

Smart cities and Competitive Advantage: A perspective of MENA region

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Summary

In the context of recently estimated trends, it is anticipated that the growth pattern of the populace in urban regions will be more significant in the first thirty years of the 21st century in comparison to the accumulative urban development patterns seen in previous data gathered from around the world. The Middle East and North Africa (MENA) is the region that consists of developing countries, out of which most are rapidly urbanising populations that are expected to double by the end of 2030. Although many of the major countries in the Middle East are becoming aware of their rapidly coupling populace, which not only consists of natives but also foreign expatriates, the evidence of a shift towards technology and competitiveness of being a benchmark of standardised culture and science mix has been witnessed only in economic centres. The successful initiatives by some MENA countries to pave their way forward in streamlining their future potential to facilitate sustainability through digitalisation help in laying out a baseline framework for the adoption of the guidelines for moving towards smartness. The purpose of this research is to develop a framework for successful implementation of smart cities strategies in the Middle East and North Africa (MENA) region.

Keywords: competitive advantage, cities, digitalisation, IoT, MENA, smart, strategies.

Word count: 2151

Track: Organisational Transformation Change and Development

Introduction

Urbanisation is accelerating globally, particularly in developing regions. The United Nations predicts that by 2050, over 66% of the world's population will reside in urban areas (United Nations, 2014). This rapid growth presents challenges in resource management, infrastructure, and environmental sustainability, especially for regions like the Middle East and North Africa (MENA), where cities are facing intense pressure to modernise. Smart city frameworks have emerged as strategic responses to these challenges, offering digitally integrated urban environments that aim to enhance living standards, improve service efficiency, and promote competitive advantage (Cobbinah et al., 2015; WHO, 2016).

This study explores successful smart city strategies within the MENA region to identify key enablers and barriers. Focusing on cases like Dubai, Qatar, Morocco, and Abu Dhabi, it evaluates how digitalisation, urban planning, policy frameworks, and sustainability goals converge to transform urban governance and foster competitiveness.

Research Methodology

A mixture of an in-depth literature review and a systematic literature review (SLR) was employed in this study. Within the selected field, the SLR identified areas of ambiguity and research gaps. By creating a list of criteria for material to research, SLRs help to prevent bias by encompassing a wide range of material in connection to addressing a specific issue, regardless of the reviewer's initial opinions (Xiao and Watson, 2019).

To support the information gathered from SLR, semi-structured interviews were chosen. A group of professionals with expertise in the construction sector in the MENA region are invited to participate in the study. Purposive sampling was used in the study. Exploratory research frequently employs this kind of approach (Palinkas et al., 2015). During the search, the main research question that was kept at forefront was “what are the key elements that are employed in planning out strategies for adoption of smart city in MENA region for competitive advantage?”

ICE Virtual Library, Google Scholar, ProQuest, ScienceDirect, EBSCOhost, Global, Scopus and ABI/INFORM are the databases used for the literature search. It is critical to choose studies that focus specifically on "adoption of smart cities strategies for competitive advantage." High-quality research projects with sound study designs and reliable results are required. High-caliber research studies are necessary to ensure that the results are reliable and credible (Lefebvre et al., 2019). Given that the review focused on studies with solid methods and trustworthy results, the findings seem more certain. From Table 1, Inclusion criteria targeted English-language studies focused on smart city strategy adoption, competitive advantage, and relevance to MENA. Key search terms included "smart cities," "IoT," "digitalisation," "competitive advantage," and "MENA region." The review included 15+ high-quality studies.

Table 1: Inclusion and exclusion criteria

	Inclusion Criteria	Exclusion Criteria
Focus	Studies must be related to factors and elements that are employed in planning out strategies for the adoption of smart cities for competitive advantage.	Studies are not related to factors and elements that are employed in planning out strategies for the adoption of smart cities for competitive advantage.
Language	Studies must have been published in English	Studies published in languages other than English.
	Studies must be peer-reviewed articles from credible journals.	Studies that are not peer-reviewed.
Date	Studies must be equal or less than ten years old	Studies that are past twenty years
Region	International	----

Background of Smart Cities

Smart cities represent a convergence of digital technology, governance, and citizen-centric innovation. They aim to integrate Information and Communication Technologies (ICT) into urban systems such as transportation, waste, energy, and healthcare (Caragliu et al., 2011; Anthopoulos et al., 2021). Definitions vary. Some focus on singular technological components, while others advocate for holistic, integrated ecosystems. According to Harrison et al. (2010), the essence of a smart city lies not merely in technology but in the connectivity and efficiency it brings to urban life. Reddick et al. (2021) emphasise that collaborative governance and strategic partnerships are essential to achieving this vision.

In contrast to the cumulative urban development patterns observed in earlier data collected from all over the world, it is predicted that the population growth pattern in urban areas will be more prominent during the first thirty years of the twenty-first century (WHO, 2016). About 70% of the world's energy consumption and greenhouse gas emissions are covered by urban areas. However, it only occupies 5% of the Earth's total plain area. These remarkable trends are complemented by an unprecedented increase in the demand for food security, land and construction materials, water, pollution control, and waste management (Anthopoulos et al., 2021).

As a result, urbanised cities are constantly under pressure to provide higher-quality services, advocate for a competitive local economy, enhance service delivery, boost efficiency, and cut costs, maximise productivity and skill, and address issues of traffic congestion and environmental sustainability. The main driving force behind the transformation of cities towards creative solutions and the testing of various smart infrastructure application strategies is this wide range of pressures (Anthopoulos et al., 2021).

Around the world, people are considered the poles of cities. Thus, to meet these human-centred demands, cities must be empowered to allow not only sustainability but also outstanding expertise and forward-thinking innovation to provide enhancements and raise the value of living conditions for individuals, businesses, communities, and society, in addition to the element of protecting the environment. As a result, cities can be seen as structured symbols that demonstrate the multifaceted interconnections made possible by

putting into practice a strategic digitalisation plan and vision in the form of smart cities, a global agenda for transforming existing or emerging civilisations in a sustainable manner and influencing the future of urban areas through technological advancements (Elamir et al., 2020).

Evolution of Smart Cities in MENA

Smart city development in MENA has gained traction due to five main drivers: population growth, urbanisation, technological advancement, sustainability imperatives, and economic diversification (Elamir et al., 2020). Earlier initiatives often focused on isolated technology deployments, but newer models pursue integrated, sustainable ecosystems.

Angelidou (2015) outlines four foundational forces in smart city evolution: urban ICT, knowledge economies, governance reform, and sustainability. In MENA, these are embodied in state-led initiatives like Dubai's "Smart City" vision and Qatar's Lusail project. However, disparities exist across the region due to uneven political stability and infrastructural readiness.

In the early stages of the smart city movement, many cities focused on creating "smart solutions" in areas like transportation, waste management, and electricity (Kamolov and Kornaukhova, 2021). Consequently, specialised projects and initiatives were developed, often in collaboration with corporate partners. For example, Rodrigues da Silva (2014) studied a project conducted by the UN Human Settlements Programme to develop sustainable urban transport strategies in cities worldwide. According to Anthopoulos et al., (2021), the idea of smart cities has been shifting in favour of a more comprehensive and integrated strategy.

In the MENA region, the development of smart cities has been influenced by various factors, including rapid population growth, health and sustainability, technology and urbanisation, and the need to diversify economies. Shokeir and Yahia (2020) note that the region has a high potential for smart city development due to its growing ICT infrastructure, young population, and supportive government policies. However, progress has been uneven across countries and cities, with some leading the way in terms of

integration and sustainability while others are still in the early stages of implementation, (Khemaja et al., 2019).

Key Drivers of Smart City Adoption in MENA

a. Rapid Population Growth

Cities like Riyadh and Cairo are growing at rates exceeding 2.5% per year, straining infrastructure and services (Rodrigues da Silva, 2014). Smart mobility and energy systems are thus vital. For instance, Saudi Arabia's NEOM project is a response to the demand for sustainable urbanism in the face of rapid demographic expansion (Aldegheishem, 2023).

b. Technological Readiness and Urbanisation

Infrastructure—both “hard” (physical) and “soft” (digital/knowledge-based)—plays a central role in enabling smart cities (Angelidou et al., 2014). IoT, AI, cloud computing, and sensor networks are foundational. Smart cities need robust digital infrastructure and broadband penetration (Buhnova et al., 2022; Woetzel et al., 2018).

c. Education, Health and Sustainability

Education enhances citizen engagement in smart governance (Elamir et al., 2019). Smart cities also aim to improve healthcare through data systems, and to reduce carbon footprints via green technologies (Aditya, 2016). Sustainability remains a common objective across MENA initiatives, from Masdar City's carbon-neutral plan to Morocco's “Digital Morocco 2020” strategy (Talbi et al., 2021).

d. Economic Diversification and Innovation

Given the volatility of oil-based economies, smart cities offer MENA nations a means of diversification. Digital economies, smart entrepreneurship, and decentralised finance (e.g., blockchain) contribute to building “smart economies” (Kirwan & Dobrey, 2022). Cities like Dubai and Doha exemplify this shift toward innovation hubs (Caragliu & Del Bo, 2019).

Case Studies

a. Dubai, UAE

Dubai's Smart City Strategy focuses on sustainability, innovation, and happiness. Projects include Silicon Park, the Hyperloop, and Dubai Data Initiative. The strategy leverages IoT, AI, blockchain, and CBI (Collaborative Business Intelligence) to improve service delivery (Smart Dubai, 2023; El Khatib & Alzouebi, 2021).

Dubai Silicon Oasis (DSO) integrates digital infrastructure with renewable energy and autonomous mobility, setting a global benchmark for smart development (Virtudes et al., 2017). Initiatives also include the Rosemont Hotel with an indoor rainforest and AI-driven logistics hubs.

b. Qatar – Lusail City

Lusail exemplifies smart transport integration. Its Smart Mobility Solution includes bus rapid transit and interconnected rail-taxi systems. Policies align with sustainability goals, reducing congestion and emissions (Shaaban & Adalbi, 2021).

Lusail's citizen-centric design, inspired by cross-cultural urban models, integrates lessons from Europe and Asia (Sharif & Pokharel, 2022; Riva Sanseverino et al., 2018). The city's user-focused planning framework aligns with global best practices (AlAli et al., 2023).

c. Morocco

Morocco's smart city approach is guided by "Digital Morocco 2020." Tangier Tech is a prominent project, focusing on innovation, industrial growth, and sustainability. Morocco has positioned itself as a smart city leader in Africa, offering expertise to neighbouring countries (Fernández & Fernández, 2023).

Key drivers include ICT infrastructure, citizen participation, and environmental stewardship (El Alaoui, 2017). Morocco also hosts international summits to foster regional collaboration on urban innovation (Khabara, 2014).

d. Abu Dhabi – Masdar City

Masdar City is designed as a carbon-neutral urban zone using solar and wind power. It integrates IoT-driven infrastructure, waste-to-energy systems, smart buildings, and electric mobility (Shankaran & Chopra, 2020). The Pearl Rating System ensures architectural sustainability. Masdar promotes an investment zone for low-carbon businesses, offering a replicable model of green development in oil-rich regions (Shokeir & Yahia, 2020).

e. Kingdom Tower – Jeddah, Saudi Arabia

Kingdom Tower merges vertical and horizontal smart city concepts, integrating IoT, security, e-commerce, and AI into a mixed-use superstructure. It serves as both a landmark and a blueprint for smart building innovation (Doherty, 2018).

Challenges and Opportunities

Despite significant progress, MENA cities face barriers such as political instability, digital divides, and financial constraints. Comprehensive smart city strategies must address these challenges through inclusive governance, regional cooperation, and continuous innovation (Allam et al., 2022).

Education and public engagement remain critical to successful adoption. Cities must ensure transparency, data security, and resilience in the face of climate and geopolitical uncertainties (Aina, 2017; Kogan & Lee, 2014).

Policy and Research Implications

This research provides actionable insights for policymakers, urban planners, and private investors. It emphasises the need for:

- Strategic digital infrastructure investment
- Collaborative public-private ecosystems
- Citizen-centred governance frameworks
- Cross-border MENA cooperation
- Focused educational and environmental policies

By building on successful models like Dubai and Lusail, MENA cities can position themselves as global smart hubs, fostering inclusive growth and sustainability.

Conclusion

The MENA region's smart city journey is still evolving, but substantial milestones have been achieved. From Dubai's integrated systems to Morocco's regional leadership, each case offers lessons in innovation, adaptability, and sustainability.

The most common approach for using smart engineering techniques of digitalised architecture in the construction of smart infrastructure is planning the city's urban layout (Rassia, 2014). Along with urban planning, the sustainable development approach is taken into consideration when developing renewable energy and technology that turns current energy expenditures into intelligent use of natural resources integrated by digitalised systems, which is moving closer to the adoption of smart cities. The literature review also emphasises recommendations for the application of eco-technologies as promising solutions for future urban growth, as well as the interdisciplinary examination of technological and social challenges impeding the adoption of smart cities.

The research highlights the intersection of technological readiness, socio-economic needs, and governance frameworks as the cornerstone of smart city success. Future research should further examine cross-cultural implementation, citizen feedback, and real-time impact assessments. Ultimately, the smart city model offers not just a path to technological advancement, but a vision of holistic urban living such as sustainable, inclusive, and resilient.

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