste collection points and equipment, public safety paraphernalia, and pollution sensors.

Participants

Focus group: The study organized four focus group discussions with a convenience sample of teachers (in the fields of city planning, architecture, engineering, urban designing, landscaping, and economics) and students (on a purely voluntary basis) over a period of two weeks to obtain clean and valid data. All discussions were held over Zoom.

Analysis and Discussion of Results

The first research question that the study set out to answer was *Which are the domains where AI can impact the development of smart cities and aid urban governance in KSA?*
Five parameters were selected based on previous literature to examine the impact of machine learning algorithms and data analytics in taking urban development in the direction of smart city set ups that also aid urban governance. These were: traffic management cameras, energy records, waste collection points and equipment, public safety paraphernalia, and pollution sensors. Two urban sites were chosen for this purpose (hereinafter referred to as UC1 (urban center 1) and UC2 (urban center 2) in the Qassim __ region of KSA. These cities are identical in all respects except that UC2 is an older urban center with some AI and IoT applications being in place for maintenance and administration. To elaborate, IoT and data analytics are being used in UC2 across the parameters under study here. We aggregated and processed AI-based data from UC2 and thereafter applied advanced machine algorithms to gather insights. Parallelly, UC1 is managed across the actionable parameters by human workforce in the conventional manner. In the absence of AI in UC1 the researcher relied on municipal cameras (installed for general public safety purpose) to collect the data for comparison.

Parameter 1: Traffic Management

The AI mechanisms used in UC2 for traffic management, including traffic light durations, pedestrian breaks, and peak time management, were GPS and high sensitivity cameras. These used machine learning models mainly for predictive analysis to ensure commuter safety and congestion free traffic flow. Typically, in UC2, the system dynamically suggested route alternatives and modulated traffic lights to keep the roads congestion free. Compared to UC1, two factors were observed that favored UC2: One, the average travel time between equidistant points was always lesser by as much as 32% at the best and never lesser than 25% in AI-driven UC2 model. In UC1, the absence of machine operated traffic management (though GPS was available to commuters) not only cause frequent traffic bottlenecks, these in turn, contributed to higher vehicular emissions at 41% more than UC2. The other con was that at peak traffic time, both these factors showed even higher readings with average travel time being as much as 55% higher and vehicular emissions going further up to 45% in UC1 as compared to UC2. These readings also have domino effect on fuel consumption though it was not in the scope of this study.

Parameter 2: Energy records

Energy consumption in most Saudi cities is primarily in the domestic sector and here too, for air conditioning. Consequently, per capita use is quite high given the climatic conditions. Moreover, almost all of the cooling demand is fulfilled by fossil fuel usage, a perishable resource coming to a gradual but certain end. Given the rapid urbanization of the country the current demand is likely to see a rise. In this background, wastage caused by imbalance between demand and supply, poor operations, loss of energy in transmission, and forced dumping are all too visible in UC1 model which is subject to frequent insufficient power generation leading to occasional load shedding and even total grid shutdown. It is not that the grid is not generating adequate supply, the problem lies in the mismatch of high demand at certain peak hours not being met whereas supply surges when demand is low. In the case of UC2, on the other hand, the presence of smart grids managed by deep learning algorithms, peak demand times are easily identified and predicted, and grid is protected from overload. This not only satisfies the energy needs of the city as and when needed, it also protects the grid from potential breakdown. In money terms, while overproduction and consequent dumping of power translate to national loss, financial loss also occurs when business districts face shortage not to count the loss of human efficiency in the domestic sector that faces shortage.

Parameter 3: Waste collection points and equipment

AI-driven waste management is a relatively new entrant in the country. There are two main challenges that the country faces in waste management: Sewerage and wastewater treatment, and solid waste management. Traditionally, the models have not been designed for recycling and upscaling of wastes, but with the mention of sustainable waste management in the Vision 2030 document, the country is looking at smart solutions to effective waste management. In its nascent application, ordinary sensors that transmit messages of full capacity of bins to collection dumpsters that ferry the waste to landfills has proved highly effective in UC2 with reduced transportation time and costs. Moreover, predictive analysis using machine learning algorithms has facilitated prior information of waste generation, optimal collection routes and schedules. It is expected that as data will be updated, waste segregation and recycling will also benefit from AI application. In the case of UC1, waste management is still dependent wholly on human agency, this has necessitated employment of a huge immigrant workforce the effects of which are a separate area of inquiry. In any case, inefficiency and cost to state are visible in UC1 as there are frequent mismatches between waste generation and disposal which is a civic nuisance and economic burden apart from projecting a negative image of the country.

Parameter 4: Public safety paraphernalia

Saudi Arabia prides itself on being a safe and secure country to any potential danger to its citizens. The model of UC2 establishes the efficacy of surveillance camera networks and social media feeds that are constantly upgraded with the latest software in the crime detection and prediction. As compared to UC1 the assistance that law enforcement agencies received from machine learning models in UC2, the crime rates are lower by as much as 20% and effective response time for emergency medical aid and police intervention is lower in the latter by 35% than the former.

Parameter 5: Pollution Sensors

Though a largely clean air nation, Saudi Arabia is beginning to witness changes in the air quality indices in the urban centers caused by immigration of large numbers of foreigners and rural dwellers to cities for various reasons. This has led to growing vehicular emissions apart from global socio-economic activities adding to pollution. Using datasets over a period, IoT sensors in UC2 have successfully identified and predicted pollution patterns, enabling the administration to take proactive control measures. These include traffic, industrial and construction activity restrictions that have significantly reduced pollution and improved air quality in UC2 over a period. Public health costs to the administration have also seen a dip with this development as complaints of ailments linked to poor air have seen a drastic drop. On the other hand, UC1 continues to record bad air quality, comparison of data over four weeks shows that air quality of UC1 being consistently in the range of 'poor' while UC2 has been in the 'good' range with AQI values at an average of 150+ and <60 respectively.

The second research question that this study examines is *What are the best practices and factsheets pertaining to smart cities that have already incorporated AI solutions in urban planning.*
Table 1 below presents a fact sheet of AI solutions adopted by cities around the world and the contributions of these to enhancing livability and optimizing administration.

Table 1: Smart city solutions factsheet

	Area of application	Case study	AI-driven solution and facts	User gains
1.	Traffic management	Singapore	AI applications to monitor traffic density, align signal timings, and commuter updates	Reduced travel time and AQI

		Los Angeles	Automated Traffic Surveillance and Control (ATSAC) system for management of intersections	Reduced travel time and congestion
		Barcelona	Traffic flow management	Sustainable transport
		Lisbon	Management of intersections	Reduced travel and stop times
		London	Traffic signal management	Alignment with public transport schedules, lower emissions
2.	Energy conservation via smart grids	Las Vegas	Energy consumption optimization and efficient operation of smart buildings	Lower wastage and greater reliability
		New York	Voltage optimization, peak demand fulfilment, improved reliability	Reduced outages, peak time supply optimization
		Melbourne	Smart grid management to align with climate, water management	Waste reduction, better quality water availability
		Masdar City	Energy recovery to minimize waste	Improved energy efficiency
		Copenhagen	Optimization of heating systems	Lower emissions and better heating
	Waste management	Lucknow	Zero landfill goal	Zero net waste
		Singapore	IoT sensors and solar-powered compactors	Recycling promotion
		San Francisco	AI monitored smart bins	Better waste management
		Seattle	Smart waste management with IoT and eco-friendly vehicles to ferry waste	Reduced emissions
	Public safety	London	Predictive policing	Safer public spaces
		New York	Predictive policing, automated emergency dispatch	Safer public spaces
		Chicago	Predictive policing, automated emergency dispatch	Safer public spaces
	Pollution reduction	Hamburg	AI systems for vessels to draw power from mainland near the shores	Reduced air and noise pollution
		Seoul	5G enabled robots	Scan and control of pollution in industrial sectors
		Barcelona	Multimodal AI applications in urban areas	Controlled NO2 limits in the streets
		São Paulo	Predictive models to forecast pollution up to 48 hours in advance	Improved air quality

The data in Table 1 shows that AI integration into the urban models can transform potential deadlocks that threatened the civic structures across the globe, thus enhancing resource management and efficient utilization, optimization of sustenance of measures, and citizens' livability. Machine algorithms stand out for their ability to process huge amounts of data, predict possibilities, and enable administrations to go in for precautionary and corrective measures. Augmented with IoT, the possibilities of the role of AI in many unexplored urban operations are immense and deserve careful and dedicated research.

The third research question that the study set out to answer was *What are the experiences and perceptions of the users towards smart technologies in civic setting and what threats do they perceive post their adoption*.

Being a mixed methods study, qualitative data was gathered to answer this question through four focus group discussions organized over Zoom. The participants comprised a convenience sample of teachers and volunteering students at Qassim University where the researcher is employed. Both pros and cons were identified by the researcher in these discussions but one thought that was shared unanimously was the safety of data with the inroads of AI into all walks of life, though the teachers were more suspicious of technology in this context than the students which may be attributed to the relatively greater comfort level of the young people with technology.

Some participants opined that whistle blowers in the west had proven time and again that a great deal of individual freedom is curtailed with the use of technological tools and applications as much of the information is saved by systems of whose use (or abuse) the laypersons are not even aware.

The other leading theme was the loss of human face in mankind's existence as more and more human workforce is being replaced by machine algorithms which function on data that may be marred by prejudices, biases, and limitations. Consequently, the solutions offered by AI may not be as perfect as they are being touted.

The student community, however, are unanimous in their conviction that to compete in a globalized world, exposure to the latest technology is a must, and for KSA to present an image of a forward moving nation, closing the doors to technology will only be detrimental. As users of smart civic applications, the participants acknowledged that they certainly improved the urban living experience and more such incorporations will be welcomed.

Conclusion

This mixed methods study set out to answer three research questions to act as guidelines in urban Saudi Arabia's gentle transformation to smart cities. Data for the study were collected via comparative case studies of two urban centers in the central region of the country and civic outcomes compared where one center catered to five civic parameters using AI applications while the other used traditional systems. Results made out a strong case for the country to move towards incorporation of smart technologies in urban governance as the local and international outcomes establish their efficacy in terms of individual quality of life, cost to administration, and global ramifications. The qualitative data came in from focus group discussions which indicated that the older generations do have certain reservations in complete and unconditional adoption of AI technologies while GenZ are quite open to them and eager for their implementation to come at par with their global peers.

The movement towards more intelligent, data-driven urban planning techniques is required due to the world's cities becoming more populated. Big Data and Artificial Intelligence (AI), which present previously unheard-of possibilities to optimize urban systems and enhance inhabitants' quality of life, are at the core of this revolution. Big Data's enormous volume, diversity, and speed allow for data-driven decision-making by providing urban planners with real-time insights about the environment, infrastructure, and human behavior. Through sophisticated algorithms and machine learning approaches, AI improves these capacities, enabling automation, optimization, and predictive analytics for a range of urban functions.

With an emphasis on its uses in infrastructure management, environmental sustainability, public safety, urban development, and citizen participation, this article examines the nexus between big data and artificial intelligence in smart cities (Ejaz et al., 2024). Cities can increase service efficiency, lower costs, improve safety, and promote more sustainable urban growth by utilizing these technologies. To fully exploit the potential of smart cities, however, issues including algorithmic bias, data privacy, security, and implementation costs must be resolved. Future developments in urban planning are also covered in the study, such as the incorporation of real-time analytics, adaptive machine learning models, and the Internet of Things (IoT).

To address the complex urban population, increase and socioeconomic needs, artificial intelligence (AI) has become increasingly prevalent in urban planning. Urban government decision-making and policymaking could be revolutionized by AI data-driven approaches. But there is a disconnect between AI's potential in theory and how it is incorporated into governance structures. Smart cities draw attention to technological developments, but they also emphasize sociopolitical issues including public trust, ethics, and diversity. The study thoroughly examines the literature on the use of AI in urban planning and governance, looking at the socio-political aspects of AI integration as well as improvements in decision-making (Lartey & Law, 2025).

Limitations

Though the study is unique in its point of inquiry and has far reaching use for many stakeholders, the limitations include a limited dataset (of two urban centers in KSA). The qualitative data in future endeavors should also be reinforced with inclusion of voices from the administration and subject experts.

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