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Sustainable-Smart-Healthy Development Framework for Urban Social Spaces Imaginary: A review

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Abstract
The value of sustainable urbanisation has been redefined by UN-Habitat, which includes intangible and cultural values. The pace of smart and healthy urbanism is accelerating in humankind, yet there is little evidence for integrating such new perspectives of sustainable urbanisation. Therefore, this paper aims to propose a holistic sustainable-smart-healthy (SSH) framework – public social spaces where people can live a smart and healthy urban lifestyle that benefits current and future generations. Through the systematic literature review methodology, important themes were constructed. This study has contributed to the existing sustainable development body of knowledge in conceptualising SSH future urban environments.

Keywords: Intangible and cultural values; sustainable-smart-healthy development; urban imaginary; urban planning

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1.0 Introduction

Sustainable-smart-healthy (SSH) development is a popular yet challenging development trend in the world and Malaysia today (Lim et al., 2021; Ramaswami et al., 2016; Thompson et al., 2023; Trindade et al., 2017). The value of sustainable urbanisation has been redefined by UN-Habitat (2020) which, in addition to including three main aspects, namely economic, social, and environmental, sustainability also needs to be evaluated in terms of Intangible and Cultural Values (ICVs) such as established institutions, and cultural diversity.

The aspect of ICVs is important, and there is lacking research contributing to the ICVs relationship to urbanisation's social, economic and environmental value, even though it is in the early 2020s. UN-Habitat (2020) recommended methods such as increased learning and health, tolerance and community understanding, and equity opportunities in public spaces. Furthermore, under the era of the fourth industrial revolution (4IR), with the development of advanced technology or smart instruments such as artificial intelligence (AI), Internet of Things (IoTs), and cloud computing and big data analytics (BDA) as new instrumentation of urban solutions, creating urban cyber-physical ecosystem has been welcomed by decision-makers (Malek et al., 2022).

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However, innovation under the urban cyber-physical ecosystem (physical, digital and biological) is full of unknown factors and challenges (Economic Planning Unit, 2021). For example, how to measure the health of cities (physical) and citizens (biological) using available (digital) infrastructure to help overcome the threat of the COVID-19 pandemic is an urgent issue (Lim, 2022) that opens room for further exploration.

In the bigger picture, the holistic framework of creating such sustainable-smart-healthy social space for future urban imagination still lacks evidence to answer the question – how to integrate the components, i.e., ICVs, urban cyber-physical ecosystem, and smart instruments in building sustainable-smart-healthy social space. Therefore, this paper aims to propose a holistic SSH framework for urban imaginary – sustainable-smart-healthy social spaces where people can live a prosperous and healthy urban lifestyle that benefits the present and future generations. To explore the framework, this paper applied the systematic literature review methodology using the Google Scholar database. The following section explains the methodology, findings, discussion and concluding remark.

2.0 Methodology

Since the topics of linking the relationship between sustainable urbanisation values, smart city, and healthy city development were limited in literature, the authors decided to explore the big picture through the systematic literature review (SLR) method (Moher et al., 2009). This method has been applied in previous studies such as Trindade et al. (2017) in the sustainable development of smart cities; Malek et al. (2021) in social inclusion in building a citizen-centric smart city; Rocha et al. (2021) in smart cities' applications to facilitate the mobility of older adults; De Nicola and Villani (2021) in smart city ontology and their applications; Buttazzoni et al. (2020), Corsi et al. (2022), and Da Rosa Tavares and Victória Barbosa (2020) in smart cities, technologies and healthcare. Therefore, this SLR method has proven effective in providing a deeper understanding of scientific research topics.

The commonly chosen databases are Google Scholar, Web of Science, and Scopus. For this paper, Google Scholar was selected as it covers not only peer-reviewed journal papers but also a wide range of grey reports, books, working papers, and other website publications, which could be important for this exploratory qualitative research. This paper tried to answer the research question of integrating sustainable urbanisation components in building smart and healthy social spaces. Keyword strings applied are sustainable urbanisation (urbanization), smart city(ies), healthy city(ies), etc. (see results in Table 1). The keyword search was performed from July to mid-August 2024.

Table 1. The selection of keywords and results of the search

keywords	Search	Exclusion of Patents and Citations	Records after Patents and Citations were Removed
sustainable urbanisation	204	84	120
sustainable urbanization	666	241	425
value of sustainable urbanisation	14	13	1
value of sustainable urbanization	2	2	-
sustainable urbanisation value	-	-	-
sustainable urbanization value	-	-	-
smart city	30,000	14,200	15,800
smart cities	34,500	17,400	17,100
healthy city	990	424	566
healthy cities	1,670	824	846
smart healthy city	11	3	8
smart healthy cities	10	2	8
healthy space	25	5	20
healthy spaces	73	26	47
healthy social space	-	-	-
healthy social spaces	-	-	-
Total	68,165	33,224	34,941

Note: The advanced search setting in Google Scholar includes 1) finding articles with the exact phrase, where the words occur in the title of the article, and no limitation on return articles authored by, published in and dated between. (Source: authors)

The SLR process followed four stages proposed by the PRISMA statement (Moher et al., 2009), namely 1) identification, 2) screening, 3) eligibility, and 4) inclusion. At Stage 1 – Identification, records were identified through keyword strings from the Google Scholar database. Records after patents and citations were removed, with the exact phrase/ word occurring in the article's title and the returned article dated up until 30th June 2024. A master Excel worksheet was created to incorporate all the studies found during the initial search. At Stages 2 and 3 – Screening and Eligibility, duplicated records, irrelevant titles, abstracts and contents were removed. Publications involving sustainable urbanisation, smart cities, healthy cities, and social spaces were carefully assessed by reading the abstracts, introductions and conclusions. Those publications that did not discuss smart and healthy topics in urban, social spaces and development contexts were excluded from the list. At the final stage of Inclusion, additional records identified through the backwards-forward search were included and yielded a final total number of 75 articles for review and thematic analysis (refer to Fig. 1). This rigorous search protocol has ensured the relevant references to be covered in the review and tends to induce research gaps through the later part of identifying possible patterns and meaning across qualitative data (Robinson & Lowe, 2015).

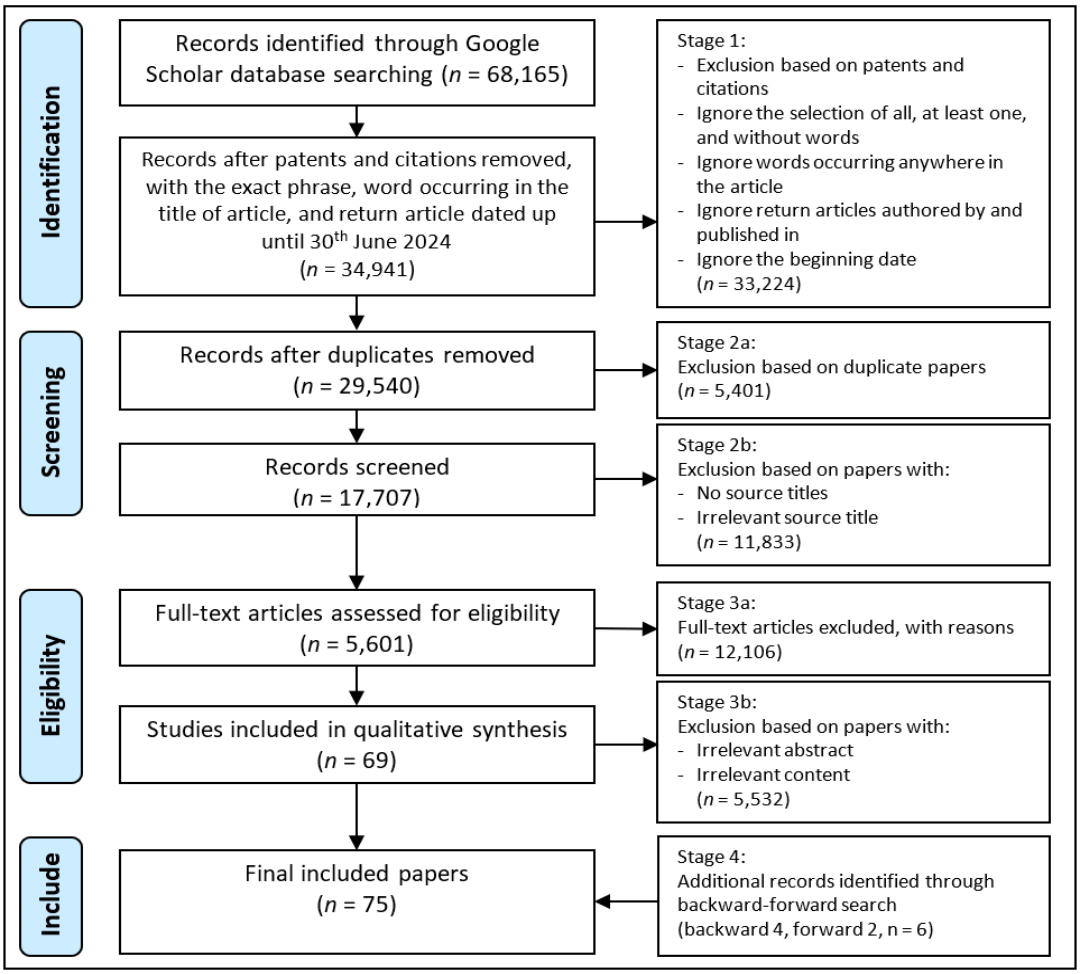

Fig. 1. The execution stages of the systematic literature review
(Source: adapted from Malek et al., (2021) and Moher et al., (2009))

3.0 Findings

The findings were structured in three sub-sections, i.e., the value of sustainable urbanisation, which explains the components of constructing sustainable urbanisation, and the smart and healthy cities.

3.1 The value of sustainable urbanisation

The three core values, namely economic, environment and social, remain important in shaping sustainable urbanisation for future generations (UN-Habitat, 2020). The economic value of sustainable urbanisation emphasises inclusive prosperity and opportunities for all; the environmental value prioritises building resilient urban development; while the social value of sustainable urbanisation stresses leaving no one and no place behind. Other than the above three values, the fourth value of institution and culture, considered to provide the superstructure of sustainable urbanisation and the lifeblood of vibrant urban areas, is coined as Intangible and Cultural Values (ICVs).

The concept of ICVs includes established institutions – a constitution, laws, regulations, social norms, customs and traditions, and cultural diversity – creative expression, quality of cultural life, investments in culture preserve history and heritage, participation in publicly available arts and culture opportunities (UN-Habitat, 2020). Orlove et al. (2022) relate the value of the institution and culture to preserving cultural heritage that is significant yet ignored in preserving the urban identity. The institutions, such as the state actors, have the power to form policy and implementation. However, the state actors' resources have limitations, and besides the public private partnership (PPP), other scholars, i.e. Kummitha and Crutzen (2017), and Lim et al. (2021) are advocating to cultivate the community's contribution and enhancing their participation in government initiatives and projects. Practising tolerance and community understanding, as well as collaborative and participatory governance with non-state actors, will shape a transparent governance system and coherent urban policy that ensures the economic, social, and environmental values are created through the process of urbanization.

3.2 Smart cities

For smart city topics, this is the most popular topic among the search (de Jong & Lu, 2022; Mora et al., 2017). Two overarching schools of thought in understanding smart city development are technology-driven and human-driven methods (Kummitha and Crutzen, 2017). The technology-driven method is dominant in practice where smart instruments, i.e., IoT technologies, smart infrastructure, smart

citizens, and data analytics, are viewed as innovative solutions to tackle urban problems (De Nicola & Villani, 2021). However, from a human-driven method perspective, the holistic concept of a smart city includes six elements, namely smart economy, government, people, living, environment, and mobility, which are widely accepted and applied in many countries smart city blueprint and action plans (Giffinger et al., 2007; Lim et al., 2021). The holistic view is crucial under the 4IR (fourth industrial revolution) that stresses the cyber-physical ecosystem (Cassandras, 2016), efficient resource management and enhancing the resilience of the community (Okonta & Vukovic, 2024).

The cyber-physical ecosystem emphasises the balanced application of emerging technologies that permeate across digital (i.e., AI, IoTs, cloud computing and BDA, and blockchain), biological (i.e., neurotechnology, synthetic biology, bioprinting, and genetics) and physical space (i.e. autonomous vehicles, advanced robotics, advanced materials, and 4/5D printing) (Economic Planning Unit, 2021). In other words, this cyber-physical ecosystem and infrastructure impacts all aspects of smart city spaces and human life. However, digital divides could be created if the technologies are unevenly deployed or too market-driven. Urban policy should always stress human-centred development. Civic and local technological innovation should be encouraged for long-term urban and neighbourhood-level resilience and sustainability (Cassandras, 2016; Malek, et al. 2021, UN-Habitat, 2020).

3.3 Healthy cities

For the healthy city, this topic is older than the smart city. From the 1990s to the early 2000s, the World Health Organization (WHO) popularly propagated the healthy city. Worldwide alliances for healthy cities were active at that time, even today. For example, according to the Alliance for Healthy Cities website, about 174 participating member cities are from Southeast Asian countries, China, Korea, Japan and Australia (Alliance for Healthy Cities, n.d.). The World Health Organization (WHO) Awards for Healthy Cities has been organised since 2004. City in Malaysia, such as Kuching, and in Australia, such as Illawarra, received the 2004 WHO Healthy Cities Awards for their outstanding track record in improving quality of life through the Healthy Cities approach (Alliance for Healthy Cities, n.d.). Thus, the healthy city is considered an evergreen (but less attractive) topic only until the recent COVID-19 pandemic, this topic has returned to the world's attention, and the smart healthy city literature is proliferating (Buttazzoni et al., 2020; Corsi et al., 2022).

Besides the sudden attack of the pandemic, recent attention to levels of physical activity, mental health, obesity, asthma and increasing environmental inequality has put planning back on the urban health agenda. The more seminal reference has to be traced back to Barton and Grant (2006)'s healthy city map, which stresses three major components, i.e., global ecosystem, climate stability, and biodiversity. The global ecosystem consists of the outer layers of the natural environment, built environment, and (human) activities, to the inner layers of local economy, community, and lifestyles centred on people of all ages, genders, and hereditary factors. Climate change/ stability is of great concern where natural habitats should be harmonised with man-made buildings, places, and activities such as living, learning, work and play while not compromising human intervention of wealth creation in the natural world and the manner of development activity in our built environment. In such a healthy ecosystem, biodiversity must be balanced by considering air, water, and land qualities and designing streets and routes with natural-based solutions (Barton and Grant, 2006; UN-Habitat, 2020).

A more recent study by Thompson et al. (2023) stresses the importance of health-supportive behaviours and the need to provide a supportive environment and reduce risk factors for disease. They offered two examples of integrating smart infrastructures in detecting human social health-related activities in Sydney and Kogarah, Australia public spaces. In the case of Sydney, the Healthy Living Hardware (HLH) poles (free-standing, multi-functional, human-scale smart poles aiming to improve public facilities and digital infrastructure) were installed in urban plaza and urban park. They conducted detailed behaviour mapping to investigate the HLH Poles, which provided opportunities to support healthy living in social spaces. The authors consider Thompson et al. (2023)'s preliminary study as a potential example to explore expanding human public health behaviour tracking through innovative technology in urban spaces.

4.0 Discussion

From the findings above, there are three domains to build the SSH framework, namely, 1) economy, environment, social, and institutional and cultural values (ICVs) in sustainable urbanisation centred on tolerance and community understanding, 2) smart urban cyber-physical ecosystem that stresses on the balanced technology application in the physical, biological, and digital realms, and 3) health and well-being supportive environment with emphasising human health behaviour tracking through technological innovation. Although the literature on social space is scarce, the role of social spaces is emerging to be prominent as cities are getting denser, and democratising the public social space will benefit all citizens, including vulnerable groups (Del-Real et al., 2021; Thompson et al., 2023; UN-Habitat, 2020). In other words, the imagined future SSH social spaces should have equity opportunities for all to access – inclusivity (Sugandha et al., 2022).

From a case study in Australia, healthy social spaces in urban areas can be created and demonstrated through three elements, namely observation of the pandemic outbreak (greater use of local environments, epidemic of loneliness, social isolation and mental health), green and paved open space (increasing importance in densifying cities), and smart social space projects such as health and ageing supportive infrastructure (Thompson et al., 2023). This is a good example of combining smart technology development and promoting healthy cultural preservation through citizen's contribution and framed under participatory governance (Alves, 2019; Lim & Yigitcanlar, 2022). Under this participatory governance framing, developing collaborative planning practices and emphasis on social capital are areas to be explored (i.e., Zhou et al., 2024). In summarising the findings, the authors form the SSH framework through two layers of thought: layer one on conceptual framing and layer two on implementation (see Fig. 2). Layer one is more to setting the architecture of sustainable-smart-healthy cities, while layer two is towards realising the ideal state through demonstration in public spaces, considering the impact of pandemic outbreaks, and deployment of smart social space projects.

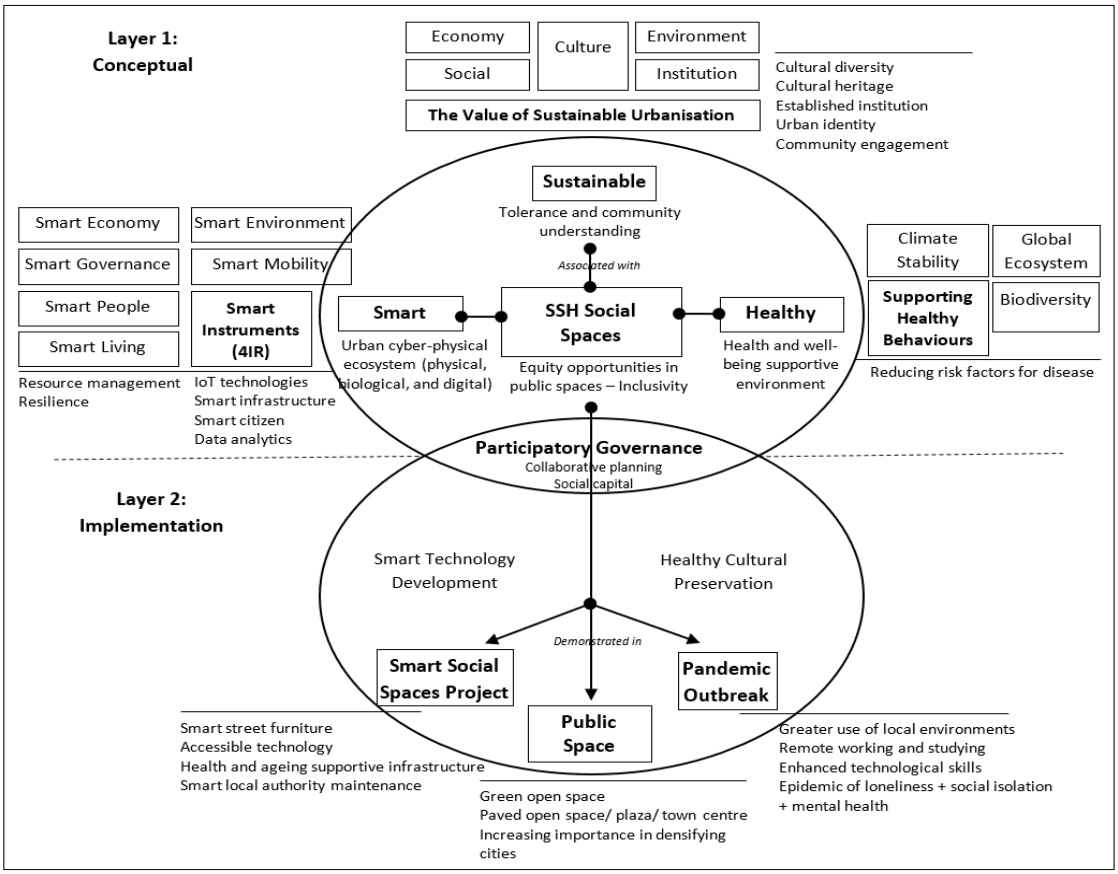

Fig. 2. The sustainable-smart-healthy (SSH) development framework for urban social spaces

(Source: Adapted from Barton and Grant (2006), Giffinger et al. (2007), Lim and Yigitcanlar (2022), Sugandha et al. (2022), Thompson et al. (2023), and UN-Habitat (2020))

5.0 Conclusion

Through the systematic literature review methodology, important themes were constructed, i.e., integrating intangible and cultural values (i.e., institution and cultural diversity) from sustainable urbanisation, smart instruments from the smart city, and supporting healthy behaviour from the healthy city. Findings revealed that cultural heritage significantly influences urban identity and community engagement, while urban cyber-physical ecosystems enhance resource management and resilience. Additionally, smart instruments facilitate data-driven decision-making, optimising urban services and improving health outcomes. The proposed SSH framework provides a holistic approach to conceptual and implementation layers, addressing the shortcomings of previous sustainable development frameworks that focused primarily on economic, social, and environmental dimensions. With the basis of understanding layer one of those foundation conceptual ideas, i.e., associating the concepts of sustainable urbanisation, smart and healthy cities, implementing layer two would make sense through demonstration in smart (public) social spaces projects that considering potential pandemic outbreaks. Participatory governance is viewed as the heart of this SSH framework, which enables and dedicates a balance between smart technology development and healthy cultural preservation for SSH development implementation. Despite the formulation of the SSH framework, this study is limited to a single database selection that future studies could integrate another scientific platform such as Web of Science and Scopus. Besides, possible biases in the selected literature and the exclusion of non-English sources may restrict the findings' comprehensiveness and need further empirical testing on the proposed framework.

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Paper Contribution to Related Field of Study

This study has contributed to the existing sustainable development body of knowledge in conceptualising the sustainable-smart-healthy nexus by integrating intangible and cultural values, urban cyber-ecosystem, smart instruments, participatory governance and healthy-cultural sensitivity in developing sustainable future urban environments.

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