

Journal: Omni Science: A Multi-disciplinary Journal

ISSN: 2231-0398

Title: Review on Smart Cities and Modern Development Methods

Review Article

Volume:15

Issue: 2

Year: 2025

Article Received: 22 February 2025

Article Accepted: 24 March 2025

Article Published:

Dr. Huda Hadi Ali

Lecturer, Department of Geography, College of Education for Girls., University of Kufa,
Iraq.

Corresponding email id: huda-al.ah@gmail.com

Abstract

Urban interiors around the world are espousing innovative technologies, participating in artificial intelligence, mist figuring, the Internet of belongings, and other digital solutions as they pursue smart city initiatives. Additionally, persons have originated to guess wild, easy-to-use practices and material at their fingertips in today's increasingly digital world. In this location, city directors and commissioners are under concentrated stress to offer fast, efficient, and charge-effective services to residents and businesses. Perhaps most importantly, city governments must continue to support the organization that types their cities work—water, electricity, roads, bridges, traffic signals, public transportation, and extra. Cities around the world are accelerating their digital transformation to provide connected, safe, and reliable services to meet the ever-growing needs of residents and businesses. These smart cities have become the most desirable places to live and work--and are therefore called the cities of the future. Municipalities side larger difficulty and more intricate disputes than constantly previously as urban residents persist to cultivate. In addition, people have come to expect fast, easy-to-use practices and evidence at their fingertips in today's increasingly digital world. In this situation, metropolitan directors and superintendents are beneath strong heaviness to deliver fast, efficient and cost-effective amenities to populaces and industries.

Keywords: Artificial Intelligence, Cloud Computing, Internet of Things, Digital Solutions

Introduction

Cleverer cities everywhere the realm are spending (IoT)- instruments to detention and appreciate facts in physical period. Despite the media promotion of smart cities as a sustainable development option, studies that have addressed this relationship are limited. Studies to date have included the goals of sustainable cities and communities, responsible consumption and production, clean and affordable energy, and clean water and sanitation. The term bearable progress is frequently used in the media discourse about the smart cities program in several countries [1].

The Core of Smart Cities

The core is what keeps a city running smoothly, from marine and energy to roads, circulation instructions, city facilities and transportations systems. As town residents cultivate and people demand modern conveniences and ordinal amenities, it is more imperative than eternally for municipalities to provide hardy and secure arrangements. By adopting fog dividing, the Internet of Things, artificial intelligence and other smart city explanations, countries can:

- ✚ Provide the core or smart mission infrastructure.
- ✚ Delivering important services that build trust in these cities.
- ✚ Improve the security of sensitive public information.
- ✚ Modernize public administrations.
- ✚ Enable connected, efficient and sustainable mobility systems.
- ✚ Deliver urban innovation and improve services for residents.

Moving to the city has often been a dream for ambitious rural people. It is a source of livelihood, a place of crowding and a meeting place for different types of cultures and businesses, unlike the agricultural and pastoral life in the countryside, and it does not hold any future ambition for its residents, so the migration to cities has not stopped since the Industrial Revolution two centuries ago. For example, the US space agency (NASA) monitored the expansion of cities to study its environmental effects, and the result was that a large number of the world's cities increased in area by 25 percent between 1990 and 2000, which reveals the size of the challenge facing the modern city [2,3]. As for the World Bank's expectations, cities will contain 80 percent of the world's population within the next two decades. According to recent statistics issued by the bank, about 55 percent of the world's populace presently lives in cities, or 4.2 billion people. By 2050, their population will more than double the current number, so that 7 out of every 10 citizens in the world will live in cities. With cities contributing more than 80 percent of global GDP, urban expansion can contribute to supportable evolution if managed wisely [4-7]. According to urban studies, the speed and scale of urban expansion brings with it challenges, including meeting the accelerating demand for affordable housing, providing interconnected transportation systems and many basic infrastructure and services, as well as securing work for new arrivals, including 60 percent of those forcibly displaced

due to wars and conflicts in cities, especially capitals. And always according to the advice and directions of the World Bank (Fig 1).



Fig. 1: Designation of Clever Towns

History of The emergence of Smart Cities

The concept of smart cities began to develop in the last decade of the twentieth century and the beginning of the twenty-first century. Despite being revolutionary, many challenges await the future of smart buildings. In light of the rapid technological development witnessed by the world and the rapid increase in urbanization rates that we are witnessing in the twenty-first century, acities andance on ineffective short-term solutions, the need has increased towards establishing sustainable smart cities that address the problems suffered by traditional cities, and provide appropriate solutions to a set of urgent problems using mechanisms and solutions that can be applied on the ground to support sustainable development and work towards its goals in various areas of life. Smart cities are one of the selective inventions imposed on us by an era of industrial development and information technology and can be defined as a smart city that aims to integrate information technology into the urban planning process, with the aim of finding innovative solutions to enhance environmental, economic and social integration within cities (Fig 2) [8-10].

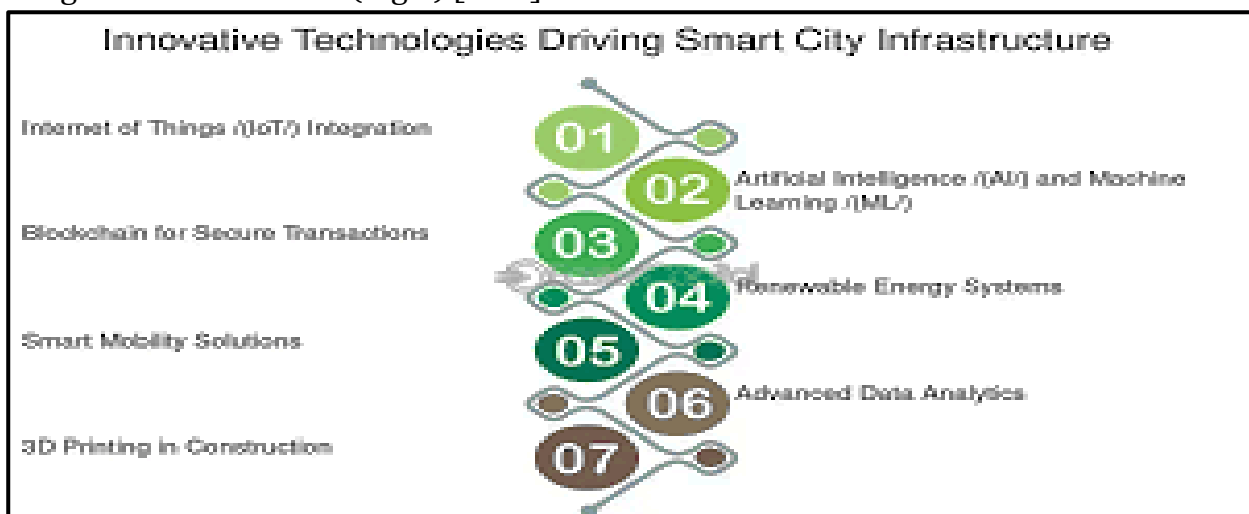


Fig. 2: Innovative of Clever Towns

They can be considered cities that provide good performance in axes such as the environment, economy, transportation, people, living and governance. They can be said to be derived from a set of knowledge-intensive creative strategies that aim to improve the social, economic, environmental, logistical and competitive performance of cities, relying on a combination of human capital, infrastructure, social and entrepreneurial capital. The term smart cities were first used in 1994 during the European Conference on Digital Cities [12-15]. In 1996, Europe began establishing the first digital cities in various European countries, with Amsterdam and Helsinki being among the first models of digital cities. Planning science in particular, and sustainable urban planning in particular, has witnessed a significant improvement in the sector of seeking to find new things regarding sustainable urban environments that are clean, environmentally friendly and provide comfort for their residents, especially in developed countries and some poor countries that have begun to rely on early experiences in the field of sustainable urban planning, albeit within a limited scope. This development was evident in the field of planning to form smart and green cities towards creating a sustainable urban environment for new or existing cities that have the ability to deal with cognitive development and speed in providing the best services to their residents while creating a healthy environment free from pollution [18-14]. Therefore, smart cities are defined as cities that rely on information and communications technology in managing and organizing the lifestyle with all its social, economic, urban and service facilities, etc., in a way that ensures access to services and organizes the workflow for all its residents with the least time, effort and material costs (Fig 3).

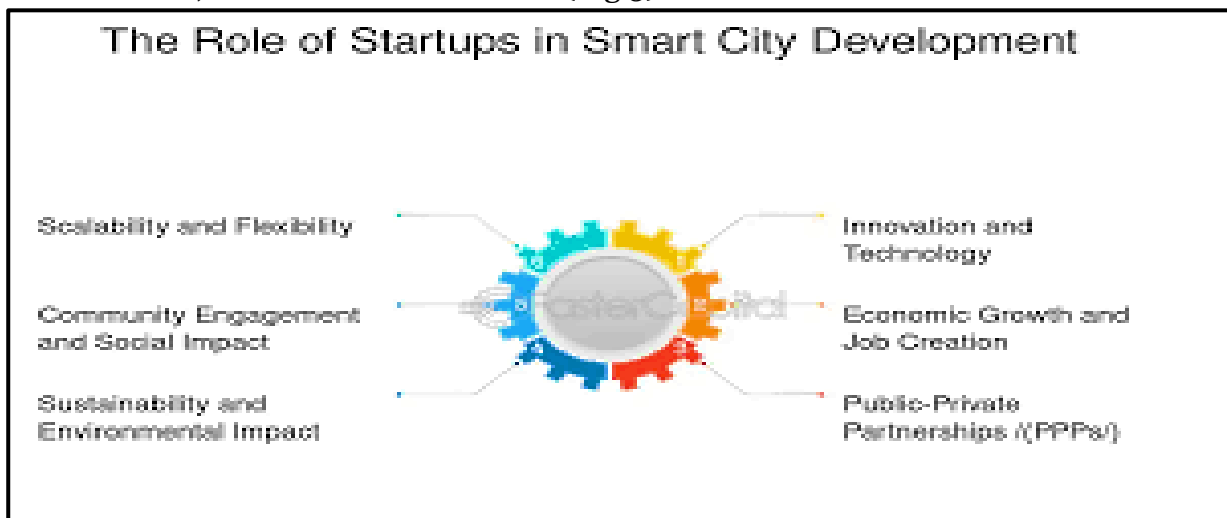


Fig. 3: History Development of Clever Towns

The reliance of the society and economies of contemporary cities on scientific knowledge or innovations as a major factor in the development of cities was a major reason or motive for the emergence of smart cities. These cities consist of main elements represented by the environmental aspect as they are environmentally friendly cities, the social aspect as they include a society that enjoys its ability to deal with scientific knowledge or innovations and adopt information technology, in addition to the technical aspect as they are cities that rely on information and communications technology to achieve smart city management [24,25]. The characteristics of smart cities are numerous and stem from

their nature and are briefly represented by e-government that relies on electronic means in its management, the smart society and the use of clean renewable energy sources to get rid of the problem of gas emissions while rationalizing water consumption for various purposes and recycling what was used from it and also recycling solid waste, in addition to smart cities relying on smart transportation by adopting green means of transportation that rely on solar or electric energy or regulating the use of traditional means of transportation by adopting public transportation more than private to reduce environmental pollution, with these cities relying on the smart economy based on the use of communications and information technologies in e-commerce and providing other services (Fig 4).



Fig. 4: Eligible Smart City Models

The Evolution of Smart Cities

Governments often invest in a mix of smart digital solutions when embarking on a smart city project. Technology, in addition to people, homes, commerce and traditional urban infrastructure, is certainly the largest contributor to achieving sustainable development goals through broadband wireless communication, open data, high-reliability security and flexible income generation plans.

Smart City Technology

Smart towns are a new form of town enlargement that aims to improve the superiority of life of city dwellers by manufacturing them more adaptable and resourceful, using new technologies that trust on the ecosystem of things and services. Technology of various types, from the Internet such as connected sensors, lights and smart utility meters, to artificial intelligence and machine learning, collect data, analyzes it, extracts information and then uses it to manage and develop cities. This new style of management has a wide scope, including public infrastructure such as buildings, streets, sidewalks and homes, water, electricity, gas and communications networks, transportation of all kinds, roads and smart cars, carpools or vehicle sharing, and electronic services and administrations impact on both the economic and social levels. These cities boost the economy by enhancing the efficiency of resource use and improving infrastructure management, which leads to increased productivity and improved business and investment conditions

[26]. Consequently, investment attraction increases, and economic growth is enhanced. Communication and interaction between citizens and government agencies are improved and job and educational opportunities are enhanced, which contributes to raising the standard of living and social development [27].

For comprehensive sustainable development, societies need to balance the need to meet the basic necessities of life – food, shelter and healthcare – with the overuse of the planet's limited resources such as fresh water and air. Leonie van den Beuken, programme manager for the Amsterdam Smart City project, believes that balancing shortage and excess, known as the doughnut economy, is what helps Amsterdam become a smart city [28,29]. “Any success of this donut alliance lies in the long-term vision,” she says. Government has to regulate and provide subsidies, the market is necessary to design technologies, social institutions to communicate with citizens, and of course knowledge and scientific institutions to conduct in-depth research. As long as we seek to bring all these groups together and deal with all the mistakes and shortcomings with the mindset of wanting to reach a sustainable, prosperous, inclusive and just city. Cities need to support their services and their financial status by integrating technology to improve these services and manage them automatically [30,31]. It shows that there is a link between economic efficiency and sustainability. What we have seen clearly in the last few years in Singapore is a clear link between the huge new infrastructure and economic efficiency and building a suitable financial technology system and looking at ways to develop small and medium enterprises to be more efficient and effective. Jan Reinmueller adds: “In the end you will learn more about the data that is being collected because once all the different areas are digitized, then you can have a better picture of how people spend their time and money.” Although theoretically there is no link between the move towards building new smart cities and reducing the spending needed to develop, grow, or maintain and repair existing urban environments, given the limited government investment available, this link cannot be avoided, especially if the rate of work on new city projects is higher than it should be [32,33].

Conclusions

Municipalities continue to be responsible for keeping inhabitants benign, delivering serious amenities, improving value of life, and supporting monetary progression—in addition to these demands. Perhaps most importantly, city directions must endure to care the arrangement that makes their city work—water, electricity, roads, bridges, traffic signals, public transportation, and more. These smart capitals are becoming more required spaces to conscious and exertion—and are being called the cities of the future.

References

1. James P, Astoria R, Castor T, Hudspeth C, Olstinske D, Ward J. Smart Cities: Fundamental Concepts. In: Handbook of Smart Cities. Springer International Publishing; 2020. p. 1–26. doi:10.1007/978-3-030-15145-4_2-1.
2. Goldsmith S. As the Chorus of Dumb City Advocates Increases, How Do We Define the Truly Smart City? [Internet]. datasmart.ash.harvard.edu; 2021 [cited 2022 Aug 27]. Available from: <https://datasmart.ash.harvard.edu>

3. Fourtané S. Connected Vehicles in Smart Cities: The Future of Transportation [Internet]. Interesting Engineering.com; 2018 [cited 2022 Aug 27]. Available from: <https://interestingengineering.com>
4. Araújo CDL, Martins FS, Cortese TTP, Locosselli GM. Artificial intelligence in urban forestry—A systematic review. *Urban For Urban Green*. 2021;66:127410. doi:10.1016/j.ufug.2021.127410.
5. McLaren D, Agyeman J. *Sharing Cities: A Case for Truly Smart and Sustainable Cities*. MIT Press; 2015. ISBN: 9780262029728.
6. Musa S. Smart Cities-A Road Map for Development. *IEEE Potentials*. 2018;37(2):19–23. doi:10.1109/MPOT.2016.2566099.
7. Khan MS, Woo M, Nam K, Chathoth PK. Smart City and Smart Tourism: A Case of Dubai. *Sustainability*. 2017 Dec;9(12):2279. doi:10.3390/su9122279.
8. Paiho S, Tuominen P, Rökman J, Ylikerälä M, Pajula J, Siikavirta H. Opportunities of collected city data for smart cities. *IET Smart Cities*. 2022;4(4):275–91. doi:10.1049/smc2.12044.
9. Kiran D, Sharma I, Garg I. Industry 5.0 And Smart Cities: A Futuristic Approach. *Eur J Mol Clin Med*. 2020;7(8):2750–6.
10. Peris-Ortiz M, Bennett DR, Yábar DPB. *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development*. Springer; 2016. ISBN: 9783319408958
11. Chan K. What is a 'Smart City'? *Expatriate Lifestyle* [Internet]. 2017 [cited 2018 Jan 23]. Available from: [Archived on 2018 Jan 24].
12. Hunt D, Rogers C, Cavada M. Smart cities: contradicting definitions and unclear measures. *4th World Sustainability Forum* [Internet]. MDPI; 2014. p. f004. Available from: doi:10.3390/wsf-4-f004
13. Clark J. Solving for the city. *MIT Technology Review*. 2021 May-Jun;124(3):9–11.
14. Woyke E. Smart cities could be lousy to live in if you have a disability. *MIT Technology Review* [Internet]. [cited 2019 Mar 15]. Available from: [Archived on 2019 Mar 5].
15. Altaei HHA, Alshammri MS. Measuring impact of logistics performance on exports and imports in a sample of selected countries for the year 2022-2023. *Al-Harf Journal*. 2024 Aug;(22).
16. Albino V, Berardi U, Dangelico RM. Smart cities: definitions, dimensions, performance, and initiatives. *J Urban Technol*. 2015; doi:10.1080/10630732.2014.942092.
17. Bernardi M, Diamantini D. Shaping the sharing city: an exploratory study on Seoul and Milan. *J Clean Prod*. 2018;203:doi:10.1016/j.jclepro.2018.08.132.
18. Almaiyali GSS, Alshammari AA. Women's economic empowerment and sustainable energy development. *Al-Harf Journal*. 2024 Dec;23(4).
19. Marchesani F. *The Global Smart City*. Emerald; 2023. doi:10.1108/9781837975754. ISBN: 978-1-83797-576-1.
20. Gracias JS, Parnell GS, Specking E, Pohl EA, Buchanan R. Smart cities—a structured literature review. *Smart Cities*. 2023;6(4):1719–43. doi:10.3390/smartcities6040080
21. Shahat Osman AM, Elragal A. Smart Cities and Big Data Analytics: A Data-Driven Decision-Making Use Case. *Smart Cities*. 2021;4(1):286–313. doi:10.3390/smartcities4010018.
22. Cardullo P, Kitchin R. Being a 'citizen' in the smart city: up and down the scaffold of smart citizen participation in Dublin, Ireland. *GeoJournal*. 2019;84(1):1–13. doi:10.1007/s10708-018-9845-8.
23. Johns F. Governance by Data. *Annu Rev Law Soc Sci*. 2021;17(1):53–71. doi:10.1146/annurev-lawsocsci-120920-085138.
24. Donti PL, Kolter JZ. Machine Learning for Sustainable Energy Systems. *Annu Rev Environ Resour*. 2021;46(1):719–47. doi:10.1146/annurev-environ-020220-061831.

25. Tuominen P. Yes to positive energy districts. VTT News - Beyond the Obvious [Internet]. VTT Technical Research Centre of Finland; 2020 [cited 2022 Aug 28]. Available from: <https://www.vttresearch.com>
26. Riley K. Pittsburgh, San Diego city officials put utilities as major players in smart-city partnerships. Daily Energy Insider [Internet]. 2017 [cited 2017 Sep 25]. Available from: <https://dailyenergyinsider.com>
27. Riley K. America needs smart grid investments pronto, stakeholders say at NARUC event. Daily Energy Insider [Internet]. 2017 [cited 2017 Dec 11]. Available from: <https://dailyenergyinsider.com>
28. Almaiyali GS, Alshammary AA. Women's Economic Empowerment and Sustainable Energy Development. Al-Harf J. 2024;23(4):December.
29. Smart City Technologies and Solutions to Deliver Better a Living | COPA-DATA [Internet]. COPA-DATA; 2021 [cited 2021 Dec 8]. Available from: <https://www.copadata.com>
30. Gharaibeh A, Salahuddin MA, Hussini SJ, Khreishah A, Khalil I, Guizani M, Al-Fuqaha A. Smart Cities: A Survey on Data Management, Security, and Enabling Technologies. IEEE Commun Surv Tutor. 2017;19(4):2456–501. doi:10.1109/COMST.2017.2736886.
31. Pribadi A, Kumiawan F, Hariadi M, Nugroho SMS. Urban distribution CCTV for smart city using decision tree methods. 2017 International Seminar on Intelligent Technology and Its Applications (ISITIA). 2017:21–4. doi:10.1109/ISITIA.2017.8124048.
32. Koukopoulos Z, Koukopoulos D, Jung JJ. Sustainability Services for Public Libraries within a Smart City Environment. Proceedings of the 9th International Conference on Web Intelligence, Mining and Semantics. 2019:1–12. doi:10.1145/3326467.3326473.
33. Tripathi S, Singh MK, Tripathi A. Smart Library for Smart Cities. SRELS J Inf Manag. 2017;53(6):439–46. doi:10.17821/srels/2016/v53i6/89406.