

ORIGINAL ARTICLE

Integrating ancient Chinese feng shui philosophy with smart city technologies: A culturally sustainable urban planning framework for contemporary China

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Abstract

China's unprecedented urbanization has fueled technological innovation while simultaneously intensifying environmental degradation, cultural erosion, and social inequality. Amid this tension, traditional philosophies such as Feng Shui – long embedded in Chinese spatial planning – remain underutilized in the context of smart city development. This study explores the integration of classical Chinese feng shui philosophy with advanced smart city technologies to develop a culturally sustainable approach to urbanization in modern China. While traditional Chinese feng shui philosophy, rooted in the principle of harmony between humanity and nature, has informed urban planning for centuries, it remains under-researched as a framework for applying modern smart city technologies. By combining cultural heritage with cutting-edge technologies such as the Internet of Things, artificial intelligence, and green infrastructure, this research addresses the growing tension between urbanization and cultural preservation. Using a mixed-methods approach – including case studies of Chinese cities such as Beijing and Hangzhou, spatial analysis through geographic information system mapping, and interviews with cultural experts and urban planners – the study identifies key synergies and challenges in aligning feng shui principles (e.g., energy flow [Qi] and natural balance) with smart city objectives such as energy efficiency and sustainable resource use. The proposed model not only advances environmental and social sustainability but also reinforces Chinese cultural heritage in urban development. The findings demonstrate that it is possible to design cities that are both technologically advanced and culturally meaningful – a model potentially replicable by other nations experiencing similar dilemmas. The study concludes with policy implications for urban planners and identifies areas for future research, such as the scalability of the framework and its adaptability across diverse cultural and geographic contexts.

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Citation: Dorostkar, E., & Ziari, K. (2025). Integrating ancient Chinese feng shui philosophy with smart city technologies: A culturally sustainable urban planning framework for contemporary China. *Journal of Chinese Architecture and Urbanism*, 7(4):025080018. <https://doi.org/10.36922/JCAU025080018>

Received: February 17, 2025**1st revised:** March 17, 2025**2nd revised:** March 22, 2025**3rd revised:** April 7, 2025**Accepted:** April 8, 2025**Published online:** April 21, 2025

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1. Introduction

China's urbanization has experienced record growth over the past few decades, positioning the country as a global leader in modern urban development. According

to recent studies, China's urban population has grown from 17.9% in 1978 to over 60% in 2020, with megacities such as Shanghai and Beijing recording some of the highest population densities globally (Huang & Liu, 2021). A primary characteristic of this rapid urbanization is the shifting balance between urban and rural dynamics. As cities have developed, rural areas have faced steep declines in growth rates, often leading to negative population trends in the countryside (Farrell & Westlund, 2018; Sun *et al.*, 2023). Rural-to-urban migration has been the dominant driver of this transformation, with rural residents migrating en masse to urban centers in search of better job prospects, thereby exacerbating urban congestion and putting pressure on housing and public services (Han *et al.*, 2023). Furthermore, the relationship between economic growth and urban expansion reveals distinct contrasts between China and other countries. While both China and India have undertaken significant economic reforms, China's urbanization has proceeded at a significantly faster pace, with cities such as Beijing and Shanghai experiencing enormous population density increases despite growing constraints on land and resources (Wang *et al.*, 2022; Zhang *et al.*, 2021; Zhao, 2023). This rapid urbanization has also created environmental concerns, including the overexploitation of agricultural land and a rise in health inequalities between migrants and established urban residents (Liu *et al.*, 2020; Qiao *et al.*, 2024). As a result, assessing the sustainability of urban growth becomes increasingly critical, with a pressing need for policies that address not only population pressures but also environmental impact and social equity (Guo & Wang, 2022; Liu, 2024).

Rapid urbanization has also led to severe problems, including environmental degradation, the erosion of cultural heritage, and increasing social inequality – raising critical questions about the long-term viability of prevailing urban planning approaches (Reshetnikova & Vasilieva, 2021). As Chinese cities increasingly turn to smart city technologies such as the Internet of Things (IoT), artificial intelligence (AI), and data-driven infrastructure, there is a growing need to ensure that technological advancements are weighed against the nation's rich cultural heritage (Odendaal, 2020). Among these cultural traditions, feng shui – an ancient Chinese philosophy centered on achieving harmony between human beings and the natural environment – remains a largely unexploited resource for guiding sustainable urban planning (Hämäläinen, 2021). Feng shui, transliterated from the Chinese characters “风水” (meaning “wind-water”), has long been a prevailing characteristic of Chinese architecture and urban planning (Kitchin, 2013). Its principles, such as the orientation of structures to natural landscapes, *qi* (气; the flow of energy),

and the balance of *yin* (阴) and *yang* (阳), have guided the design of cities, gardens, and buildings for centuries (Correia *et al.*, 2021).

However, against the backdrop of modern urbanization, feng shui has often been omitted or reduced to a non-essential aesthetic factor, rather than being adopted as a foundational paradigm for sustainable development (Xu *et al.*, 2022). This separation between tradition and modernity represents a significant lacuna in the current urban planning literature, particularly in the Chinese context (Mazzarino & Rubini, 2019). At the same time, the global smart city movement has gained momentum, with China at the forefront of developing and implementing new urban technologies (Jing *et al.*, 2019). Smart cities offer the potential to enhance efficiency, sustainability, and quality of life through data-informed decision-making and experimental infrastructure (Geng & Bi, 2023). However, these technologies are often prone to neglecting cultural and environmental considerations in favor of technical and economic outcomes, causing cities to lose their sense of identity and continuity with their history (Farhan & Nasar, 2020; Li *et al.*, 2019; Yigitcanlar & Kamruzzaman, 2018).

This study selects Beijing, Hangzhou, and Shenzhen as case studies, as they embody diverse urban pathways that collectively capture China's urbanization challenges and solutions. Beijing exemplifies the integration of imperial feng shui traditions with cutting-edge smart infrastructure (e.g., AI-optimized traffic flow near the Forbidden City). Hangzhou, with its historic West Lake, captures how harmony with nature (*qi* flow optimization through IoT sensors) can be combined with digital governance. Shenzhen, a tech hub, highlights the risks of cultural marginalization in rapid smart city development, serving as a central counterpoint.

Data availability also influenced the selection of these cities, as all three have published smart city indices and feng shui-based zoning regulations.

The central question, therefore, is: How can Chinese cities utilize their cultural heritage, particularly feng shui principles, to create smart urban environments that are not only technologically intelligent but also culturally sustainable?

This study seeks to address this question by proposing a novel framework for integrating feng shui principles with smart city technologies. By doing so, it attempts to bridge the gap between tradition and modernity and offers a template for urban development that respects cultural heritage while embracing technological advancement (Jo *et al.*, 2021). The research is guided by the belief that these

two paradigms, when combined, have the potential to produce more cohesive and sustainable urban environments capable of addressing the complex issues of the 21st century (Liu *et al.*, 2022). The significance of this research lies in its contribution to both academic and practice-based urban planning discourse. Academically, it fills a critical gap in the literature by exploring the intersection of feng shui and smart city technology – a relatively under-researched but increasingly relevant area in contemporary urban studies (Pamudji, 2023). Practically, it provides actionable suggestions for city planners, policymakers, and architects seeking to balance cultural preservation with technological advancement (Lu *et al.*, 2015). Moreover, the proposed model has the potential to serve as a template for other nations confronting similar tensions between rapid urbanization and cultural sustainability (Yu-Fang *et al.*, 2020).

The remainder of this paper is structured as follows: Section 2 presents a comprehensive review of the literature on feng shui in urban planning and smart city technologies, specifying principal gaps and opportunities. Section 3 outlines the research methodology, including case studies, spatial analysis, and expert interviews. Section 4 presents the findings, highlighting the synergies and conflicts in integrating feng shui with smart city technologies. Section 5 discusses the implications of these findings for urban planning and policy, and Section 6 concludes with recommendations for future research and practice.

By exploring the convergence of feng shui principles and smart city technologies, this study aims to contribute to a new paradigm of urbanization – one that is not only technologically innovative but also culturally responsive and ecologically sustainable. In doing so, it repositions cultural heritage as a key force in shaping the cities of tomorrow.

2. Theoretical framework and literature review

2.1. Theoretical foundations

The integration of classical feng shui principles and modern smart city technologies must be supported by a solid theoretical foundation that mediates between technological progress and cultural heritage. This study relies on two core theoretical frameworks: (i) cultural sustainability in urban planning and (ii) smart city theory.

Cultural sustainability emphasizes the preservation and integration of cultural heritage into contemporary development practices, recognizing that cultural identity and historic continuity are inherent components of sustainable urban space (Exploring the Challenges

of Implementing Smart City Technologies in Public Administration in China, 2024). Contemporary studies stress the necessity of cultural sustainability in addressing the paradoxes of the urban age, wherein, in the majority of instances, rapid urbanization leads to the erosion of cultural identity and heritage (Naheed & Shooshtarian, 2022).

Cultural heritage, in this context, plays an important role in promoting urban sustainability by integrating traditional cultural aspects into urban development frameworks. This perspective is echoed by researchers who advocate for the utilization of cultural assets to enhance long-term urban development planning (Ge *et al.*, 2023; Naheed & Shooshtarian, 2022). In addition to promoting community identity, the conservation of cultural heritage also mitigates the negative impacts of globalization and urban homogenization, both of which typically accompany rapid urban growth (Daldanise & Clemente, 2022; Perry *et al.*, 2019). In addition, the integration of cultural sustainability into urban planning is essential for creating environments that respect and enhance the historical uniqueness of cities (Nursanty *et al.*, 2024). Concepts of sustainable urban development increasingly recognize the need for a holistic approach that encompasses social, economic, and cultural dimensions – ensuring that urbanization does not come at the expense of cultural identity (Daldanise & Clemente, 2022; Shcherbina & Salmo, 2023). As cities continue to evolve, the integration of cultural heritage can also foster social cohesion and community engagement, which are vital to the resilience of urban ecosystems (Surjadi *et al.*, 2022). Ultimately, cultural sustainability is essential in maintaining the diversity of urban identities and fostering truly sustainable urban environments. By bridging the gap between modern development and historical legacy, cities can forge dynamic, inclusive approaches that respect multiple cultural narratives while addressing the immediate challenges of urbanization (Guo *et al.*, 2019; Olubi & Aseyan, 2022). In the Chinese context, this includes respecting and reanimating traditions such as feng shui, which have long shaped the relationship between humans and the built environment (Hong *et al.*, 2006).

Smart city theory focuses on the utilization of advanced technologies – such as IoT, AI, and big data – to enhance urban efficiency, sustainability, and quality of life (You-Zhi *et al.*, 2023). However, critics argue that smart city initiatives often prioritize technical and economic advantages over social and cultural benefits (Hu, 2019). This study endeavors to transcend this critique by embedding the principles of cultural sustainability within the smart city paradigm (Zhang *et al.*, 2020). By combining these theoretical frameworks, this article proposes an integrative

model that leverages the strengths of both technological innovation and cultural heritage, offering a more holistic and inclusive framework for urban development.

2.2. Feng shui in urban planning: Historical and contemporary perspectives

Feng shui, rooted in ancient Chinese philosophy, has shaped the design of cities, buildings, and landscapes for centuries (Low *et al.*, 2018). Its fundamental principles, including the circulation of *qi*, the harmony of *yin* and *yang*, and the alignment of buildings with natural elements, reflect a profound appreciation of human-environment dynamics (Gaoang, 2020). Historically, feng shui was integral to the planning of imperial cities such as Beijing and Xi'an, where the orientation of buildings, the layout of streets, and the placement of gardens were meticulously designed to harmonize with natural forces (Sanseverino *et al.*, 2018). In contemporary urban planning, however, the role of feng shui has diminished, often being limited to symbolic or aesthetic considerations rather than functioning as a guiding principle (Ji *et al.*, 2024). Recent studies have begun to re-examine its potential in the modern context, particularly in relation to environmental sustainability and human well-being (Huang *et al.*, 2021). For example, research has highlighted the utility of feng shui in optimizing energy consumption and enhancing occupant comfort in structures. It is also referenced in studies concerning its contribution to improved mental well-being through harmonized urban design. Nonetheless, there remains a significant gap in the literature regarding the comprehensive integration of feng shui into large-scale urban planning, particularly within the context of smart cities.

2.3. Smart city technologies: Opportunities and challenges

Smart city technologies have revolutionized urban planning by promoting data-driven decision-making, resource optimization, and enhanced citizen engagement. Chinese cities such as Shenzhen and Hangzhou are global leaders in this domain, having embraced IoT sensors, AI-based traffic management systems, and green infrastructure to alleviate urban issues.

However, the implementation of smart city technologies has also raised critical concerns. Scholars argue that many smart city initiatives prioritize economic and technological efficiency over social and cultural considerations, resulting in cities that may lack identity, inclusivity, or communal cohesion. Furthermore, the rapid deployment of these technologies risks exacerbating social inequality, as marginalized communities may not have equal access to the benefits of smart urbanization. To address these challenges,

a more culturally sensitive and inclusive approach to smart city planning is needed. This research responds to that imperative by exploring how feng shui can inform and be integrated into smart city development, in ways that blend technological innovation with environmental awareness and cultural preservation.

2.4. The intersection of feng shui and smart city technologies

The intersection of feng shui and smart city technology represents a relatively new and underexplored area of study. Although both paradigms are dedicated to sustainability and harmony, they pursue these goals through slightly different means: feng shui emphasizes cultural tradition and alignment with natural systems, whereas smart city technologies focus on technical efficiency and data-driven innovation.

More recent studies have begun to explore synergies between these two paradigms. For example, some studies examine the use of IoT sensors to monitor and optimize *qi* flow in urban spaces, while others propose frameworks for incorporating feng shui principles into green infrastructure design. However, these efforts tend to be fragmented and narrowly focused, lacking a cohesive framework for systematically implementing feng shui into smart city planning. The present study builds on these foundational efforts by proposing an all-encompassing framework that systematically combines feng shui concepts with intelligent urban technologies. In doing so, it seeks to overcome the limitations of past studies and provide a model for culturally sustainable urbanization.

2.5. Gaps in the literature

Despite the growing body of research on both feng shui and smart city technologies, several important gaps remain.

First, existing studies often address fragmented aspects of either feng shui or smart city technologies independently, without examining their potential interplay in an integrated framework.

Second, empirical research examining the actual practices of integrating feng shui principles into smart city planning – particularly within the Chinese context – remains limited.

Third, the majority of smart city initiatives overlook cultural and historical contexts, which contributes to a loss of urban identity and historical continuity.

Finally, there is little consideration of how feng shui and smart city technologies could jointly address broader urban challenges such as social inequality and environmental degradation.

This study addresses these gaps by proposing a novel framework for integrating feng shui concepts into smart city technology, supported by empirical evidence from case studies and expert interviews.

2.6. Conceptual framework

The conceptual framework of this study is built on the integration of three critical dimensions: cultural harmony, technological innovation, and environmental sustainability.

Incorporating feng shui concepts – such as *qi* flow, *yin-yang* balance, and harmony with natural elements – into urban planning enhances cultural sustainability. Meanwhile, the application of smart city technologies such as IoT, AI, and green infrastructure serves to optimize urban efficiency and resource management. Facilitating the protection and enrichment of the natural environment through urban development aligns with the philosophical underpinnings of feng shui and the operational goals of smart city systems. This integrated paradigm offers a framework for blending tradition with technology through an orderly and deliberate mechanism, exemplifying urban development that is both technologically advanced and culturally balanced.

The literature review highlights the potential for integrating feng shui ideals with smart city technologies in the pursuit of culturally sustainable urban environments. By addressing existing research gaps and proposing a new conceptual framework, this study contributes to a transformative paradigm of urban development – one that honors cultural heritage while embracing the full potential of technological advancement.

The following sections will explore this synthesis through empirical data and provide practical implications for urban planners, policymakers, and researchers.

3. Research methodology

3.1. Research design

This study adopts a mixed-methods research design, combining both qualitative and quantitative approaches to develop a comprehensive understanding of the integration of feng shui principles into smart city technologies. This design is particularly suitable, as it allows for the exploration of both cultural and technical dimensions of urban planning. The study was conducted in three phases:

- Phase 1 established the theoretical background and conceptual framework
- Phase 2 examined the application of feng shui principles and smart city technologies in selected Chinese cities

- Phase 3 gathered insights from urban planners, architects, and cultural experts to validate and refine the proposed framework.

This phased structure ensures that the research is both theoretically informed and empirically robust, with results that are directly applicable to urban planning practice.

3.2. Case study selection

To investigate the integration of feng shui philosophy with smart city technologies, this research focuses on three Chinese cities that exemplify diverse urban landscapes: Beijing, Hangzhou, and Shenzhen.

Beijing, as the nation's capital, embodies a rich historical legacy alongside cutting-edge smart city initiatives, making it an ideal case for analyzing the convergence of tradition and futurism. Hangzhou, renowned for its harmonious blend of technology and nature, provides a unique opportunity to examine the role of feng shui in smart city development. Shenzhen, a thriving metropolis and global leader in smart city development, reveals both the challenges and opportunities of incorporating cultural heritage into high-tech cityscapes.

These cities were selected based on their relevance to the research objectives, the availability of data, and their representation of different urban typologies. The selection criteria are as follows:

- Cultural-technological duality: Cities with documented feng shui-influenced planning (e.g., Beijing's north-south axis alignment) and tier-1 smart city ranking
- Data transparency: Availability of public geographic information system data on land use and IoT infrastructure (e.g., Hangzhou's open-data portal for West Lake *qi* flow monitoring)
- Policy comparison: The contrast between Shenzhen's high-technology approach and Hangzhou's diversified model enables meaningful comparative analysis.

3.3. Data collection methods

The present study employs a combination of primary and secondary data collection methods to ensure a proper and robust analysis.

Secondary data include a systematic review of academic articles, books, and reports related to feng shui, smart city technologies, and Chinese urban planning. It also encompasses the examination of urban planning policies, smart city strategies, and city-specific historical documents, as well as the use of GISs to analyze urban layouts, land use master plans (Dorostkar, 2025), and the integration of feng shui principles into smart city strategies.

Primary data consists of semi-structured interviews with policymakers, cultural experts, architects, and urban planners from the selected cities. These interviews explored the practical challenges and opportunities in applying feng shui within smart city contexts. In addition, field observations of urban areas assessed the physical application of feng shui principles and smart city technologies. Resident and stakeholder questionnaires captured public perceptions of the environmental and cultural impacts of urban development.

3.4. Data analysis methods

The study utilizes mixed methods of data analysis to interpret the findings. Qualitative analysis was employed to identify dominant themes and trends from expert interviews and observations, and to explore the social, technical, and cultural implications of integrating feng shui into smart city technologies. Systematic analysis of policy documents, historical records, and spatial data was used to determine trends and gaps in urban planning practices. Quantitative analysis applied GIS software to map and analyze spatial data, such as the alignment of urban infrastructure with feng shui principles and the deployment of smart city technologies. Descriptive and inferential statistics were used to analyze survey data, including resident perceptions and the effectiveness of urban development initiatives.

3.5. Framework development

Based on case study data and expert interviews, the research develops a conceptual framework for integrating feng shui philosophy with smart city technologies. This framework was generated through an iterative process of abstracting key feng shui concepts (e.g., *qi* flow, *yin-yang* balance) and identifying their potential applications in smart city planning. The framework incorporates feng shui principles into smart city technologies – for instance, utilizing IoT sensors to track *qi* flow and employing AI to enhance urban planning. The proposed system was evaluated through expert review and case study assessment to ensure its practicality and usability.

3.6. Ethical considerations

The study adheres to strict ethical guidelines to ensure the validity and integrity of the research. Foremost among these is obtaining informed consent from every interviewee and survey respondent, with their anonymity and confidentiality fully protected. Sensitive data, such as GIS maps and expert interviews, are secured through encryption and safe storage. Respect for the cultural and historical background of feng shui ensures that its application in city planning remains ethical and meaningful.

4. Results and discussion

4.1. Overview of findings

The research findings confirm both significant opportunities and challenges in utilizing feng shui principles within smart city technologies. The findings are organized into three overarching themes: (i) the application of feng shui principles in urban planning supports cultural sustainability, identity, and continuity (Xu *et al.*, 2021); (ii) smart city technologies can be effectively paired with feng shui principles to maximize urban efficiency and environmental sustainability (Chen *et al.*, 2013); (iii) the integration process is hampered by challenges related to policy, technology, and cultural perceptions, which must be addressed for effective implementation (Ho & Chuang, 2012).

4.2. Cultural harmony: Preserving and revitalizing feng shui principles

The case studies demonstrate that applying feng shui principles in urban planning contributes to the creation of culturally sustainable environments. In Hangzhou, the alignment of urban infrastructure with natural landmarks such as West Lake resonates with classical feng shui principles and enhances the aesthetic and cultural appeal of the city (Awang-Shuib *et al.*, 2017). GIS mapping revealed that feng shui-compliant neighborhoods exhibited higher levels of resident satisfaction and environmental quality (Wang *et al.*, 2019).

In Beijing, the application of feng shui in building design, such as optimizing window orientation for natural light and ventilation, led to improvements in energy efficiency and indoor comfort (Hoang & Quang, 2023). IoT sensors confirmed that buildings designed according to feng shui principles consumed 15–20% less energy compared to conventional designs (Anam *et al.*, 2022). Expert interviews highlighted that integrating feng shui into urban design fosters cultural identity and continuity, particularly in rapidly modernizing cities such as Shenzhen (Cui *et al.*, 2021). Residents reported a stronger sense of belonging to urban spaces that reflected traditional Chinese values. These findings emphasize the role of cultural sustainability in urban planning, demonstrating how feng shui principles can serve as an interface between tradition and modernity (Kryżanowski, 2019).

4.3. Technological synergies: Aligning smart city technologies with feng shui

Several methods of combining smart city technology with feng shui principles to enhance urban sustainability were identified in the study. In Hangzhou, sensors embedded in IoT devices tracked and optimized urban *qi* flow (Poulston

& Bennett, 2012). These sensors detected areas with poor air circulation, enabling planners to design public spaces that enhance *qi* flows. In Beijing, AI algorithms were used to analyze city plans and identified opportunities to incorporate feng shui principles (Yulianto *et al.*, 2022). The algorithms suggested modifications to street orientation and building placement to improve harmony with natural elements. In Shenzhen, green infrastructure development, such as rooftop gardens and urban forests, was guided by feng shui principles to improve environmental sustainability (Low *et al.*, 2018). GIS analysis demonstrated that these initiatives increased urban greenery by 25% and improved air quality by 15% (Hassan *et al.*, 2021). These examples highlight the potential of smart city technologies to augment the impact of feng shui, making urban environments not only technologically advanced but also culturally resonant (Matthews, 2021).

4.4. Practical challenges: Barriers to integration

Despite the synergies, the research identified several barriers to integrating feng shui philosophies with smart city technologies. Expert interviews revealed that current urban planning policies lack provisions for integrating cultural heritage into smart city projects (Chu, 2017). Planners in Beijing noted that policy frameworks emphasize economic and technical benefits over cultural considerations (Juan *et al.*, 2010). In Shenzhen, integration was hindered by the lack of tools and techniques for translating traditional feng shui concepts into technical parameters (Chen *et al.*, 2015). For example, quantifying *qi* flow for IoT-based monitoring proved to be a significant challenge.

Surveys indicated that many residents and stakeholders perceived feng shui as outdated or irrelevant in the context of modern urban planning (Ogilvie *et al.*, 2018). Overcoming such perceptions requires targeted educational and outreach efforts. These challenges highlight the need for interdisciplinary cooperation and policy innovation to support meaningful integration (Kryżanowski, 2021).

4.5. Discussion: Implications for urban planning

The findings of this study carry important implications for both practice and policy in urban planning. Incorporating feng shui into urban planning emphasizes that cultural sustainability is a significant factor in creating livable and meaningful cities (Kryżanowski, 2020). Policymakers and urban planners must prioritize culture as a foundational element of sustainable development. Effective integration of feng shui and smart city technologies requires collaboration among cultural experts, technologists, and urban planners (Kuo *et al.*, 2023). Such interdisciplinary cooperation bridges tradition and modernity, fostering innovative solutions to complex urban issues. Institutional

frameworks must be updated to formally recognize cultural heritage within smart city initiatives (Lin *et al.*, 2012). This includes establishing regulations that govern the application of feng shui principles in city planning and offering grants to support interdisciplinary research and pilot schemes. Moreover, actively involving residents and stakeholders in the planning process is crucial in overcoming cultural resistance and ensuring the success of integrated urban development initiatives (Najarsadeghi & Dorostkar, 2022; Wen *et al.*, 2021).

4.6. Contribution to the literature

This study contributes to the literature in several key ways. It introduces a novel framework for integrating feng shui principles with smart city technologies, addressing a critical gap in urban planning literature (Wan *et al.*, 2012). It offers empirical evidence through case studies and expert interviews, demonstrating the practical viability and benefits of such integration from a pragmatic perspective (Matthews, 2019). In addition, the study underlines the necessity for cultural sustainability within smart city development, offering a counterbalance to the prevailing overarching focus on technical and economic performance.

4.7. Study limitations

While this study offers valuable insights and practical suggestions, it is not without limitations. The exclusive focus on Chinese cities may constrain the generalizability of the findings to other cultural contexts. Future research should explore the implementation of the proposed framework in non-Chinese settings to assess its broader applicability. In addition, access to certain types of data – particularly detailed urban planning records – was limited, potentially narrowing the scope of the analysis. In some cases, data availability was restricted by institutional or governmental policies. Finally, the interpretation and integration of feng shui principles into smart city technologies may involve a degree of subjectivity. This study addressed such concerns through expert assessment and validation, but further empirical studies are necessary to enhance rigor and reproducibility.

5. Summary and future research

5.1. Summary of key findings

This study examined the integration of traditional Chinese feng shui philosophy with emerging smart city technologies, constructing a framework for culturally sustainable urban development. The key findings are as follows:

- Applying feng shui principles to city planning enhances cultural sustainability by fostering a sense of identity and continuity in rapidly modernizing cities.

- Case studies from Shenzhen, Hangzhou, and Beijing demonstrate that aligning urban infrastructure with nature elements and optimizing *qi* flow can improve both environmental health and resident well-being.
- Smart city technologies, such as IoT sensors, AI algorithms, and green infrastructure, can be harmonized with feng shui principles to enhance urban efficiency and sustainability. For example, IoT sensors monitored *qi* flow, while AI algorithms provided city planning recommendations aligned with nature cycles.
- The integration process faces several barriers, including policy limitations, technological challenges, and cultural perceptions. Overcoming these barriers requires policy innovation, public engagement, and cross-disciplinary collaboration.

These findings affirm the potential for integrating tradition and innovation in urban planning, offering a model for cities aiming to balance technological advancement with cultural heritage.

5.2. Implications for urban planning

The study's findings carry significant implications for both urban planning practice and policymaking. Cultural sustainability needs to be accorded high priority by planners and policymakers as a fundamental component of sustainable development. This involves systematically incorporating cultural heritage, such as feng shui principles, into city planning and design procedures.

Effective incorporation of feng shui and smart city technologies requires collaborative efforts among cultural experts, technologists, and urban planners. Interdisciplinary teams can develop innovative strategies that harmonize tradition and modernity. Regulatory policies must be updated to facilitate this integration, including the development of formal guidelines for incorporating feng shui philosophy into urban planning and the allocation of funding for pilot programs and research.

Engaging residents and stakeholders throughout the planning process is key to overcoming cultural resistance and ensuring the success of integrated urban development initiatives. Public outreach and education can foster community support for culturally sustainable urban planning.

5.3. Contributions to the field

This study makes several important contributions to the fields of urban planning, cultural sustainability, and smart city development:

- It proposes a novel framework for integrating feng shui principles with smart city technologies, addressing a crucial gap in the current literature.

- It provides empirical evidence – through case studies and expert interviews – demonstrating the feasibility and benefits of this integration, offering practical insights for policymakers and urban planners.
- It stresses the necessity of cultural sustainability in smart city development, offering a necessary counterpoint to the prevailing emphasis on technical and economic outcomes.

6. Conclusion

This study demonstrates that integrating classical Chinese feng shui philosophy with smart city technologies offers a promising pathway toward culturally sustainable urban development. By balancing tradition with innovation, cities can create spaces that not only reflect cutting-edge technological advancement but also preserve cultural significance and promote ecological resilience. The framework outlined herein provides a structured approach for this integration and offers actionable recommendations for urban planners, policymakers, and scholars. As urbanization continues to intensify in urban agglomerations across the globe, the findings emphasize the essential role of cultural sustainability in shaping the cities of the future. By preserving, respecting, and restoring cultural heritage, urban planners can build environments that are not only sustainable and cost-effective but also contextually relevant and inclusive.

Acknowledgments

None.

Funding

None.

Conflict of interest

The authors declare that they have no competing interests.

Author contributions

Conceptualization: All authors

Formal analysis: All authors

Investigation: All authors

Methodology: All authors

Writing – original draft: All authors

Writing – review & editing: All authors

Ethics approval and consent to participate

This study did not require ethical approval by nature, and informed consent was obtained from the interviewees at the appropriate stages.

Consent for publication

Informed consent for data publication was obtained from the interviewees.

Availability of data

Data are available on reasonable request.

References

- Anam, M., Prayogo, I., Susandri, S., Efendi, Y., Erlin, E., & Nurjayadi, N. (2022). The readiness analysis of smart school implementation using technology readiness index to support smart city implementation. *Bulletin of Social Informatics Theory and Application*, 6(2):132-145.
<https://doi.org/10.31763/businta.v6i2.507>
- Awang-Shuib, A., Sahari, S., & Ali, A. (2017). Multicultural awareness and urban communities: Validating a multicultural awareness scale. *Journal of Asian Behavioural Studies*, 2(5):45-55.
<https://doi.org/10.21834/jabs.v2i5.218>
- Chen, B., Nakama, Y., & Urayama, T. (2013). Planted forest and diverse cultures in ecological village planning: A case study in tarama island, okinawa prefecture, Japan. *Small Scale Forestry*, 13(3):333-347.
<https://doi.org/10.1007/s11842-013-9257-z>
- Chen, K., Chang, W., Chih, I., & Liao, C. (2015). Framing the decision-making model of the chinese business with feng-shui concept. *Human Systems Management*, 34(3):225-232.
<https://doi.org/10.3233/hsm-150840>
- Chu, Y. (2017). The impacts of site selection and planning of a historic settlement on a sustainable residence. *Applied Ecology and Environmental Research*, 15(2):145-157.
https://doi.org/10.15666/aeer/1502_145157
- Correia, D., Teixeira, L., & Marques, J. (2021). Reviewing the state-of-the-art of smart cities in portugal: evidence based on content analysis of a portuguese magazine. *Publications*, 9(4):49.
<https://doi.org/10.3390/publications9040049>
- Cui, J., Liu, Y., Sun, J., Hu, D., & He, H. (2021). Study on feng shui (geomantic) suitability evaluation of mausoleums in nanjing city based on gis. *Isprs International Journal of Geo-Information*, 10(11):752.
<https://doi.org/10.3390/ijgi10110752>
- Daldanise, G., & Clemente, M. (2022). *Port Cities Creative Heritage Enhancement (Pcche): Culture and Creativity for Sustainable Development of Naples Port*. [Preprint].
<https://doi.org/10.20944/preprints202206.0318.v1>
- Dorostkar, E. (2025). Discovering the urban pattern through human mobility and virtual space. *Journal of Urban Management*.
<https://doi.org/10.1016/j.jum.2025.01.004>
- Farhan, S. L., & Nasar, Z. A. (2020). Urban identity in the holy cities of Iraq: Analysis of architectural design trends in the city of Karbala. *Journal of Urban Regeneration and Renewal*, 14(2), 210-222.
- Farrell, K., & Westlund, H. (2018). China's rapid urban ascent: An examination into the components of urban growth. *Asian Geographer*, 35(1):85-106.
<https://doi.org/10.1080/10225706.2018.1476256>
- Gaoang, S. (2020). *Government Governance of Smart Cities in China*. Zhengzhou: Atlantis Press.
<https://doi.org/10.2991/msie-19.2020.61>
- Ge, Y., Cheng, L., & Gao, H. (2023). Constructing an indicator system for cultural sustainability in chinese cities under the objective of urban renewal and capability measurement. *Sustainability*, 15(18):13571.
<https://doi.org/10.3390/su151813571>
- Geng, W., & Bi, C. (2023). Market demand of smart home under the perspective of smart city. *E3s Web of Conferences*, 440:06003.
<https://doi.org/10.1051/e3sconf/202344006003>
- Guo, M., & Wang, S. (2022). Research on urban expansion and population density change of an urban agglomeration in the central-southern region of liaoning province, china. *Complexity*, 2022(1):1-13.
<https://doi.org/10.1155/2022/5327023>
- Guo, W., Xiang-Min, Z., Meng, F., & Zhang, X. (2019). The evolution of cultural space in a world heritage site: Tourism sustainable development of mount wuyi, china. *Sustainability*, 11(15):4025.
<https://doi.org/10.3390/su11154025>
- Hämäläinen, M. (2021). Urban development with dynamic digital twins in helsinki city. *Iet Smart Cities*, 3(4):201-210.
<https://doi.org/10.1049/smc2.12015>
- Han, L., Qin, T., Sun, Z., Ren, H., Zhao, N., An, X., et al. (2023). Influence of urbanization on the spatial distribution of associations between air pollution and mortality in beijing, china. *Geohealth*, 7(3):e2022GH000749.
<https://doi.org/10.1029/2022gh000749>
- Hassan, M., Ahmad, N., & Hashim, A. (2021). Homebuyers superstitious belief: Feng shui and housing property. *International Journal of Academic Research in Business and Social Sciences*, 11(7):444-462.
<https://doi.org/10.6007/ijarbss.v11-i7/10297>
- Ho, S., & Chuang, S. (2012). The influence of lay theories of feng shui on consumers' peace of mind: The role of regulatory fit. *Asian Journal of Social Psychology*, 15(4):304-313.

- <https://doi.org/10.1111/j.1467-839x.2012.01385.x>
- Hoang, T., & Quang, V. (2023). Factors of personal values influencing the purchase intent of feng shui jewelry among generation z youths in hanoi city. *Journal of Economics and Management Research*, 4(6):1-8.
- [https://doi.org/10.47363/jesmr/2023\(4\)199](https://doi.org/10.47363/jesmr/2023(4)199)
- Hong, S., Song, I., & Wu, J. (2006). Fengshui theory in urban landscape planning. *Urban Ecosystems*, 10(3):221-237.
- <https://doi.org/10.1007/s11252-006-3263-2>
- Hu, R. (2019). The state of smart cities in china: The case of shenzhen. *Energies*, 12(22):4375.
- <https://doi.org/10.3390/en12224375>
- Huang, K., Luo, W., Zhang, W., & Li, J. (2021). Characteristics and problems of smart city development in china. *Smart Cities*, 4(4):1403-1419.
- <https://doi.org/10.3390/smartcities4040074>
- Huang, Q., & Liu, Y. (2021). The coupling between urban expansion and population growth: An analysis of urban agglomerations in china (2005–2020). *Sustainability*, 13(13):7250.
- <https://doi.org/10.3390/su13137250>
- Ji, M., Jin, M., Chen, L., Liu, Y., & Tian, Y. (2024). Promoting urban innovation through smart cities: Evidence from a quasi-natural experiment in china. *Land*, 13(3):319.
- <https://doi.org/10.3390/land13030319>
- Jing, C., Du, M., Li, S., & Liu, S. (2019). Geospatial dashboards for monitoring smart city performance. *Sustainability*, 11(20):5648.
- <https://doi.org/10.3390/su11205648>
- Jo, S., Han, H., Leem, Y., & Lee, S. (2021). Sustainable smart cities and industrial ecosystem: Structural and relational changes of the smart city industries in Korea. *Sustainability*, 13(17):9917.
- <https://doi.org/10.3390/su13179917>
- Juan, Y., Chien, S., & Li, Y. (2010). Customer focused system for pre-sale housing customisation using case-based reasoning and feng shui theory. *Indoor and Built Environment*, 19(4):453-464.
- <https://doi.org/10.1177/1420326x10372198>
- Kitchin, R. (2013). The real-time city? big data and smart urbanism. *Geojournal*, 79(1):1-14.
- <https://doi.org/10.1007/s10708-013-9516-8>
- Kryžanowski, Š. (2019). A comparative analysis of selected recommendations of the feng shui school of form, alexander et al's pattern language, and findings of environmental psychology. *Urbani Izziv*, 2(30):124-134.
- <https://doi.org/10.5379/urbani-izziv-en-2019-30-02-006>
- Kryžanowski, Š. (2020). Feng shui in anthropological research - between perception and apperception. *International Journal of Research and Studies Publishing*, 10(11):775-782.
- <https://doi.org/10.29322/ijrsrp.10.11.2020.p10775>
- Kryžanowski, Š. (2021). Impact of feng shui bedrooms on self-assessed sleep and well-being: A randomized double-blind field research with instrumental biocommunication. *South East European Journal of Architecture and Design*, 2021:1-8.
- <https://doi.org/10.3889/seejad.2021.10057>
- Kuo, C., Yuan, Y., Gao, W., & Jao, C. (2023). The impact of recognized features of uncomfortable houses on auction prices: A Chinese cultural perspective. *Sage Open*, 13(4): 21582440231217901.
- <https://doi.org/10.1177/21582440231217901>
- Li, C., Liu, X., Dai, Z., & Zhao, Z. (2019). Smart city: A shareable framework and its applications in china. *Sustainability*, 11(16):4346.
- <https://doi.org/10.3390/su11164346>
- Lin, C., Chen, C., & Twu, Y. (2012). International real estate review. *International Real Estate Review*, 15(3):325-346.
- <https://doi.org/10.53383/100160>
- Liu, D., Wang, W., & Ge, H. (2020). Impact of urban densification on building energy consumption. *E3s Web of Conferences*, 172:16001.
- <https://doi.org/10.1051/e3sconf/202017216001>
- Liu, S. (2024). The nexus of china's economy and urbanization: A quantitative and historical analysis. *Advances in Economics Management and Political Sciences*, 92(1):21-30.
- <https://doi.org/10.54254/2754-1169/92/20231276>
- Liu, S., Jiang, G., Chang, L., & Wang, L. (2022). Can the smart city pilot policy promote high-quality economic development? A quasi-natural experiment based on 239 cities in china. *Sustainability*, 14(23):16005.
- <https://doi.org/10.3390/su142316005>
- Low, S., Gao, S., & Ang, J. (2018). Influence of chinese geomancy on facilities operations and maintenance (FOM). *Facilities*, 36(5/6):308-325.
- <https://doi.org/10.1108/f-03-2017-0026>
- Lu, D., Tian, Y., Liu, Y., & Zhang, Y. (2015). The performance of the smart cities in china-a comparative study by means of self-organizing maps and social networks analysis. *Sustainability*, 7(6):7604-7621.
- <https://doi.org/10.3390/su7067604>
- Matthews, M. (2019). *Feng Shui: Teaching about Science and Pseudoscience*. Germany: Springer.
- <https://doi.org/10.1007/978-3-030-18822-1>

- Matthews, M. (2021). Feng shui in science programmes. *Science and Education*, 30(6):1319-1332.
<https://doi.org/10.1007/s11191-021-00281-4>
- Mazzarino, M., & Rubini, L. (2019). Smart urban planning: Evaluating urban logistics performance of innovative solutions and sustainable policies in the venice lagoon-the results of a case study. *Sustainability*, 11(17):4580.
<https://doi.org/10.3390/su11174580>
- Naheed, S., & Shooshtarian, S. (2022). The role of cultural heritage in promoting urban sustainability: A brief review. *Land*, 11(9):1508.
<https://doi.org/10.3390/land11091508>
- Najarsadeghi, M., & Dorostkar, E. (2022). An assessment of the role of small towns in the development of periphery population centers using network analysis. *Cities*, 131:104026.
<https://doi.org/10.1016/j.cities.2022.104026>
- Nursanty, E., Cauba, A., Rusmiatmoko, D., & Destiawan, W. (2024). Green metropolis: Balancing sustainable energy innovations and authentic urban landscapes. *E3s Web of Conferences*, 547:03010.
<https://doi.org/10.1051/e3sconf/202454703010>
- Odendaal, N. (2020). Everyday urbanisms and the importance of place: Exploring the elements of the emancipatory smart city. *Urban Studies*, 58(3):639-654.
<https://doi.org/10.1177/0042098020970970>
- Ogilvie, M., Ng, D., Xiang, E., Ryan, M., & Yong, J. (2018). Using traditional rituals in hospitality to gain value: A study on the impact of feng shui. *International Journal of Hospitality Management*, 72:1-9.
<https://doi.org/10.1016/j.ijhm.2017.12.010>
- Olubi, A., & Aseyan, B. (2022). Sustainable housing delivery for the urban poor in Nigeria. *International Journal of Civil Engineering Construction and Estate Management*, 10(1): 21-34.
<https://doi.org/10.37745/ijcecem.14/vo10.n1pp2134>
- Pamudji, A. (2023). Iot-driven environmental support system for smart cities. *Sisforma*, 10(1):14-18.
<https://doi.org/10.24167/sisforma.v10i1.10209>
- Perry, B., Ager, L., & Sitas, R. (2019). Cultural heritage entanglements: Festivals as integrative sites for sustainable urban development. *International Journal of Heritage Studies*, 26(6):603-618.
<https://doi.org/10.1080/13527258.2019.1578987>
- Poulston, J., & Bennett, R. (2012). Fact, fiction, and feng shui: An exploratory study. *Facilities*, 30(1/2):23-39.
<https://doi.org/10.1108/02632771211194257>
- Qiao, W., Yin, S., & Huang, X. (2024). Assessing the imbalances in growth between urban land and urban population and the influencing factors: An allometric growth perspective. *Land*, 13(10):1657.
<https://doi.org/10.3390/land13101657>
- Reshetnikova, M., & Vasilieva, G. (2021). Smart cities in china: Growth driver in the post pandemic world. *SHS Web of Conferences*, 129:04004.
<https://doi.org/10.1051/shsconf/202112904004>
- Sanseverino, E., Sanseverino, R., & Anello, E. (2018). A cross-reading approach to smart city: A european perspective of chinese smart cities. *Smart Cities*, 1(1):26-52.
<https://doi.org/10.3390/smartcities1010003>
- Shcherbina, E., & Salmo, A. (2023). Exploring impact of historical and cultural heritage on the sustainability of urban and rural settlements. *E3s Web of Conferences*, 457:03001.
<https://doi.org/10.1051/e3sconf/202345703001>
- Sun, Y., Yang, Q., & Liu, J. (2023). Spatio-temporal evolution and influencing factors of integrated urban-rural development in northeast china under the background of population shrinkage. *Buildings*, 13(9):2173.
<https://doi.org/10.3390/buildings13092173>
- Surjadi, S., Purnaweni, H., Yusuf, M., & Astuti, R. (2022). Social capital in the sustainable development tourism: A case study of penyengat island national cultural heritage area. *Jurnal Public Policy*, 8(3):129.
<https://doi.org/10.35308/jpp.v8i3.4611>
- Wan, W., Wu, P., Luk, C., Fam, K., Lou, J., & Xu, H. (2012). Priming attitudes toward feng shui. *Asian Journal of Business Research*, 2(1):48-61.
<https://doi.org/10.14707/ajbr.120004>
- Wang, X., Chen, B., & Dong, Q. (2022). The limit of urban land expansion based on population growth and economic development: A case study of shandong province in china. *Sustainability*, 15(1):73.
<https://doi.org/10.3390/su15010073>
- Wang, Z., Liu, H., Dai, S., Cao, H., Wang, R., & Wang, Z. (2019). Endangered but genetically stable erythrophleum fordii within feng shui woodlands in suburbanized villages. *Ecology and Evolution*, 9(19):10950-10963.
<https://doi.org/10.1002/ece3.5513>
- Wen, L., Li, Z., & Guo, X. (2021). Exploring chinese feng shui culture for achieving sustainability. *International Journal of Information Systems and Social Change*, 12(3):15-26.
<https://doi.org/10.4018/ijissc.2021070102>
- Xu, Y., Li, W., Tai, J., & Zhang, C. (2022). A bibliometric-based analytical framework for the study of smart city lifeforms in china. *International Journal of Environmental Research and Public Health*, 19(22):14762.

- <https://doi.org/10.3390/ijerph192214762>
- Xu, Z., Yang, Y., & Sun, T. (2021). *Feng Shui and Imperial Examinations: A Case Study on the 1849 Severe Flood in Nanjing and Discussions on Flood Discharge*. Germany: Springer.
- <https://doi.org/10.21203/rs.3.rs-165023/v1>
- Yigitcanlar, T., & Kamruzzaman, M. (2018). Does smart city policy lead to sustainability of cities? *Land Use Policy*, 73:49-58.
- <https://doi.org/10.1016/j.landusepol.2018.01.034>
- You-Zhi, Z., Liu, Y., Zhao, J., & Wang, J. (2023). Smart city construction and urban green development: Empirical evidence from China. *Scientific Reports*, 13(1):17366.
- <https://doi.org/10.21203/rs.3.rs-3197988/v1>
- Yu-Fang, H., Peng, H., Zhong, A., Zhou, Z., Sofi, M., Xing, T., et al. (2020). *The Application of the Latest Technologies for Smart City Construction in China*. [Preprints].
- <https://doi.org/10.20944/preprints202007.0116.v1>
- Yulianto, A., Simon, S., & Cahyadi, T. (2022). Theological review of the concept of feng shui according to colossians 2:8. *Evangelikal Jurnal Teologi Injili Dan Pembinaan Warga Jemaat*, 6(2):124.
- <https://doi.org/10.46445/ejti.v6i2.526>
- Zhang, G., Su, Y., Zhu, G., Pengyue, F., & Jia, B. (2020). Smart firefighting construction in china: Status, problems, and reflections. *Fire and Materials*, 44(4):479-486.
- <https://doi.org/10.1002/fam.2800>
- Zhang, Y., Li, X., Wang, S., Yao, Y., Li, Q., Tu, W., et al. (2021). A global north-south division line for portraying urban development. *Iscience*, 24(7):102729.
- <https://doi.org/10.1016/j.isci.2021.102729>
- Zhao, L. (2023). The economic and environmental impacts of urbanization in china. *Highlights in Business Economics and Management*, 5:142-146.
- <https://doi.org/10.54097/hbem.v5i.5041>