

## RESEARCH ARTICLE

## The Smart–Resilient–Livable–Lovable (SRL) Model of Two Metropolitan in Sumatera

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### Abstract

Urban development in the twenty-first century is shifting from a technocentric focus on a human-centered paradigm that emphasizes emotional bonds. The limited exploration of the interconnections among smart, resilient, and livable dimensions in shaping urban lovability presents both theoretical and empirical gaps. This study proposes and tests the Smart–Resilient–Livable–Lovable (SRL) model to examine how technological innovation, resilience, and livability shape lovability. Utilizing a quantitative design with Structural Equation Modelling (SEM), the research compares two waterfront metropolises in Sumatera, Indonesia. Findings reveal Palembang follows a structural-integrative model, where smartness and resilience significantly enhance livability (P value 0.00), which in turn acts as a crucial mediator fostering lovability. Conversely, Bandar Lampung exhibits a social-emotional model, where smart urbanism initiatives directly build civic pride (P value 0.00) despite existing infrastructural gaps and insignificant links between livability and emotional attachment (0.077). City pride across both cities demonstrate that urban identity can grow from the soul of a city – its culture and social values – even when the body – physical infrastructure is still developing. The results offer policymakers insights for designing human-centered strategies that reconcile physical systems with the psychological well-being of residents.

**Keywords:** Smart Urbanism, Resilient City, Livable City, Lovable City, Waterfront Development, Palembang, Bandar Lampung

### 1. Introduction

Urban development in the twenty-first century is no longer solely oriented toward technological advancement and economic competitiveness. Instead, contemporary approaches increasingly emphasize social well-being, ecological resilience, and the emotional bonds between residents and their cities (Escalera-Reyes, 2020; Masterson et al., 2017; and Wang et al., 2023). The paradigm shift from smart and resilient cities toward livable and lovable cities reflects a growing recognition that the future of sustainable urbanism depends not only on the body of the city – its physical systems, infrastructure, and governance – but also on its soul, including social identity, cultural heritage, and residents' collective emotional experiences (Kourtit et al., 2022; Kourtit, Neuts, et al., 2021; Kourtit, Nijkamp, et al., 2021). Although previous research has examined the roles of smart and resilient cities in advancing sustainability, discussions on how these dimensions interact to shape lovable cities – urban environments that are emotionally meaningful and cherished by their inhabitants – remain limited.

Recent literature indicates that the concept of the smart urbanism, once primarily technological, has evolved toward Smart Urbanism, where governance quality, transparency, and public participation play a central role in improving urban life (Mora et al., 2023; Park & Yoo, 2022). Similarly, the resilient city paradigm has expanded beyond technical and infrastructural concerns to incorporate social and adaptive capacities that support livability and overall well-being (Chisale et al., 2024; Fang et al., 2023). Meanwhile, the livable city framework assesses urban quality of life through the development of physical infrastructure

(Abubakar et al., 2022; Grison et al., 2023; Yang et al., 2025), social facilities (Çelik & Jaiyeoba, 2023; Ye et al., 2022; Zhang et al., 2025), and urban utilities (Baobeid et al., 2021; Mouratidis, 2021), while also acknowledging the importance of cultural preservation and affordability in fostering satisfaction and attachment among urban residents (Gallou, 2022; McKay et al., 2023). However, the concept of the lovable city – defined as a city that evokes affection, pride, and emotional attachment – remains rarely integrated into empirical urban studies, especially in the context of Global South countries such as Indonesia.

The limited exploration of the interconnections among smart, resilient, and livable dimensions in shaping urban lovability presents both theoretical and empirical gaps. Most prior studies have examined these dimensions independently, often resulting in fragmented policy approaches. Furthermore, existing research tends to focus on advanced cities with established digital infrastructures, while comparative studies in developing urban contexts with strong socio-cultural foundations remain scarce. This gap is particularly relevant for Indonesia, where coastal and riverine cities face the compounded challenges of rapid urbanization, climate-related risks, and limited institutional capacity.

The selection of Palembang and Bandar Lampung as case studies is grounded in their characteristics as waterfront cities that reflect the dynamic nature of urban development in Sumatera. Palembang, a metropolitan city shaped by the Musi River, provides a pertinent context for examining the integration of smart urbanism initiatives, climate resilience, and improvements in urban livability amidst rapid economic growth. In contrast, Bandar

Lampung represents a coastal city typology confronting ecological and social pressures such as coastal flooding, urban sprawl, and infrastructural constraints. The contrast between these two cities offers a strong empirical basis for analyzing variations in the implementation of smart, resilient, and livable urban strategies, as well as their combined influence on the emergence of lovable cities. Both cities also demonstrate increasing policy commitment toward digital innovation, disaster risk mitigation, and improvements in residents' well-being.

This study seeks to address the aforementioned gaps by proposing and empirically testing the Smart-Resilient-Livable-Lovable (SRLL) Model, which conceptualizes lovability as an outcome of the interactions among smart urban systems, resilience capacity, and livability conditions. Through a comparative analysis of Palembang (a river-based metropolis) and Bandar Lampung (a coastal city), the study investigates how geographical characteristics, governance capacity, and social foundations shape the relationships among the SRLL dimensions.

The objective of this research is to provide a model for developing lovable cities in the Global South, particularly those that rely heavily on social capital formation and adaptive governance. By integrating theoretical perspectives from Smart Urbanism, Urban Resilience, and Lovable Urbanism, this study contributes to advancing the understanding of human-centered sustainable urban development. The findings are expected to offer valuable insights for urban planners and policymakers in designing development strategies that reconcile the physical and emotional dimensions of urban life, ultimately fostering cities that are not only smart and resilient, but also livable and genuinely loved by their residents.

## 2. Literature Review

### 2.1 Smart urbanism: From Technology-Driven Systems to Adaptive Urban Governance

The concept of the smart urbanism has evolved significantly since its early articulation in the mid-1800s, which described emerging urban forms as efficient and self-governed. By the early 1900s, this idea shifted toward the smart growth movement and later developed into technology-based innovation in the planning, development, operation, and management of cities to enhance service delivery, operational efficiency, and economic competitiveness (Park & Yoo, 2022; Yigitcanlar et al., 2018). The early framing of smart cities – centered exclusively on Information and Communication Technology (ICT) – received substantial criticism from scholars and practitioners due to its technocentric bias. This critique catalyzed the expansion of the smart urbanism paradigm toward the inclusion of human resources, social innovation, and good governance, which ultimately gave rise to the concept of Smart Urbanism (Yigitcanlar et al., 2018).

Smart Urbanism positions the smart urbanism as an adaptive system that integrates technological infrastructures, governance mechanisms, and human-centered components to enhance overall urban quality of life (Mora et al., 2023; Park & Yoo, 2022). Thus, an effective smart urbanism is not merely one that deploys advanced technologies, but one that strategically combines technological innovation, participatory governance, and socially responsive institutions to improve citizen well-being. In the context of this study, the indicators of Smart Urbanism cover a holistic set of domains: technology-related aspects such as internet connectivity and technology literacy; governance dimensions such as

government services, support for the informal sector, job availability, city cleanliness, tourism sector development, and urban planning and design; and human-centered factors including community awareness, civic harmony, and public participation (Alahi et al., 2023; Bastos et al., 2022; Chen & Cheng, 2022; Fatriadi et al., 2017; Wang et al., 2022; Wei et al., 2024).

### 2.2 Resilient City: Structural Robustness for Enhancing Quality of Life

The concept of the resilient city emerged in the 1970s, drawing initially from Holling's (1996) work on ecological resilience, which describes the ability of natural systems to return to a stable state after experiencing disturbances. This foundational idea subsequently influenced various disciplines – including ecology, psychology, and engineering – and was later applied to the field of urban planning (Feng et al., 2021; Rogov & Rozenblat, 2018). Between the 1990s and 2000s, cities across the world increasingly faced heightened vulnerabilities associated with climate change, natural hazards, and socio-economic shocks. Consequently, the resilience concept evolved to address the need for cities to become more robust and adaptable in the face of multidimensional risks (Meerow et al., 2016; Wu et al., 2022).

A resilient city is commonly defined as one that possesses the capacity to absorb, adapt to, and transform in response to disturbances without losing its essential functions. This capacity is supported by factors such as robust urban infrastructure, environmental quality, community adaptive capacity, and even food security. In this study, the indicators used to measure urban resilience include a). Infrastructure systems, such as drainage networks and evacuation routes and areas (Aziz et al., 2024; Choe et al., 2023; De Oliveira et al., 2022); b). Environmental quality, measured through water and air quality (Pandey & Ghosh, 2023; Ptak-Wojciechowska et al., 2021); and c). Adaptive and coping capacities, including resilience to extreme weather, flood resilience, and urban safety (Chisale et al., 2024; Fang et al., 2023), as well as food availability (Jensen & Orfila, 2021).

Within the SRLL model, resilience is positioned as a foundational dimension of long-term sustainability. It enhances residents' sense of safety and comfort and indirectly strengthens livability and lovability by promoting spatial experiences that are stable, secure, and predictable.

### 2.3 Livable City: Quality of Life and Resident Well-Being

A livable city encompasses various physical, social, and environmental dimensions aimed at creating safe, healthy, inclusive, and welfare-supporting living conditions (Mouratidis & Yiannakou, 2021; Zhan et al., 2018). One of the key factors influencing urban livability is the availability and quality of urban infrastructure, facilities, and utilities. Infrastructure components include the road network, waste management systems, and clean water supply (Abubakar et al., 2022; Grison et al., 2023; Yang et al., 2025). Urban facilities consist of education services, religious facilities, green open spaces, and healthcare services (Abi Suroso, 2017; Çelik & Jaiyeoba, 2023; Nelfia et al., 2025; Ye et al., 2022; Zhang et al., 2025). Public utilities – such as public transportation and pedestrian pathways – also play a crucial role in shaping daily mobility and accessibility (Baobeid et al., 2021; Mouratidis, 2021). In addition, socio-economic dimensions, including heritage and cultural conservation and living costs, significantly influence how residents perceive the comfort and desirability of urban environments (Gallou, 2022; McKay et al., 2023).

Within the SRLL framework, livability acts as a central mediating dimension that links a city's smartness and resilience with its emotional appeal or lovability. A city cannot become loved by its residents unless it first provides a comfortable, functional, and livable environment. In other words, smart and resilient urban systems gain meaning and emotional resonance only when they translate into tangible improvements in everyday living conditions.

#### 2.4 Lovable City: Between the Physical Form and the Soul of the City

The concept of a lovable city expands upon the paradigm of affective urbanism, which emphasizes that the relationship between residents and their city is not merely functional but also deeply emotional (Kourtit et al., 2021; Viderman & Knierbein, 2019). Urban lovability emerges from positive spatial experiences, a sense of belonging, shared pride, and the symbolic meanings attached to place – capturing notions such as sense of place and place attachment (Rambhoros et al., 2025). According to Kourtit et al., (2022); Kourtit, Neuts, et al., (2021); Kourtit, Nijkamp, et al., (2021), lovability is shaped through a balance between the body of the city – its physical structures, infrastructure, and services – and the soul of the city – its social identity, history, and cultural values. A lovable city is therefore not only efficient and aesthetically pleasing but also reflective of the values, aspirations, and character of its residents.

In this paper, the indicators shaping a lovable city include its ability to serve as a meaningful home for its residents, to offer a comfortable living environment, and to foster shared civic pride (Collins, 2016; Kourtit, Neuts, et al., 2021; Kraemer & Stern, 2022).

Within the SRLL framework, the lovable city represents the integrative outcome of interactions among the smart, resilient, and livable dimensions. A city becomes genuinely lovable when technological innovation, environmental resilience, and high-quality living conditions converge to create meaningful and pride-evoking urban experiences.

#### 2.5 Conceptual Framework of SRLL (Smart Resilient Livable and Lovable City)

Based on the theoretical review presented above, this study proposes the SRLL (Smart-Resilient-Livable-Lovable) model as a holistic framework for understanding the interconnections among key dimensions of sustainable urban development (see figure 1). The model assumes that smart and resilient cities function as primary drivers that enable urban areas to operate efficiently through technological innovation while remaining adaptive to risks and disturbances. Livability acts as a mediating dimension that translates technological performance and resilience capacities into tangible improvements in residents' daily living experiences. Lovability, in turn, is conceptualized as the integrative outcome that emerges from the synergy between the city's structural performance – its physical form, infrastructure, and services – and its social and cultural identity. Conceptually, the model suggests that both smartness and resilience influence lovability through the mediating role of livability. The SRLL framework is empirically tested in two waterfront cities in Sumatra – Palembang, a river-based city, and Bandar Lampung, a coastal city – each of which presents distinct social, geographical, and institutional characteristics. This comparative approach makes it possible to examine how variations in urban form and governance shape the

pathways connecting smartness, resilience, livability, and lovability.

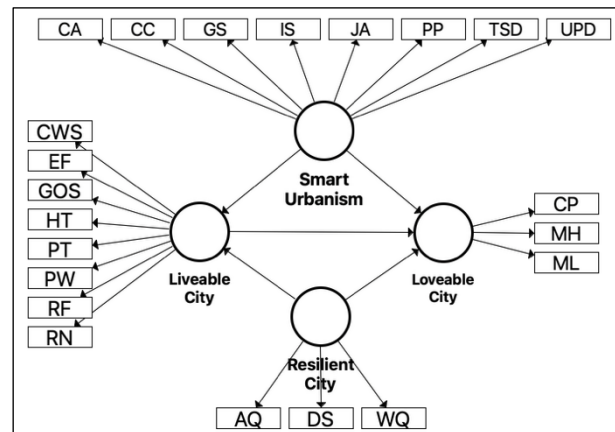


Fig 1. Conceptual Model of SRLL

#### 2. Methodology

This study employs a deductive research approach to test a conceptual model developed from established literature on smart urbanism, urban resilience, livability, and lovability. The research was conducted in two waterfront metropolitan cities, Palembang and Bandar Lampung, both of which are experiencing rapid urbanization and technological transitions that make them relevant contexts for examining the interlinkages of SRLL (Smart-Resilient-Livable-Lovable) urban dimensions. A quantitative design was applied using Structural Equation Modeling (SEM) with Smart Partial Least Squares (SmartPLS) for complex models with reflective indicators. The model consists of four latent variables – smart urbanism, resilient city, livable city, and lovable city – comprising a total of 33 reflective indicators adapted from previous theoretical frameworks. The target population includes residents aged 15–64 years, amounting to 1,125,221 individuals in Palembang and 723,830 in Bandar Lampung. The sample size was determined using Slovin's formula with a 0.5% margin of error, resulting in 400 respondents for each city. A proportionate stratified random sampling technique was applied to ensure representation across all districts.

Data were collected using an online survey administered via structured questionnaires employing a five-point Likert scale. Prior to analysis, data were cleaned to ensure accuracy and proportional distribution across districts. Data analysis proceeded through two main stages: measurement model evaluation and structural model evaluation. The measurement model was assessed based on indicator validity and reliability using loading factors of  $\geq 0.50$ , Composite Reliability  $\geq 0.70$ , Average Variance Extracted (AVE)  $\geq 0.50$ , and discriminant validity using cross-loadings or HTMT  $\leq 0.90$ . The structural model was evaluated through collinearity assessment ( $VIF \leq 5$ ), significance testing via bootstrapping with a p-value threshold of  $< 0.05$ , and model strength based on  $R^2$ ,  $F^2$ , SRMR ( $< 0.08$ ), and NFI ( $> 0.90$ ). Non-valid or unreliable indicators were removed through iterative refinement to enhance model fit. Finally, six hypotheses were tested to assess the direct relationships among smart urbanism, resilient city, livable city, and lovable city dimensions using path coefficients and statistical significance levels.

The smart urbanism dimension reflects the integration of technology, governance, and community engagement,

which materializes through indicators such as CA (Community Awareness), CC (City Cleanliness), CH (Civic Harmony), GS (Government Services), IC (Internet Connectivity), IS (Support for the Informal Sector), JA (Jobs Availability), PP (Public Participation), TL (Technology Literacy), TSD (Tourism Sector Development), and UPD (Urban Planning and Design). These elements of smartness interact closely with the resilient city dimension, which captures the city's capacity to anticipate, absorb, and recover from shocks through DS (Drainage System), ERA (Evacuation Routes and Areas), EWR (Extreme Weather Resilience), FR (Flood Resilience), FS (Food Security), US (Urban Safety), WQ (Water Quality), and AQ (Air Quality). The benefits of smart and resilient governance are then translated into the everyday urban experience through the liveable city dimension, represented by CWS (Clean Water Supply), EF (Education Facilities), GOS (Green Open Spaces), HCC (Heritage and Cultural Conservation), HT (Healthcare), LC (Living Costs), PT (Public Transport), PW (Pedestrian Way), RF (Religious Facilities), RN (Road Network), and WM (Waste Management). Ultimately, the convergence of these structural and experiential qualities shapes the lovable city dimension, expressed through MH (My Home), ML (My Life), and CP (City Pride), where residents develop a deep sense of belonging, satisfaction, and collective pride in their city.

### 3. Result

#### 3.1 Characteristics and Citizens' Satisfaction with Urban Development Dimensions and Positive Affection toward the Waterfront City of Palembang and Bandar Lampung

According to population size – number population over 1 million persons, there are several metropolitan areas, such as Medan, Batam, Padang, Palembang, and Bandar Lampung. Two of these are in the southern of Sumatera, which they experience a significant urbanization due to located nearby Jakarta as a primate city in Indonesia. Indeed, Palembang and bandar Lampung have different urban characteristics from geophysics, historical, economic, and demographic aspects (see figure 2).

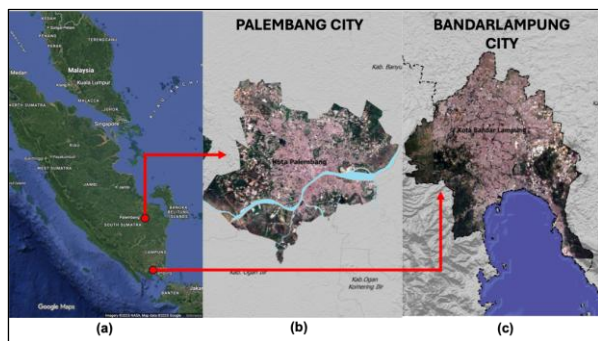


Fig 2. The Map of Sumatera (a): Palembang (a) and Bandar Lampung (b)

The City of Palembang, one of the major metropolitan areas on Sumatra Island with a population of 1.77 million in 2023, possesses a distinctive geographical character as it is divided by the Musi River – a major river that has been the center of life since the 7th century during the era of the Sriwijaya Kingdom. The presence of the Musi River not only shapes the city's historical and cultural identity but also presents ecological challenges, including vulnerability to river flooding, limited green-blue space, and suboptimal drainage systems. From a resilience perspective, these conditions highlight the need to strengthen ecological

infrastructure and adaptive disaster risk governance. As the oldest city in Indonesia, Palembang holds a strong historical and cultural heritage, particularly along the Musi River and the old town area, reflecting the city's urban evolution from the Sriwijaya period to the colonial era.

Economically, Palembang serves as a regional growth center and an international trade hub for South Sumatra, supported by extensive investments in transportation, logistics, and energy infrastructure over the past two decades. Its reputation as a sports city, strengthened through the hosting of the 2018 Asian Games and SEA Games, demonstrates growing urban management capacity, particularly in smart governance and city administration. These achievements not only stimulated urban infrastructure renewal but also solidified Palembang's position within Indonesia's 100 Smart Cities Movement initiated by the Ministry of Communication and Information in 2018. The city's development strategy focuses on digital-based public services, intelligent transportation systems, and integrated urban data management to promote sustainability and resilience.

The figure compares survey responses in Palembang and Bandar Lampung across eight indicators—infrastructure (IFR), facilities (FCT), utilities (UTS), environment (ENV), social (SOC), economy (ECO), government (GOV), and love of cities (LOC)—categorized into Agree-Very Agree, Neutral, and Disagree-Very Disagree. In both cities, most respondents fall within the Agree-Very Agree category, indicating generally positive perceptions of urban conditions (figure 3). Palembang shows slightly lower agreement levels, such as facilities (around 70%), utilities (about 65%), and government (around 45%), accompanied by higher neutral responses—especially in economic aspects (around 40%) and social aspects (around 30%). Meanwhile, in Bandar Lampung, agreement levels are particularly high for utilities (about 90%), love of cities (around 75%), and social aspects (around 70%), with disagreement remaining below 10% across most indicators. Overall, the results highlight that Bandar Lampung demonstrates stronger positive perceptions across most urban indicators, while Palembang exhibits more varied responses with higher neutrality in several sectors.

Citizen satisfaction surveys indicate an average satisfaction rate of around 56%, reflecting a relatively solid foundation for urban development yet uneven progress across sectors. The highest satisfaction levels are found in education (77.25%), healthcare (74.25%), and internet access (75.25%), signaling progress in basic public services. However, low satisfaction in drainage (42.5%), waste management (36.5%), and flood resilience (27.25%) reveals weaknesses in environmental infrastructure and disaster preparedness. Similarly, issues of safety (34%) and public participation (42%) suggest a need for stronger social cohesion and civic engagement (see figure 3).

Bandar Lampung is a coastal city located at the southern tip of Sumatra Island, covering an area of 197.22 km<sup>2</sup> divided into 20 districts and 126 subdistricts. Its strategic position along the Lampung Bay makes it the main gateway to Sumatra and a crucial link between Java and Sumatra through Panjang Port and the Trans-Sumatra Highway. However, this geographical location also exposes the city to significant environmental risks such as sea-level rise, coastal erosion, flooding, and tsunamis – as recorded in the historic 1883 Krakatoa eruption that triggered a massive tsunami across the Lampung Bay area.

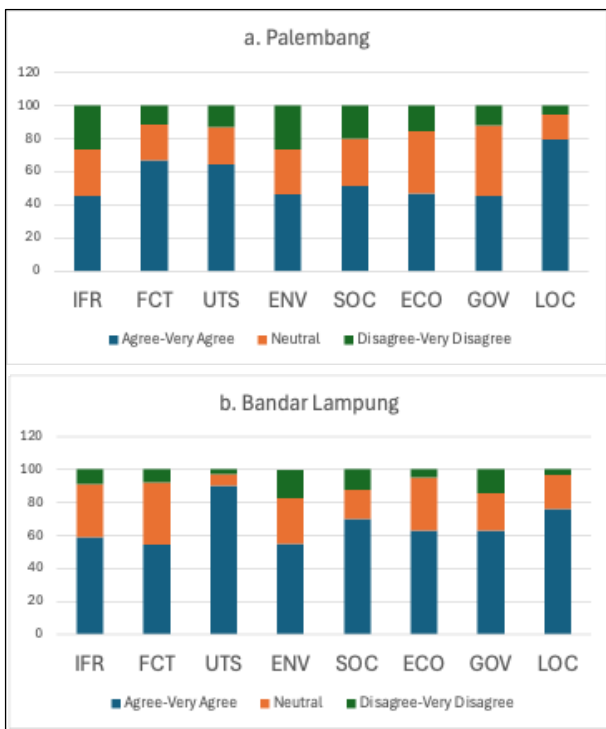


Fig 3. Citizens' Satisfaction with Urban Development and Positive Affection

With a population of around 1.1 million in 2024, Bandar Lampung is characterized by a multiethnic and heterogeneous society shaped by historical transmigration policies since the colonial era, resulting in rich social and cultural diversity. Economically, the city serves as the main trade and service center of Lampung Province, with a dense spatial structure in the coastal and central areas encompassing residential zones, commercial districts, industrial sites, ports, and coastal tourism areas. This rapid economic growth strengthens its role as a regional growth center but also intensifies spatial pressure and environmental degradation in coastal zones. As part of the 100 Smart urbanism Movement (2018), the municipal government has initiated digital-based public services and smart transportation systems. However, data integration across agencies and equal access to digital services still need to be improved to ensure an inclusive and sustainable smart urbanism transformation.

Citizen satisfaction surveys reveal mixed results across different development dimensions. Overall, around 64% of residents express satisfaction, 24% remain neutral, and 12% are dissatisfied, indicating that while the city's development foundation is solid, it remains uneven. The highest satisfaction levels are found in waste management (93.75%), education (94.5%), healthcare (93.25%), and religious facilities (95.75%), reflecting strong performance in basic public services. However, critical areas such as drainage (7.25%), public transportation (14.5%), pedestrian pathways (13%), and resilience to flooding (11%) and extreme weather (12%) show severe deficiencies in urban mobility and climate resilience. Socially, community harmony (83.5%) and cultural preservation (72%) are strong, yet public safety (55.5%) and employment opportunities (35.75%) remain key concerns (see figure 3). Thus, these generate the the dimension of resilient city and few indicators of liveable city in the model are insignificant to enhance lovable city.

Both Palembang and Bandar Lampung demonstrate the need for a paradigm shift in urban policy from growth-oriented development toward sustainability, resilience, and inclusivity. However, the two cities reflect different emphases in their policy implications due to their distinct geographical and socio-economic contexts.

In Palembang, the focus lies on strengthening environmental quality and participatory governance. The city's vulnerability to riverine flooding and ecological degradation along the Musi River underscores the urgency of developing green-blue infrastructure and adaptive drainage systems. Palembang's historical and cultural legacy also supports the need for community-based empowerment and collaborative governance to maintain its identity while fostering sustainability. The key priority is balancing economic growth with environmental resilience and inclusive governance, ensuring that modernization does not come at the cost of ecological stability or civic participation.

Meanwhile, Bandar Lampung – as a coastal and rapidly expanding trade city – faces more acute climate and infrastructure challenges. The findings highlight the necessity of Nature-based Solutions (NbS) to tackle flooding and drainage issues, alongside the development of integrated public transport and pedestrian-friendly urban design. Its urban policy should emphasize resilience to climate change, social inclusion, and community well-being. On the socio-economic side, job creation, urban safety, and MSME empowerment are essential to strengthen local economies. Governance-wise, Bandar Lampung must enhance transparency, citizen participation, and digital service integration to build public trust.

while Palembang's policy implications lean toward environmental governance and participatory management, Bandar Lampung requires infrastructural resilience and socio-economic inclusivity. Both cities share a common trajectory toward becoming resilient, adaptive, and sustainable urban systems, yet their approaches differ – Palembang through governance and ecological restoration, and Bandar Lampung through infrastructure and community-centered adaptation.

### 3.2 Construct Validity and Key Determinants of Smart, Resilient, Livable, and Lovable City Dimensions

For the Smart urbanism variable, Palembang demonstrates eight significant indicators with loading factor values  $\geq 0.7$  CA (0.695), CC (0.745), GS (0.775), IS (0.799), JA (0.780), PP (0.810), TSD (0.806), and UPD (0.757). These findings indicate a strong interrelationship among governance, public participation, and tourism planning and development. The results suggest that Palembang has achieved a balance between governance, civic engagement, and innovation in urban planning – forming a foundation for an adaptive smart urbanism. Conversely, Bandar Lampung presents only five significant indicators CA (0.808), GS (0.884), PP (0.811), TL (0.740), and UPD (0.877), implying that governance remains the fundamental element in shaping its smart urbanism dimension. However, substantial improvements in infrastructure are required to enhance digitalization and urban connectivity. While Bandar Lampung performs relatively well in public service delivery and civic participation, it lags in internet connectivity (0.395) and urban cleanliness (0.468).

For the Resilient City variable, Palembang exhibits three significant indicators DS (0.736), WQ (0.827), and AQ

(0.814), reflecting strengths in drainage systems as well as water and air quality. This suggests that Palembang is relatively better prepared to cope with hydrometeorological disasters through improved water management and drainage infrastructure. In contrast, Bandar Lampung has no indicator exceeding the 0.700 threshold, indicating a relatively low level of urban resilience. The city requires substantial enhancement in disaster preparedness, evacuation route planning, and flood resilience systems, as all indicator values remain below 0.65.

Regarding the Livable City variable, Palembang records eight significant indicators CWS (0.795), EF (0.797), GOS (0.826), HT (0.838), PT (0.819), PW (0.770), RF (0.801), and RN (0.799), reflecting a well-developed living environment from social, facility, and infrastructural perspectives. Bandar Lampung also demonstrates seven strong indicators CWS (0.904), EF (0.933), HT (0.940), RF (0.937), RN (0.887), WM (0.952), although several public-oriented aspects such as public transportation (PT), pedestrian walkways (PW), and green open spaces (GOS) remain weak. Overall, Palembang performs better in social and spatial aspects – particularly in green spaces and public transport – while Bandar Lampung excels in basic service provision and environmental cleanliness management. The low Living Cost (LC) values in both cities indicate that perceived affordability does not play a dominant role in determining overall livability.

In the Lovable City dimension, both cities exhibit exceptionally high indicator values (MH, ML, CP), with all loading factors exceeding 0.899. This signifies a strong emotional attachment of residents to their respective cities. Bandar Lampung slightly outperforms Palembang in the My Home (0.921) and City Pride (0.914) indicators. Such high scores demonstrate that urban identity and pride are well established in both cities, with city pride emerging as a key driver for strengthening residents' sense of belonging and enhancing the city's overall image.

Comparative analysis across variables reveals that Palembang maintains more stable and robust relationships among the Smart, Resilient, and Livable City dimensions – serving as a structural foundation for building an adaptive and sustainable city. Meanwhile, Bandar Lampung stands out in the affective dimension (Lovable City) but needs to reinforce its resilience and digital connectivity to achieve more balanced urban development. These findings highlight that residents' emotional attachment to a city does not necessarily correlate with its structural readiness. Palembang demonstrates strengths in structural and governance aspects, whereas Bandar Lampung excels in social identity and collective civic pride (see figure 4 and 5).

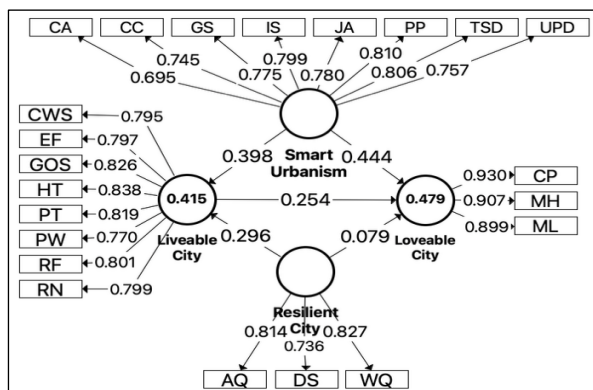


Fig 4. Model of SRLL in Palembang

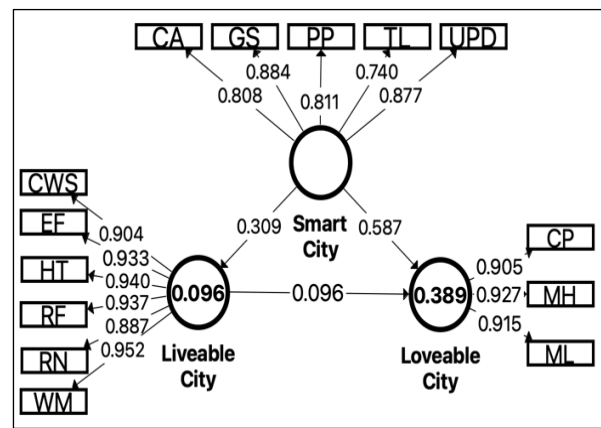


Fig 5. Model of SRLL in Bandar Lampung

### 3.3 Interlinkages between Smartness, Resilience, Livability, and Urban Lovability

In Palembang, the path analysis indicates that Smart urbanism → Lovable City ( $p = 0.000$ ) has a strong and significant positive relationship, suggesting that the implementation of smart urbanism concepts directly enhances residents' emotional attachment and pride in their city. The Smart urbanism → Livable City path ( $p = 0.000$ ) is also strong, meaning that technological innovation and smart governance contribute significantly to improving urban comfort and livability. Similarly, Resilient City → Livable City ( $p = 0.000$ ) is significant, showing that adaptive measures against disaster risks and the development of robust environmental systems enhance the city's habitability. However, the Resilient City → Lovable City path ( $p = 0.205$ ) is not significant, indicating that urban resilience has not yet been perceived directly by residents as a factor influencing their emotional attachment. In contrast, Livable City → Lovable City ( $p = 0.000$ ) is significant, confirming that a comfortable and livable city fosters residents' sense of belonging and pride (see table 1).

In Bandar Lampung, the Smart urbanism → Lovable City path ( $p = 0.000$ ) shows a very strong relationship, with the highest T-statistic value (11.922). This indicates that residents perceive direct emotional benefits from digital innovation and smart services. The Smart urbanism → Livable City relationship ( $p = 0.000$ ) is also strong, meaning that digitalization contributes to residents' quality of life. However, Livable City → Lovable City ( $p = 0.077$ ) is not significant, suggesting that while the city may be comfortable, this does not automatically translate into stronger emotional attachment or civic pride (See Table 1).

These findings reveal distinct relational dynamics between the two cities. In Palembang, Livable City serves as a crucial bridge between the smart and lovable dimensions, while Resilient City exerts little direct influence on emotional attachment. Conversely, Bandar Lampung exhibits a more direct and stronger linkage between Smart urbanism and Lovable City, meaning that public service innovation and digital governance more effectively build emotional connections with residents, even though they have yet to significantly improve perceived urban comfort. Both cities rely on technology as a major driver of positive citizen perception, yet through different pathways: Palembang follows the sequence Smart → Livable → Lovable, while Bandar Lampung demonstrates a fragmented relationship – Smart → Lovable – with a weaker livability link (see table 2).

Table 1. The interlinkages among variables

The interlinkages among variables	Original Sample	Sample Mean	Standard Deviation	T Statistic	P Value	Correlation
PALEMBANG						
Smart urbanism-> Lovable City	0,398	0,401	0,049	8,185	0	Significant
Smart urbanism -> Livable City	0,444	0,442	0,06	7,371	0	Significant
Resilient City -> Livable City	0,296	0,296	0,055	5,388	0	Significant
Resilient City -> Lovable City	0,079	0,085	0,062	1,268	0,205	not statistically significant
Livable City -> Lovable City	0,254	0,253	0,048	5,286	0	Significant
BANDAR LAMPUNG						
Smart urbanism-> Lovable City	0,587	0,586	0,049	11,922	0	Significant
Smart urbanism -> Livable City	0,309	0,313	0,053	5,851	0	Significant
Livable City -> Lovable City	0,096	0,1	0,054	1,771	0,077	not statistically significant

Table 2. The interlinkages among variables mediated by an intermediate variable

The interlinkages among variables mediated by an intermediate variable	Original Sample	Sample Mean	Standard Deviation	T Statistic	P Value	Correlation
PALEMBANG						
Smart urbanism -> Livable City -> Lovable City	0,101	0,101	0,022	4,509	0	Significant
Resilient City -> Livable City -> Lovable City	0,075	0,075	0,02	3,69	0	Significant
BANDAR LAMPUNG						
Smart urbanism -> Livable City -> Lovable City	0,03	0,032	0,019	1,589	0,113	not statistically significant
Smart urbanism -> Livable City -> Lovable City						not correlated

In Palembang, two indirect relationship models were identified:

1. Smart urbanism → Livable City → Lovable City ( $\beta = 0.101$ ;  $p = 0.000$ ), indicating that the adoption of smart urbanism principles enhances livability, which subsequently fosters emotional attachment and pride among residents. Technological innovation, digital governance, and public participation collectively improve quality of life and urban lovability.
2. Resilient City → Livable City → Lovable City ( $\beta = 0.075$ ;  $p = 0.000$ ), meaning that urban resilience in disaster preparedness and environmental management also contributes indirectly to citizens' emotional connection by ensuring safety and security, which are key aspects of livability.

These results confirm that Livable City acts as a significant mediator between Smart/Resilient City and Lovable City. In other words, a city can only become lovable when it first becomes livable – when it successfully provides comfort, safety, and adequate public facilities.

In Bandar Lampung, only one indirect relationship was detected: Smart urbanism → Livable City → Lovable City ( $\beta = 0.030$ ;  $p = 0.113$ ), which is not significant. This indicates that smart urbanism development has not yet translated into improved livability or emotional attachment. Livable City does not function effectively as a mediator, likely due to limited basic infrastructure, weak environmental resilience, and persistent social inequality. Although the city has advanced digital innovation, these efforts have not

yet transformed residents lived experiences into greater comfort or pride.

Comparatively, Palembang demonstrates a synergistic and hierarchical interconnection – Smart → Livable → Lovable – whereas Bandar Lampung's relationships are more fragmented, with smart initiatives standing independently without reinforcing livability. The social implications of these patterns are also notable: in Palembang, residents report feeling safe, comfortable, and proud of their city, while in Bandar Lampung, citizens have yet to fully experience the tangible benefits of urban innovation. Overall, Palembang reflects strong integration between innovation, resilience, and quality of life, resulting in a city that is both functional and emotionally valued by its residents. Bandar Lampung, on the other hand, remains in a transitional phase, where smart urbanism initiatives have yet to evolve into improved wellbeing and civic pride.

#### 4. Discussion

A comparative analysis between Palembang and Bandar Lampung reveals contrasting dynamics in how the dimensions of smartness, resilience, and livability contribute to shaping a lovable city – one that not only functions efficiently but is also emotionally cherished by its residents. These findings support the theoretical perspective that urban lovability emerges from the interaction between a city's body (its physical and structural performance, environmental quality) and its soul

(cultural identity, history, community spirit, atmosphere, and shared social values) (Kourtiti et al., 2022; Kourtiti, Neuts, et al., 2021). Although both cities are categorized as waterfront metropolises, their differing geographic characteristics (riverside vs. coastal), institutional capacities, and social foundations have produced distinct models of interdimensional relationships.

In Palembang, the synergistic connection among the smart, resilient, and livable city dimensions is evident, particularly through the significant Smart → Livable → Lovable pathway. This pattern reinforces the Smart Urbanism framework (Viehl et al., 2024; Yigitcanlar et al., 2018), which argues that a city's smartness is not merely defined by digitalization, but by its governance capacity to integrate technology, transparency, and citizen participation to improve quality of life. Enhancements in livability through digital public services, transport efficiency, and participatory governance have significantly contributed to residents' sense of pride and belonging.

From a resilience perspective, Palembang's strength in drainage systems, water, and air quality reflects adaptive capacity in mitigating hydrometeorological risks. The indirect pathway Resilient → Livable → Lovable emphasizes that resilience contributes not only to technical robustness but also to the perceived quality of life, safety, and emotional connection among citizens. This aligns with the findings of Alidoust, (2023) and Zeng et al., (2022) who argue that urban resilience enhances social wellbeing and citizens' perception of urban futures. The livable city dimension acts as an affective precondition for lovability by cultivating feelings of togetherness, pride, and happiness through safe, comfortable, and participatory spatial experiences – thereby fostering a collective urban identity (Mouratidis, 2021; Rambhoros et al., 2025).

In contrast, Bandar Lampung exhibits a dominant Smart → Lovable pattern, whereas Smart → Livable → Lovable is statistically insignificant. This suggests that the development of a smart urbanism in Bandar Lampung promotes urban affection primarily through social capital and governance, despite its limited infrastructure sophistication. This finding is consistent with prior studies (Chang & Smith, 2023; Jnr, 2023; Lee et al., 2022; Szarek-Iwaniuk & Senetra, 2020), which emphasize that human capital and governance are fundamental to fostering civic attachment, emotional engagement, social representation, and inclusivity in smart urbanism development.

The results further demonstrate that residents' attachment to their city does not necessarily stem from the quality of physical infrastructure, urban facilities, or accessibility – the body of the city – but can instead grow from its symbolic capital or soul of the city, associated with cultural identity, history, community, and social values (Kourtiti et al., 2022; Kourtiti, Neuts, et al., 2021). The high values for My Home and City Pride indicators in Bandar Lampung highlight the strength of social and community identity, particularly within its heterogeneous coastal culture. However, the city's low performance in resilience-related indicators, especially those concerning physical systems or the body of the city, reflects infrastructural and technological gaps that hinder overall livability.

Comparatively, the two cities exemplify distinct conceptual models in developing a lovable city:

The Structural-Integrative Model (Palembang) – aligned with the theory that urban affection is shaped through the inseparable development of a city's body (physical systems and infrastructure) and soul (social identity and collective meaning).

The Social-Emotional Model (Bandar Lampung) – representing a form of social and governance smartness,

where social capital and participatory governance serve as foundational elements for cultivating civic pride and emotional connection, even in the absence of advanced infrastructural improvements.

These findings enrich the discourse on smart–resilient–livable–lovable city interlinkages by demonstrating that technological innovation alone is insufficient for fostering emotional attachment. Instead, a city becomes genuinely lovable when smart and resilient systems are human-centered, inclusive, and embedded within the socio-cultural identity of its people.

## 5. Conclusion

This study demonstrates that the emergence of a lovable city – a city emotionally cherished and valued by its residents – depends strongly on the dynamic interrelations among the smart, resilient, and livable city dimensions. These three dimensions collectively enhance urban quality of life, which in turn strengthens citizens' emotional attachment to their city.

A comparative analysis between Palembang and Bandar Lampung reveals two distinctive developmental models. Palembang represents a structurally integrated model, in which the smart and resilient dimensions reinforce livability, subsequently fostering lovability (Smart → Resilient → Livable → Lovable). In contrast, Bandar Lampung reflects a symbolic model, where smart urbanism initiatives directly build civic pride and affection (Smart → Lovable), yet have not fully improved everyday comfort and livability.

These findings advance theoretical understanding by emphasizing that urban affection emerges from the synergy between the body of the city – its infrastructure, governance, and physical systems – and the soul of the city – its identity, culture, and collective meaning (Kourtiti et al., 2022; Kourtiti, Neuts, et al., 2021). Hence, effective urban planning should not solely address physical needs but also enhance citizens' psychological and emotional wellbeing (Rambhoros et al., 2025; Sheikh & Van Ameijde, 2022).

The proposed SROLL Model (Smart–Resilient–Livable–Lovable) positions lovability not as a standalone dimension but as the outcome of an integrated system combining structural performance, adaptive governance, and collective identity. From a practical standpoint, the findings underscore the need to shift policy orientation from technology-driven development toward human-centered and ecologically resilient urban governance. Palembang should continue to consolidate its digital and environmental governance systems, while Bandar Lampung must prioritize infrastructural resilience, climate adaptation, and inclusive digital access. For both cities, the implementation of Nature-based Solutions (NbS) and participatory urban design are essential for translating innovation and resilience into a lived experience of civic pride and belonging.

In general, this study contributes to a contextualized understanding of how technological intelligence, environmental resilience, and urban livability interact to shape emotional bonds between citizens and their cities. It provides direction for realizing future cities that are resilient, sustainable, and deeply loved by their inhabitants – particularly these findings deliver insight of how to plan the future cities relate to the case studies - coastal and riverine urban areas – of the Global South, such as Indonesia.

The study is primarily constrained by its limited exploration of social indicators within the smart, resilient, and livable city dimensions, resulting in a framework that

leans heavily toward technical and structural performance. To advance urban development discourse, future research should integrate more nuanced social metrics – such as social capital, community cohesion, and equitable access – to capture the human experience more comprehensively. By expanding the model to include these socio-emotional variables, subsequent studies can better explain the mechanism behind resident pride and provide a more holistic blueprint for developing cities that are not only technologically advanced but also socially inclusive and emotionally resonant.

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