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SMART SUSTAINABLE CITIES IMPLEMENTATION IN ZAMBIA: THE INFLUENCE OF LOCAL CULTURE

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ABSTRACT

Purpose: This study examines the relationship between culture and the barriers to implementing smart sustainable cities (SSCs) in Zambia.

Methods: This article utilised a quantitative research approach, conducting a questionnaire survey of ninety-two (92) purposively selected respondents from architecture, engineering, construction, security, healthcare, and governance sectors in both public and private organisations. The study employed correlation analysis using the Kendall tau-b to examine the relationship between culture and the challenges of implementing SSC.

Findings*:* The findings showed a positive correlation of varying significance between culture and the barriers to SSC implementation in Zambia. A significant correlation was observed between culture and insufficient use of ICT for environmental sustainability and energy efficiency as well as centralised decision-making. Other barriers strongly associated with culture included a lack of ICT knowledge and information sharing, standardised assessment frameworks for SSC, and proper implementation of local area plans.

Research Limitation: The disproportionate regional representation in the sample may limit the generalizability of the findings across Zambia.

Practical implications: Recognizing the link between barriers to SSC implementation in Zambia and local culture highlights the importance of investing in understanding local culture before any SSC development, as this could be crucial for project success in culturally diverse contexts.

Social Implication: Considering local culture in SSC development can enhance the inclusion of citizens from diverse cultural backgrounds.

Originality/ Value: The research highlights the correlation between cultural factors and the challenges in establishing SSCs, emphasising the need to integrate cultural considerations to enhance inclusivity in their development.

Keywords*: Barriers. culture. implementation. smart sustainable cities. Zambia.*

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INTRODUCTION

As of 2018, fifty-five percent (55%) of the world population lived in urban areas, a proportion which was expected to increase to sixty-eight percent (68%) by 2050 (United Nations Department of Economics and Social Affairs. 2018). Further projections indicate that urbanisation may lead to an additional 2.5 billion people residing in urban areas by 2050, with approximately 90% of the increase occurring in Africa and Asia (ibid). Though massive urbanisation has led to the development of megacities, it creates opportunities on the one hand and poses challenges on the other (Sharma & Rajput, 2017). Lately, making a city 'smart' is emerging as a strategy to mitigate the problems generated by rapid urbanisation because smart sustainable cities are high-tech cities that have several problem-solving capabilities (Townsend, 2013; Sharma & Rajput, 2017).

The need to curb the effects of unprecedented urban growth and the increasing necessity for sustainable development creates an urgency for smarter and sustainable ways of managing a city's challenges, leading to the emergence of smart sustainable cities (SCCs) (Nam & Pardo, 2011). It should be noted that the SSC concept combines the concepts of a smart city and a sustainable city (Höjer & Wangel, 2015). However, the main goal of SSCs is to ensure that cities offer the current and future generations improved living conditions to their citizens, which span the economic, technological, social, and regulatory aspects (Nam & Pardo, 2011)

Notably, in Southern Africa, Zambia has experienced a significant increase in its urban population, which has grown from 3.6 million in 2000 to 7.8 million in 2022 (Zambia Statistics Agency 2022). The World Bank (2022) has reported that urban growth rates in Zambia surpass rural growth, a trend expected to persist over the next three decades. This rapid urbanisation has led to a deficiency in basic infrastructure and the emergence of unplanned settlements characterised by poor water and sanitation and a lack of social amenities (Zulu & Oyama, 2017; World Bank, 2022).

Moreover, the adverse effects of urbanisation in Zambia, such as traffic congestion, crime, and various forms of urban pollution, including air, noise, light, surface water, and groundwater pollution, have become prevalent in major cities (Tembo, 2014). These challenges have necessitated the adoption of more innovative and sustainable approaches to urban development, leading to the embracing of the concept of SSCs in Zambia.

In response to the increasing demand for urban transformation, the Zambian government instituted the Smart Zambia Institute (SZI) to lead the shift toward smart urbanisation. Nonetheless, the existence of SZI does not ensure the successful implementation of Smart Sustainable Cities (SSC) in Zambia, as its mandate is narrowly focused on e-government initiatives—one of the multiple domains constituting smart, sustainable cities. Several e-government programs have been subsequently initiated across various government ministries and departments in Zambia (Mzyece 2012). Deploying these e-governance initiatives has encountered numerous challenges, which have been the subject of extensive research.

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Utilising a structured questionnaire to investigate the factors influencing the adoption of e-government services within the transport sector, specifically in Lusaka, Undi-Phiri and Phiri (2022) identified that the likelihood of utilising any e-government service is significantly impacted by factors such as trust in both the government and the internet, as well as the perceived control and expected user effort involved. In evaluating the readiness of Zambia's civil service for the adoption of e-government, Sikaonga and Tembo (2020) observed that the progress of such initiatives is impeded by a lack of awareness regarding existing programs, insufficient funding at the ministerial level, discrepancies between public policies and ground realities, high costs of internet services, and resistance to change among workforce members.

As articulated by Sikaonga and Tembo (2020), the identified challenge of resistance to change may be influenced by pre-established organisational cultures and societal perceptions shaped by prevailing social norms. Conversely, Bwalya et al. (2012) posit that several other critical challenges to the efficacy of e-government encompass inadequate information and communication technology (ICT) skills, the unaffordability of internet services, a lack of pertinent e-government offerings, the risk of information breaches, apprehension toward change, the absence of platforms in native languages, cybersecurity concerns, and a noticeable deficiency in awareness campaigns.

Furthermore, when examining the implementation of e-government initiatives within local authorities, Bwalya and Mulundano (2023) reported that various factors, including inadequate funding, limited ICT infrastructure, skill shortages, unstable power supply, and inconsistent internet connectivity, have significantly hindered the success of these initiatives. Although e-government represents merely one of the various domains that comprise SSC, the challenges experienced within this domain are likely to adversely affect the implementation of other interconnected domains, thereby compromising the overall success of the designed SSC framework. Notably, barriers such as a lack of funding, inadequate skills, and the high cost of unstable internet are recurrent themes throughout the literature. Additionally, challenges related to resistance to change from customers and employees have been underscored as pivotal, often attributed to perceptions shaped by local beliefs or cultural norms regarding services.

Based on the reviewed literature, it is evident that while considerable research has been conducted on the obstacles impeding the success of e-government in Zambia, a critical facet of SSC, there remains a substantive gap concerning the relationship between these barriers and local cultural contexts. This study seeks to address this gap by examining the influence of local culture on the implementation of SSCs, utilising Zambia as a case study. Understanding the role of local culture in the context of smart urbanisation initiatives is imperative for formulating effective strategies that resonate with Zambia's unique cultural landscape.

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LITERATURE REVIEW

Influence Of Culture in Smart Sustainable Cities Implementation

Skimming through smart sustainable cities literature presents a scholar with much evidence regarding the role of culture in the development of innovative, sustainable cities (SSCs) and smart cities (SCs). Defined by the Oxford Learner's Dictionary as customs, beliefs, art, way of life, and social organisation, culture plays a significant role in accepting and integrating innovative initiatives within a society (Mutambik, 2024). Acknowledging that every country, city, and community is shaped by its unique culture, influencing their attitudes towards change and innovation is important. Though no study has endeavoured to establish the relationship between culture and the barriers to the implementation of SSCs and SCs, literature presents strong evidence of the importance of cultural consideration in the implementation of SSCs, as shown in the following paragraphs.

There is a high likelihood of local norms and culture deterring the assimilation of innovation; for this reason, the implementation of innovative, sustainable cities may require a cultural change, which can be achieved through training and campaigns, as was the case of Namyangju in Korea (Myeong et al., 2020). Instilling a culture of innovation through training government managers and frontline workers is critical in achieving a holistic and sustainable smart city transformation that can survive leadership changes (ibid). The study further highlighted the need for leadership in developing a culture of innovation as there is often resistance, which may be attributed to the existing culture in the organisation or society.

The case studies of Palava and Barcelona (Harrison, 2017) suggest that the key to successful smart city implementation is to prioritise the needs and preferences of the people, favouring a bottom-up approach over a technology-oriented one. The author emphasises the importance of recognising smart city technologies as products of their socio-historical context, shaped by politics, budgets, local culture, and material limitations or affordances of technology. Harrison (2017) also highlights the significance of considering the local culture when selecting smart city technology and initiatives, as neglecting this aspect may lead to resistance from the citizens. For this reason, the project implementation office must engage with stakeholders to understand the local culture, norms, and traditions, as this is essential for the implementation process.

On the other hand, some smart cities are developed around marketing and promoting their culture. For example, Kyoto in Japan (Anthopoulos, 2017) and various cities in China, including Yangzhou and Beijing Haidian District, as highlighted by China Academy of Information and Communications Technology (CAICT) and EU-China Policy Dialogues Support Facility II (PDSF) (2016). The issue of cultural considerations is not only applicable to old cities being retrofitted but is also a significant consideration in branding new cities. Cities select brand names to express themselves concerning defining and communicating a place’s unique attributes, such as

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culture, language, architecture, cuisine, heritage, and more (Okosun et al., 2024; Anthopoulos, 2017).

In a Delphi survey, Faraji et al. (2021) observed that the advancement of technology and information technology has significantly impacted the culture of urban societies, leading urban managers to adopt smart management strategies for urban culture. This may also explain the slow assimilation of technology in existing urban centres or cities. For example, a review of the effects of smart cities (SCs) such as Masdar in Abu Dhabi, Songdo, and Hwan Seung Dongstan in South Korea by Allam and Newman (2018) revealed negative impacts on surrounding areas. These cities were designed in isolation and tend to operate independently, resulting in adverse effects on neighbouring cities through business loss and cultural erosion (ibid). These effects hinder local and surrounding communities' acceptance of SC initiatives, highlighting the importance of user engagement and community development.

In contrast, Salsabila et al. (2024) conducted a literature review demonstrating information technology's positive impact on preserving traditional culture in Cirebon Palace. This includes increased access to information about the traditional culture of Cirebon Palace for the wider community, documentation and digitisation of various cultural heritages, promotion and public education about the traditional culture, and the development of cultural ecotourism. The study suggests that information technology can be an effective tool in cultural preservation with well-planned strategies in place.

In addition, the significant urban population has led to a diverse cultural environment and the development of multicultural cities. (Faraji et al. 2021). This has necessitated innovative governance to focus on new approaches for enhancing cultural intelligence among urban executives (ibid). Faraji et al. (2021) found that indicators such as Cultural Knowledge, Smart Policymaking, Strategic Plans to Promote e-government and ICT, Cultural Strategy, and ICT Investment are crucial for the adequate performance of smart governance in multicultural cities. Šulyová and Vodák (2020) also emphasise the importance of diversity management in a multicultural society, suggesting strategies such as creating cultural awareness, perceiving diversity as a competitive advantage, and incorporating multicultural values into city concepts. They further highlight the need for early childhood education to build awareness of other cultures.

In the 2024 study, Mutambik utilised a literature review and a questionnaire survey to explore the relationship between culture and the obstacles to implementing smart sustainable cities. Although Mutambik (2024) did not directly link culture to the barriers of smart sustainable cities, the study did emphasise that sustainability, as a key strategic priority, is influenced by cultural context. The author argues that planners must consider local and regional cultural factors when choosing and adapting digital technologies and managing and promoting public acceptance. Mutambik (2024) found that culturally influenced factors such as perceived privacy, benefits, ease of use, usefulness, cultural adaptation, connectivity, service quality, digital literacy, process improvement, energy

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efficiency, and time efficiency are positively associated with the use of cultural informed Technology (CIT). However, the study also revealed that in the context of smart sustainable cities, the perceived cost savings are diminished and possibly negated by other factors such as cultural adaptation, alignment of new technology, and enhanced personal efficiency. This finding is unique in the existing literature.

In their exploration of how to improve the sustainability of smart cities from a design perspective, Gao et al. (2023) emphasised the importance of prioritising people and achieving a balance across the dimensions of management, space, resources, and platform within the people-environment-society-economy-culture system. They highlighted the use of technology to enable the sustainable design of smart cities, emphasising urban management and spatial planning as key considerations. Gao et al. (2023) also emphasised the significance of cultural context in the sustainable design of smart cities, stating that cultural aspects profoundly impact smart cities' development and should be considered crucial in their design.

Yang and Zhen (2024) conducted a cross-regional analysis of smart city development models in their literature review. They concluded that different countries' understanding of smart cities is influenced by their indigenous cultures, leading to varying perceptions of smart city definitions, components, and standards across different geographic regions. Yang and Zhen (2024) also found that regional cultural, technological, and temporal contexts influence the dimensions and combinations of smart cities proposed by various scholars. They further argued that for technology to integrate seamlessly with individuals, smart cities must understand their own culture, which influences all aspects of human society, including the habits of inhabitants, urban planning, resources, and tourist attractions. This cultural awareness is essential for technology to empathise with individual behaviour and make decisions that are not just rational but also humane (ibid).

According to Angelidou (2016), the successful implementation of Smart Sustainable Cities (SSC) initiatives in London relies on a strategy prioritising education and training at different levels, including physical and digital educational infrastructure, institutions, and targeted programs. This comprehensive approach aims to address the impact of culture on the acceptance of innovation and technology within the city. However, the lack of strong connections between academia, industry, and government in London hinders the dissemination and commercialisation of new knowledge and innovative ideas (Angelidou, 2016). Angelidou (2016) emphasises that education and training should be central to any smart city initiative to promote human and social capital. Additionally, technology should be leveraged to enhance human and social capital, facilitating a necessary cultural shift for the success of smart city initiatives.

Previous studies have emphasised the significance of considering local norms and culture in developing SSCs or SCs. However, no study has attempted to establish the nature of the relationship between culture and the obstacles to implementing SSCs. This study aims to fill this

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gap by examining the relationship between culture and the barriers to SSC implementation, using Zambia as a case study.

RESEARCH METHODS

The study employed a quantitative research method, utilising a questionnaire survey with a five-point Likert scale to gather information from participants in various sectors, including architecture, engineering, construction, security, traffic management, governance, banking, healthcare, commercial utilities, and internet services. 150 respondents were selected through purposive sampling, following the methodology established by Glenn (1992) as referenced in Singh and Masuku (2014). The questionnaire was administered via Google Forms, an online platform, and achieved a response rate of 61.3%, which is considered acceptable according to the recommendations of Daikeler et al. (2022). This response rate resulted in a final study sample of 92 respondents.

The study investigated the relationship between local culture and barriers to implementing smart, sustainable cities (SSCs) using bivariate correlation, specifically the Kendall Tau B correlation coefficient. Additionally, as Rooshdi et al. (2018) suggested, the ranking of the identified barriers to SSC implementation was determined using the relative importance index (RII).

RESULTS AND DISCUSSION

Demographic information of the respondents

The AEC industry accounted for 69 percent of the respondents, followed by the health sector and physical planning sector each accounting for five percent of the respondents, as shown in Figure 1.

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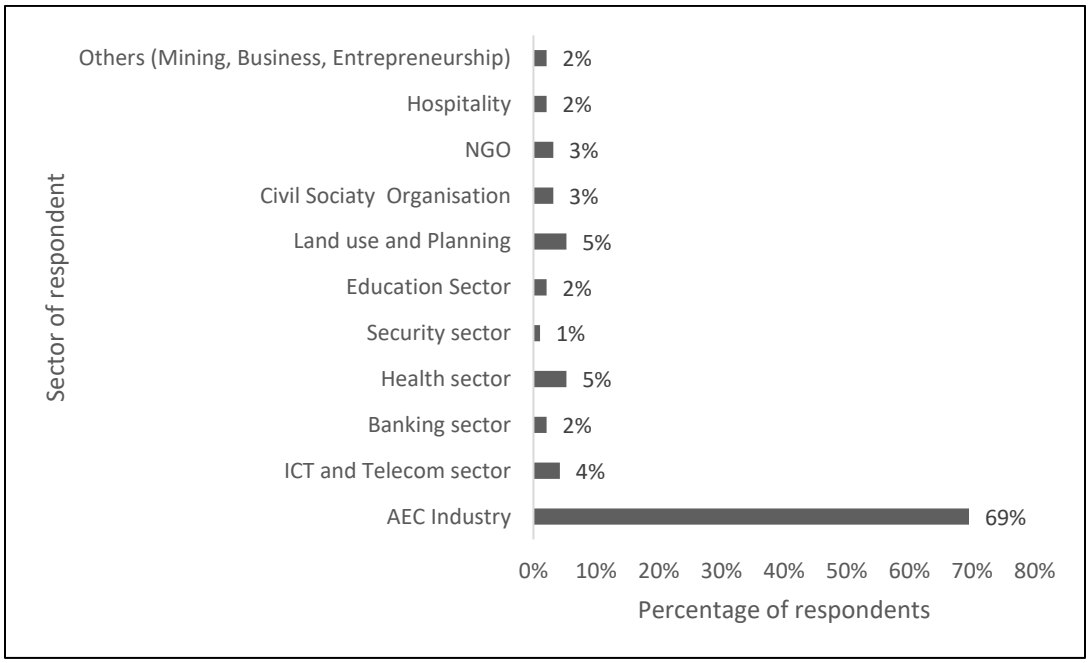

Figure 1: Sector distribution of survey respondents

The survey found that 56 percent of respondents held bachelor's degrees, 36 percent held master's degrees, 7 percent had diplomas, and 1 percent had PhDs.

Relationship between local culture and barriers to SSCs implementation

Table 1 shows the results of the bivariate correlation analysis between local culture and barriers to SSCs implementation using the Kendall Tau-B correlation coefficient. According to Sakhare and Patil (2019), the barriers included in the analysis were those whose relative importance was above 0.8 and hence belong to the high-impact class.

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Table 1: Correlation of the barriers to SSC implementation with lack of political will and influence of local culture.

Barriers to Smart Sustainable Cities Implementation in Zambia.	**RII**	**Kendall's Tau_b**	**Local culture**
Outdated and dilapidated infrastructure	0.89	Cor Coeff	.206*
		Sig. (2-tailed)	.028
Lack of funding for Smart sustainable services and initiatives	0.88	Cor Coeff	.221*
		Sig. (2-tailed)	.018
Lack of proper implementation of the local area plans	0.87	Cor Coeff	.248**
		Sig. (2-tailed)	.007
Lack of political will	0.85	Cor Coeff	.220*
		Sig. (2-tailed)	.016
Lack of stakeholder engagement	0.85	Cor Coeff	.186*
		Sig. (2-tailed)	.046
Lack of coordination in the implementation of smart sustainable services	0.85	Cor Coeff	.176
		Sig. (2-tailed)	.055
Increasing debt burden usually discourages an increase in spending for the benefit of modernisation	0.83	Cor Coeff	.185*
		Sig. (2-tailed)	.041
Lack of ICT knowledge and information sharing as well as engagement opportunities	0.83	Cor Coeff	.349**
		Sig. (2-tailed)	.000
Insufficient R and D funding and lack of technological capabilities	0.82	Cor Coeff	.084
		Sig. (2-tailed)	.374
The centralized decision-making process, top-down approach	0.81	Cor Coeff	.364**
		Sig. (2-tailed)	.000
Lack of planning; vision and strategy, project management, capacity (HR), and ICT knowledge among city planners	0.81	Cor Coeff	.247**
		Sig. (2-tailed)	.006
Insufficient use of ICT for environmental sustainability, and energy efficiency.	0.81	Cor Coeff	.371**
		Sig. (2-tailed)	.000
The lack of standardised assessment frameworks for Smart Sustainable Cities	0.8	Cor Coeff	.275**
		Sig. (2-tailed)	.002
lack of awareness of the availability of these smart sustainable services	0.8	Cor Coeff	.228*
		Sig. (2-tailed)	.011
Weak Public-Private Partnership and Inefficiency of Resource Management	0.8	Cor Coeff	.124
		Sig. (2-tailed)	.172
Local culture	0.8	Cor Coeff	1.000
		Sig. (2-tailed)	

Source: Authors own
**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Based on the findings presented in Table 1 of the study, a positive correlation was observed between local culture and various barriers to implementing SSCs. However, these positive correlations exhibited varying levels of statistical significance, ranging from weak to strong. This positive correlation implies that a shift in cultural norms in a particular direction will likely result in a corresponding change in the barriers to implementation. This suggests that specific challenges

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faced in implementing SSCs in Zambia could potentially be addressed through efforts to modify specific cultural norms and beliefs. The barriers that exhibited statistically significant correlations with local culture, listed in order of significance, are as follows:

a) Insufficient use of ICT for environmental sustainability and energy efficiency.
b) The centralised decision-making process favours a top-down approach
c) . c) There is a lack of ICT knowledge, information sharing, and engagement opportunities.
a) standardised assessment frameworks for smart, sustainable cities are lacking.
b) Lack of proper implementation of the local area plans.
c) Lack of planning, vision and strategy, project management, capacity (HR), and ICT knowledge among city planners.

Discussion

The observed positive correlation between local culture and the barriers to implementing Smart Sustainable Cities (SSC) in Zambia indicates that local cultural factors significantly influence these barriers, albeit with varying impacts across different challenges. Mutambik (2024) posits that local culture plays a crucial role in the acceptance and integration of innovative initiatives within a society, suggesting that the resistance to change, as highlighted by Bwalya et al. (2012; Sikaonga & Tembo, 2020), may be significantly shaped by cultural perceptions surrounding the initiatives proposed. Although correlation does not equate to causation, the findings imply that substantial modifications in local culture could significantly alleviate the identified barriers.

Notably, the barrier exhibiting the highest Kendall correlation coefficient pertains to the insufficient utilisation of Information and Communication Technology (ICT) in environmental sustainability and energy efficiency. This barrier appears prevalent in Zambia, likely due to prevailing local norms and beliefs that discourage adopting and using ICT. This barrier indicates a deficiency in an innovation culture within this sector, suggesting that overcoming it may necessitate a cultural transformation facilitated by targeted training and awareness campaigns, as Myeong et al. (2020) documented. The imperative for such campaigns and training underscores the necessity for comprehensive change management strategies prior to the implementation of SSC-related innovations. Moreover, these strategies must receive backing from the sector and political leadership, as such support has been noted to mitigate resistance to change Myeong et al. (2020).

The second most significant barrier identified is the centralisation of decision-making processes, which promotes a top-down approach to SSC implementation. This centralised approach often results in the imposition of technologies on citizens without their engagement, potentially overlooking critical cultural considerations that could lead to resistance against the technologies introduced. In this regard, Harrison (2017) advocates for a bottom-up approach as vital for the

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success of SSC initiatives, as it prioritises community engagement and recognises the influence of cultural orientations on public perceptions. Consequently, Harrison (2017) also emphasises that a bottom-up framework facilitates the inclusion of local cultural context in the selection of technologies, thereby reducing the likelihood of innovation rejection.

Additionally, barriers related to a deficiency of ICT skills, which is generally prevalent among urban planners, can be traced back to organisational dynamics and local cultural settings. The presence of a culture that fosters innovation within the educational sector, as argued by (Myeong et al., 2020), would likely result in the inclusion of ICT skills within the curricula of various professions, extending down to grade school education. The prioritisation of digital and ICT-related education across all levels has been a critical factor contributing to the successful implementation of SSC in London, as noted by Angelidou (2016). In London's case, this dual focus not only upskilled the citizenry but also nurtured a culture of innovation that further facilitated the acceptance of new technologies (Angelidou, 2016).

Another significant barrier identified is the inadequate implementation of local area plans, which correlates strongly with local culture. At first glance, this issue might not appear connected to cultural factors; however, it often is. In many cases, improper execution of local area plans stems from resistance within the community, driven by the adverse effects of urbanisation on surrounding areas, as observed in South Korea, as documented by Allam and Newman (2018). The perceived erosion of culture within these communities likely hinders the effective implementation of local area plans. Remarkably, technologies do not engage the affected citizens and stakeholders when introduced. Moreover, the failure to adequately incorporate local cultural elements into the design of these plans, as noted by Gao et al. (2023), can significantly impact the development of sustainable smart cities (SSCs).

While the correlation between barriers to SSC implementation in Zambia and local culture does not imply causation, it does reveal a relationship that affects the barriers discussed in previous paragraphs. This finding underscores the necessity for developing comprehensive and robust change management strategies, which should be crafted following thorough stakeholder consultations to identify cultural norms and aspects that could impede the success of SSC initiatives. Additionally, it emphasises the importance of investing in understanding local culture and devising appropriate change management plans before proceeding with any infrastructure development.

CONCLUSION

The role of culture in implementing smart sustainable cities (SSCs) is a subject of considerable scholarly interest and significance. Within the Zambian context, a positive correlation has been observed between local culture and various barriers to successfully implementing SSCs. This

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correlation exhibits variability across different barriers, with a particularly pronounced association evident in several areas: the inadequate implementation of local area plans, insufficient integration of information and communication technology (ICT) for promoting environmental sustainability and energy efficiency, and the lack of standardised assessment frameworks for SSCs.

The findings of this study substantiate existing literature regarding the influence of cultural factors on SSC implementation. The success of SSC development in Zambia is contingent, among other factors, on a nuanced understanding of local cultural dynamics. However, it should be noted that this study is based on a survey conducted exclusively within the Zambian population.

This research's notable limitation is the disproportionate regional representation within the study's sample population, attributable to time constraints. This lack of diverse representation may adversely affect the generalizability of the findings, as they may not accurately reflect the conditions across all provinces of Zambia, potentially resulting in variations in outcomes.

Moreover, further research is warranted to bolster the validity of these findings, particularly in diverse contexts, to investigate the causal relationships between cultural factors and other barriers to the implementation of SSCs. This inquiry is crucial, as the interplay between culture and SSC implementation is a complex and multifaceted issue that merits in-depth exploration. A more comprehensive understanding of this pivotal aspect of sustainable urban development can be attained by conducting additional studies across varied settings and examining the intricate causal relationships between culture and barriers to SSC implementation.

Identifying positive correlations between barriers to SSC implementation in Zambia and local culture underscores the imperative for substantial investment in comprehending local customs, norms, and values before initiating any SSC-related development. Such a strategy may serve as a critical differentiator between project successful and unsuccessful deployment in culturally diverse environments.

The social implications of this study's findings emphasise the necessity for a paradigm shift in the approach to infrastructure development. Specifically, there is a need to place equal importance on social surveys aimed at elucidating local culture, assessing the potential impacts of the intended SSC on this culture, and determining how cultural factors will influence the design of the SSC. A thorough understanding of the local norms and values that shape the cultural landscape of a region, city, or organisation will facilitate the development of a robust and effective change management framework and system, which will help enhance cultural inclusivity in SSC development.

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