Salehpour Servak Z. et al.
July 2026
Urban Economics and Planning
Volume 7, Issue 4

Original Article

Received: 2025/11/04
Revised: 2025/11/26
Accepted: 2025/11/27

HOW TO CITE THIS ARTICLE
Salehpour Servak Z. Asgari A. Saberi A. Bahadori B. The role of smart urban transportation network in enhancing the vitality of public spaces in Yasuj city. *Urban Economics and Planning* 7(4):98-115.

DOI: 10.22034/uep.2025.557571.1767

The role of smart urban transportation network in enhancing the vitality of public spaces in Yasuj city

Zarir Salehpour Servak[1], Atiyeh Asgari[2*], Ali Saberi[3], Behnaz Bahadori[4]

1. Assistant Professor, Department of Architecture and Civil Engineering, Faculty of Engineering and Technology, Yasuj Azad University, Yasuj, Iran
2. Assistant Professor, Department of Urbanism. ST.C, Islamic Azad University, Tehran, Iran
3. Ph.D. Student of Spatial Planning, Department of Human Geography and Planning, Faculty of Geography, University of Tehran, Tehran, Iran
4. Ph.D. Student of Geography and Urban Planning, Department of Human Geography and Planning, Faculty of Geography, University of Tehran, Tehran, Iran

Abstract

The functional benefits of intelligent transportation systems (ITS), such as reducing traffic congestion and pollution, are well-documented; however, their mechanisms of influence on qualitative and social dimensions of urban life, particularly urban vitality, have been far less examined. It remains unclear how smart transportation technologies, beyond technical optimization, can directly foster social interactions, support local businesses, and contribute to more vibrant and engaging public spaces. Accordingly, the present study aims to analyze the role of smartening urban transportation networks in enhancing the vitality of public spaces in the city of Yasuj. This research is applied in terms of purpose and employs a descriptive–analytical methodology. The findings indicated that both ITS components and urban vitality indicators in Yasuj are in an unfavorable condition, revealing a significant gap between the current situation and desirable standards. Structural modeling results confirmed a direct and meaningful relationship between transportation smartening and the enhancement of urban vitality. However, the influence of ITS dimensions on vitality was not uniform. Efficiency, sustainability, and accessibility showed the strongest effects on vitality (with path coefficients of 0.245, 0.208, and 0.208, respectively), while components such as public awareness (0.037) and user satisfaction (0.039) did not exhibit statistically significant impacts. Overall, the structural model demonstrated that ITS development exerts its strongest influence on the socio-cultural dimension of vitality in the study area, suggesting that smart transportation can serve as a key strategy for improving the quality, liveliness, and social dynamism of urban public spaces.

Keywords

Smartification
Social Interactions
Transportation Network
Urban Liveliness
Yasuj

* Corresponding Author: a_asgari@iau.ac.ir

1. Introduction

Modern cities face numerous challenges today, including rapid population growth in urban areas, which leads to increased pollution, heavier traffic, and growing demands such as energy consumption (Yildirm et al., 2025). Meanwhile, smart city ecosystems represent the next generation of urban environments that rely on intelligent information and communication technologies to provide information and bidirectional energy flows (Jafari et al., 2024). A smart city comprises six fundamental components: smart economy, smart mobility, smart environment, smart people, smart living, and smart governance (Moura & de Abreu e Silva, 2019). Through the integration of ICT and data analytics, smart city aims to optimize urban operations, enhance the quality of public services, and improve citizens' well-being (Feizi et al., 2020).

Among the essential pillars of smart cities is smart transportation, or Intelligent Transportation Systems (ITS). Smart transportation refers to the integrated application of advanced managerial strategies and modern technologies, including sensors, computing systems, electronics, and communication technologies, to increase the efficiency and safety of urban mobility systems (Elassy et al., 2024). The primary goal of ITS is to enable rapid data transmission and provide high-accuracy situational awareness of urban traffic environments, ensuring precise, timely, and efficient transportation (Almatar, 2024), thereby improving quality of life, minimizing environmental impacts, enhancing social inclusion, and contributing to a more efficient urban economy (Jiang et al., 2024).

Generally, the key objectives of smart transportation include reducing traffic congestion, optimizing travel time, lowering fuel consumption and pollutant emissions, and ultimately improving users' overall experience of the transportation system (Elassy et al., 2024). However, the role of transportation extends far beyond the mere movement of people and goods; it fundamentally shapes social interactions, economic activities, and the quality of public spaces. These broader implications highlight the importance of the concept of urban vitality. Urban vitality refers to the dynamism, diversity, and vibrancy of urban spaces, driven by human presence and activities (Jiang et al., 2022). A vibrant city features active public spaces, diverse economic and social activities, and appealing environments that can boost economic productivity, enhance social interaction, and improve public safety. As such, vitality serves as a key indicator for assessing the quality and sustainability of urban development (Lee & Cho, 2025). Factors including population density, mixed land uses, economic dynamism, accessibility, and efficient transportation networks play crucial roles in shaping urban vitality (Cai et al., 2025).

In medium-sized Iranian cities, particularly Yasuj, rapid urbanization over the past few decades has led to significant challenges in mobility, public space quality, and a decline in urban vitality. Yasuj, with a population of 134,532 and an annual growth rate of nearly 3.5 percent over the past decade (Statistical Center of Iran, 2016), has expanded without a corresponding improvement in its transportation infrastructure. The heavy reliance on private vehicles, the absence of an efficient public transportation system, inadequate street lighting, numerous accident-prone points, and disjointed traffic management have all contributed to a decreased public presence, reduced perceived safety, and the formation of inactive public spaces during off-peak hours (Hosseini & Saberi, 2023). These issues stem from the city's relatively recent establishment, structural weaknesses in policy-making and implementation, and the repercussions of unplanned urban sprawl and expansion under the influence of a monocentric system dependent on outdated transportation infrastructure over the past five decades (Pourahmad et al., 2023: 17). Consequently, the quality of mobility experience has diminished, social interactions have been constrained, and small-scale urban economic activities weakened.

Globally, ITS is recognized not only for reducing congestion and travel time but also as a tool for enhancing safety, improving equitable access, strengthening social interactions, and supporting urban vitality. Nevertheless, it remains unclear how such technologies can foster vitality in developing cities like Yasuj and through what mechanisms. The influence of technology on social dynamism can be ambivalent: increased speed and efficiency may reduce street-level interactions, or conversely, improved accessibility and reduced mobility barriers may enhance social presence. Despite the potential benefits of ITS, Yasuj has made limited progress in adopting these technologies, and a considerable gap remains between the city's current situation and desirable standards of smart mobility. Therefore, given the importance of urban smart transportation as a core component of smart cities and its role in fostering urban dynamism, this study aims to assess the existing transportation system of Yasuj in terms of smart mobility capabilities and its impacts on the vitality of public urban spaces.

2. Theoretical foundations

The rapid growth of urbanization and increasing complexity of urban management have brought the concept of "smart city" to the forefront of academic and policy discussions as a transformative approach for enhancing sustainability, resilience, and quality of life (Praharaj, 2025; Abdalla et al., 2026). Smart cities are built upon a technology-driven logic in which the integrated use of information and communication technologies, data analytics, and digital infrastructure improves the efficiency of urban services, enhances livability, and supports sustainable resource management (Wang et al., 2021). Within this framework, Intelligent Transportation Systems (ITS) represent one of the most fundamental dimensions of the smart city, because they manage essential urban functions of mobility, accessibility, and spatial connectivity, linking nearly all physical, social, and economic elements of the city (Xavier et al., 2025). ITS leverages technologies such as the Internet of Things, artificial intelligence, advanced sensors, and big data analytics to enhance safety, reduce congestion, increase travel efficiency, and improve the overall experience of urban mobility (Elassy et al., 2024; Algherbal & Ratrout, 2025). Accordingly, many contemporary theories of urbanism describe ITS as the "smart mobility infrastructure" and a core foundation shaping sustainable urban development. Conversely, institutional, managerial, and technological challenges, including limited resources, insufficient standards, and social inequalities, may restrict the potential of ITS and hinder the full realization of its benefits (Bozkurt et al., 2025).

At the intersection of technological advancements and the social dimensions of urban environments, the concept of urban vitality becomes critical. Urban vitality is a qualitative construct that refers to the sense of dynamism, vibrancy, and attractiveness of urban spaces, serving as a key metric for assessing the long-term quality and sustainability of cities (Cai et al., 2025). It is shaped by factors such as time, place, productive activities, transportation systems, and supportive urban services (Deng & Zimo, 2023). It also refers to the characteristics of the urban environment, such as population density, mixed land uses, and access to services and transportation, that contribute to the attractiveness and vitality of cities (Madrid-Solorza et al., 2023).

Urban vitality has deep theoretical roots within classical urban planning. It has been a central concern across various schools of thought, often emerging as a response to the shortcomings of modernist planning and the perceived monotony and fragmentation of contemporary urban spaces. As Chapman (2009) argues, the vitality of urban centers is contingent upon addressing pressures related to declining urbanization, mobility, social change, and leisure and tourism. Broadly, urban vitality is grounded in postmodern urban theory, and operationalizing these concepts in societies still shaped by modernist paradigms poses philosophical and structural challenges, as the foundational preconditions for such concepts may be absent (Hosseini et al., 2022: 36). Urban vitality also plays a key role in newer planning paradigms. For instance, New Urbanism and Smart Growth theories of the 1990s argue that highly vibrant urban areas manifest enhanced quality of life through active social interactions, public activities, and a strong sense of place, all of which contribute to reconstructing the essential qualities of urban environments (Li et al., 2022).

Urban vitality is also emphasized in the works of leading scholars. Jane Jacobs (1961) defines vitality as the result of mixed land uses, sufficient density, continuous human presence, and frequent social interactions. Landry (2000) identifies accessibility, safety, identity, diversity, and social cooperation as foundational components of vibrant cities. In more recent approaches, vitality is viewed as an outcome of the interaction between physical space quality, access networks, mixed-use development, and opportunities for social engagement (Qiao & Zheng, 2025). Contemporary studies on smart growth and new urbanism similarly argue that vitality emerges from the coordination of mixed-use development, walkability, and accessibility, and cannot be achieved without an efficient and integrated transportation system (Lee et al., 2022). This perspective highlights mobility and accessibility as core prerequisites for fostering human activity and urban life.

From this standpoint, smart transportation is not merely a technical mechanism for movement but a socio-spatial infrastructure that enhances accessibility, increases safety and comfort, reduces temporal and spatial costs, and promotes environmental sustainability, thereby encouraging greater public presence, strengthening social interactions, and enriching the experience of public spaces (Algherbal & Ratrout, 2025; Cai et al., 2025). Thus, the relationship between smart transportation and urban vitality is structural and reciprocal: transportation technologies and network quality directly influence the dynamism, vibrancy, and flow of urban activities. However, the realization of these benefits depends on a city's institutional and managerial capacities; challenges such as resource scarcity, weak governance, or lack of inter-agency coordination may limit the contribution of ITS to urban space quality (Wang et al., 2021).

Accordingly, the theoretical framework of this study is built on the premise that smart transportation—by enhancing efficiency, safety, accessibility, travel experience, and sustainability—can establish the foundational conditions necessary for fostering urban vitality and act as a structural driver of social life, urban interaction, and the attractiveness of public spaces. The integration of these theoretical streams is based on the assumption that urban mobility is not solely a technical process of movement, but a socio-spatial infrastructure that shapes human interaction, public presence, and urban dynamism. From this perspective, ITS, through reducing temporal–spatial barriers, improving equitable access, enhancing safety, and optimizing travel experiences, serves as a structural catalyst for vitality-related components such as social activity, interaction, sense of belonging, and quality of public space experience. Therefore, the theoretical framework posits that the various dimensions of ITS (efficiency, safety, accessibility, sustainability, and travel experience) play a decisive role in enhancing urban life and improving overall levels of vitality.

3. Literature review

Abdalla et al. (2026) identified the principal drivers of knowledge management in smart city projects. Their results showed that five factors, including enhanced knowledge sharing, prevention of knowledge loss, integration of knowledge assets, improved knowledge documentation processes, and increased employee productivity, represent the most influential drivers in smart city contexts.

Algherbal and Ratrout (2025) examined the integration of autonomous vehicles into intelligent transportation systems (ITS). Their findings highlighted that ITS technologies play a significant role in reducing congestion, enhancing safety, and improving network efficiency; however, the impact of autonomous vehicles on congestion and safety is dual in nature and depends largely on their penetration rate within the network. The study underscored the necessity of gradual and well-planned strategies to ensure coexistence between autonomous and non-autonomous vehicles.

Bozkurt et al. (2025) evaluated data governance models in European smart cities. Their results revealed that requirements such as data standardization, clear access protocols, and strengthened cross-sectoral collaboration are among the core needs for effective data governance. They also found substantial variation across existing governance models regarding their ability to meet these needs, emphasizing that cultivating a data-driven culture is vital for the success of urban smartification projects.

Xavier et al. (2025) analyzed and classified Brazilian cities based on their degree of smartness. Using the K-means clustering algorithm, the findings indicated that variations in cities' infrastructure, technological maturity, and the number of ICT-based projects are key determinants of their level of smartness. The study highlighted that effective utilization of ICT tools plays a crucial role in enhancing urban management and citizen well-being.

Elassy et al. (2024) investigated the components of ITS and their role in urban sustainability. Their study demonstrated that technologies such as vehicular networks, intelligent traffic lights, virtual signage, and movement-prediction systems substantially contribute to improving safety and efficiency and reducing environmental impact. They also highlighted the data security and privacy concerns and, through case examples, illustrated how proper implementation of ITS can significantly improve urban transport performance.

Almatar (2024) examined the requirements and challenges of smart transportation planning in Saudi Arabia. Findings showed that the main motivations for adopting smart transportation include the need for enhanced safety, speed, and efficiency, which collectively improve the quality of life for citizens. Nonetheless, challenges such as insufficient resources, weak legal frameworks, and a shortage of skilled professionals continue to be major obstacles to system development.

Wang et al. (2021) assessed the inclusiveness of proposals submitted to the U.S. Department of Transportation's "Smart City" challenge. Their results indicated that many submissions failed to address the needs of older adults, people with disabilities, and other underserved groups. Thus, the study emphasizes that smart city development without inclusive design considerations may exacerbate inequalities, highlighting the crucial role of governmental policymaking in ensuring equity.

San'atgar et al. (2025) examined citizen perspectives toward smart public transportation in 15 districts of Isfahan. Their findings revealed that efficiency and satisfaction are considered the most significant indicators influencing the smartification of public transport. Among the districts, District 6, followed by Districts 1 and 5, demonstrated the highest readiness for implementing smart transport systems.

Esmaeili et al. (2024) investigated the challenges of developing smart urban transportation in Tabriz metropolis. Their results showed that the city faces numerous obstacles—including a lack of integrated urban management, absence of a clear vision, weak planning, limited financial resources, and insufficient institutional structures—which collectively hinder the advancement of smart transportation initiatives.

Golkar et al. (2024) explored the role of smart transportation in the socio-economic development of Tehran. Their results indicated that although no significant correlation was found between smart transport infrastructure and macro-level socio-economic indicators, the most considerable impacts of smart transportation appear at micro-levels, including the creation of secondary employment opportunities, improved quality of life, time savings, and enhanced spatial justice in accessibility. The study argues that the impacts of smart transportation are not only reflected in major economic indicators but also manifest prominently in everyday urban experiences and improved travel conditions.

4. Materials and methods

4.1. Study area

Yasuj, the capital city of Boyer-Ahmad County and Kohgiluyeh and Boyer-Ahmad Province, is located in southwestern Iran. Geographically, the city occupies the northeastern part of the province. Yasuj borders Chaharmahal and Bakhtiari Province to the north, Khuzestan to the west, Bushehr to the south, and Fars and Isfahan provinces to the east (Pourahmad & Saberi, 2025: 34). According to the Statistical Center of Iran, the population of Yasuj in 2016 reached 134,532 residents (Hosseini & Saberi, 2023: 181). The city is situated in a cold-climate region characterized by moderately cold weather conditions. Its climatic features, distinctive topography, and spatial configuration have shaped unique patterns of daily movement, travel behavior, and needs associated with intelligent transportation systems—distinguishing Yasuj from many other cities in Iran (Seyadat-Hasannouran et al., 2025: 28). Additionally, the city's multi-nodal spatial structure further reinforces the need for smart transportation solutions aimed at improving accessibility, enhancing intra-urban mobility, and promoting urban vitality. Accordingly, analyzing the role of smart transportation in shaping urban vibrancy in Yasuj requires simultaneous consideration of its climatic, physical, and intra-city structural characteristics.

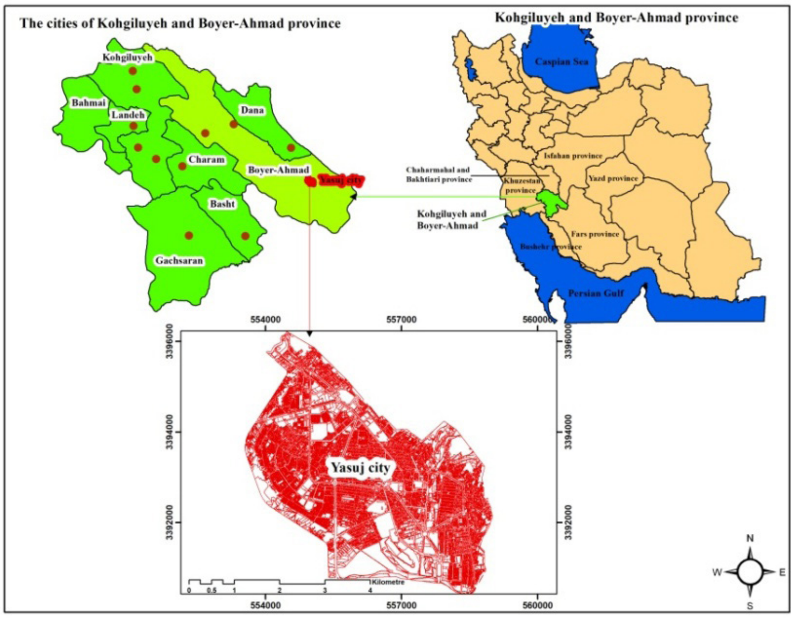

Figure 1. Map of the study area

4.2. Research methodology

This study is applied in nature and employs a survey-based design using a mixed quantitative–qualitative approach. The statistical population consists of eligible residents of Yasuj. Using Cochran's formula, a sample size of 384 individuals was estimated, and sampling was conducted through a non-probability convenience method. Although convenience sampling is commonly used in urban studies due to ease of implementation and the ability to collect data quickly, it carries several limitations. Respondents available at the time and place of questionnaire distribution may differ demographically or in their use of smart transportation systems from those not sampled. Individuals who volunteered to participate may also hold different attitudes or experiences compared to those who declined participation. Additional limitations include uneven spatial distribution of respondents and reduced generalizability, as the data primarily reflect the perceptions of those included in the sample rather than the entire population. Despite these limitations, the exploratory nature of the study, the city's dispersed population distribution, and the difficulty of simultaneously accessing diverse groups made this sampling method the most feasible option. To mitigate limitations, questionnaires were distributed across various districts and among different age groups. Data were collected using a standardized questionnaire comprising two sections: dimensions of intelligent transportation and dimensions of urban vitality. Questionnaires were administered both in-person and online. The validity of the questionnaire was assessed and confirmed through face validity and through expert review, as well as through convergent validity. Seven specialists (Table 1) reviewed the questionnaire for content and face validity; three rounds of revisions were conducted, and inappropriate items were removed or rewritten. The final version was approved by all experts. Reliability was tested using Cronbach's alpha and composite reliability, both of which met acceptable thresholds. For data analysis, a one-sample t-test in SPSS was employed to evaluate the status of each component relative to the average threshold (value = 3). Pearson's correlation coefficient was used to assess relationships between intelligent transportation and dimensions of urban vitality. Subsequently, to model causal relationships and determine the effects of ITS components on urban vitality, structural equation modeling using Partial Least Squares (PLS) in SmartPLS was applied. PLS was selected because of its suitability for complex models with multiple latent constructs, its robustness to non-normal data, and its strong predictive analytical capability. These combined analytical methods enabled a precise explanation of relationships, assessment of measurement indicators, and analysis of the conceptual structure of the research.

Table 1. Profiles of experts and academic professors

Section	Activists	Number (people)	Place of activity
Research Validity	University professors	2	Yasuj State University, Yasuj Azad University Branch
	Managers and executive experts	3	Yasuj Municipality (Deputy of Transportation and Traffic and Deputy of Urban Development)
	Students and graduates	2	Graduate of the University of Tehran

Table 2. Components of urban transportation smartization examined in the research, based on (Golkar et al., 2025; Kaveh et al., 2024; Esmaili et al., 2024; Karimi Aghcheh et al., 2023..Li et al., 2025; Jnr, 2025; Kirejev et al., 2025; Algherbal&Ratrout, 2025; Al-matar, 2024; Elassy et al., 2024)

Component	Question
Sustainability	The use of public transportation in the city has effectively helped reduce air pollution (ST1); the current transportation network is a good incentive for walking and cycling (ST2); the use of new technologies in transportation (such as new buses) has reduced fuel and energy consumption (ST3); the development of urban transportation has been consistent with preserving green spaces and the city's environment (ST4); and, compared to private cars, I consider current public transportation to be an environmentally friendly option (ST5).
Accessibility	I have easy access to public transportation stations (bus, taxi) from my place of residence (ST6); public transportation services are adapted for the elderly and physically disabled (ST7); the costs of using public transportation in the city are fair and affordable (ST8); I can easily use a combination of several public vehicles to reach different parts of the city (ST9); and public transportation services are available at different times of the day (even late at night) (ST10).

Component	Question
Safety and security	I feel safe at stations and inside public transport (ST11); intelligent surveillance (such as cameras) has helped increase safety and reduce traffic violations (ST12); I feel safe when crossing pedestrian crossings at intersections (ST13); the lighting and safety of stations and passages at night is sufficient and appropriate (ST14); and the urban transport system has high safety standards (ST15).
Knowledge and awareness	Information about public transport routes and schedules is clear and accessible (ST16); navigation and transportation apps provide accurate and reliable information (ST17); I am well informed about traffic conditions and alternative routes through smart signs or apps (ST18); finding my way and using public transport in our city is simple and without confusion (ST19); and I can easily find out how to pay the fare (cash or electronic) (ST20).
Satisfaction	I am satisfied with the orderliness and punctuality of public transportation (especially buses) (ST21); the level of cleanliness and hygiene at stations and public transportation is acceptable (ST22); the behavior of drivers and public transportation employees is respectful and professional (ST23); timely and appropriate notification is provided when problems or delays occur (ST24); I am satisfied with the quality of my travel experience with public transportation (ST25); and amenities such as air conditioning (cooling and heating) in vehicles are appropriate (ST26).
Efficiency	Using public transportation saves time on my daily commute (ST27); the smart transportation system has been able to reduce traffic on the city's main roads (ST28); the waiting time for public transportation (bus, taxi) is short and reasonable (ST29); finding a parking space in central areas of the city has become easier with the help of smart technologies (ST30); public transportation routes are designed directly and optimally (ST31); and the fare payment process (such as using a ticket card) is fast and efficient (ST32).
Acceptance and participation	I am willing to use electronic payment methods instead of cash (ST33); I trust transportation apps in terms of protecting my privacy and information security (ST34); using public transportation is a smarter choice compared to a personal car (ST35); I am willing to participate in surveys and participatory programs of the municipality to improve services (ST36); I believe that the municipality cares about citizens' feedback and suggestions about transportation problems (ST37); I welcome innovations and new technologies in the urban transportation system (ST38); I think that the culture of using public transportation among citizens is improving (ST39); and I am willing to share my travel information anonymously to receive better services (ST40).

Table 3. Components and subcomponents of urban vitality, examined in the research based on (Shahrokhifar et al., 2022; Molavi et al., 2020; Hosseini and Saberi, 2023; Kozegar et al., 2023; Charejoo et al., 2023; Jalaladdini & Oktay, 2011; Jacobs, 1961)

Component	Indicator	Question
Sociocultural	Safety and security	Time variation in the presence of residents, security of residential streets from bicycles and motorcycles, street harassment, lighting of public spaces at night, defenseless spaces, safe environment, constant movement throughout the day and night, lighting and illumination of public spaces, and women's sense of comfort
	Presence and social dynamics	Walking, holding public events, social interaction, social vitality, the existence of places to talk to others, the existence of hangouts and communication places, organizing activities that have a sociable aspect, places to gather and meet demands, participating in collective activities, and the impact of holding events and festivals on increasing social interactions
	Inclusion	Diversity of different age groups on the street, possibility of using spaces for all age groups, possibility of using spaces for all ethnicities and urban tribes, lack of restrictions on people in spaces in terms of gender, mixing of uses, residential and income mixing
	Sense of place	The existence of memorable and nostalgic monuments and signs, the existence of buildings, elements, and landmarks in urban spaces, the existence of historical monuments, hope for life and optimism about the future, reminiscence and association of memories, and pride in place

Component	Indicator	Question
Functional physical	Accessibility	Access to public transportation, access to goods and services, convenience in reaching one's place of residence, access to services considering age differences, availability of parks and green spaces, children's playgrounds, availability of multiple transportation options, walkable access to neighborhood streets, presence of diverse and active businesses during different hours, existence of periodic markets (daily markets, weekly markets, street vendors, and small bazaars), movement and circulation during different hours of the day and night, and population-attracting land uses
	Recreation and comfort	Current condition of recreational facilities in the residential area, access to the city center and shopping and entertainment facilities, organization of events and exhibitions, presence of local and regional parks, availability of rest areas, social and psychological comfort, existence of gathering spots and public hangout spaces, adequate quality of paving, availability of drinking fountains, and the ability to walk comfortably without disturbance from vehicles
	Environmental comfort	Sense of ease and physical comfort, benefiting from sunlight and warmth, a balanced combination of light and shade, protection against wind, consideration of seasonal changes in design, and incorporation of water elements in spatial design
	Facilities and amenities	Size of the space, seating areas, urban furniture, the presence of food and beverage kiosks, the availability of various infrastructure and superstructure facilities, public parking, connection to the public sewage network, and spaces suitable for the disabled
Aesthetic	Urban landscape	Sanitation and cleanliness conditions, physical and visual attractiveness and diversity, spatial arrangement and layout, appropriate placement and quantity of urban furniture elements, physical quality and pavement condition for walking, adequate paving quality, aesthetic quality of building façades, presence of color diversity in public spaces, and proper spatial connectivity within the spatial and physical structure
	Diversity and attractiveness	The role of existing spaces in enhancing vitality, presence of ethnic and tribal diversity, differences in housing prices across city districts, design of cultural and artistic places and their impact on residential attractiveness, traditional and historic homes in the residential area, diversity and flexibility in land uses and types of activities, high number of commercial shops along the main streets, informal activities and street vendors, color diversity in buildings overlooking main streets, and use of vibrant colors in space design
	Legibility	Directional signage in streets and pathways, a defined and distinctive entrance, presence of iconic sculptures for orientation, aesthetic quality of building façades, consistency of building architecture with local cultural identity, compliance with technical regulations for street design (appropriate widening, slope, and right-of-way standards), ease and speed of navigation and wayfinding, presence of traffic signs, availability of buildings with distinctive architecture serving as landmarks, coherence in building form and façades, route legibility for visually impaired individuals, route legibility for people with low literacy, and route legibility for newcomers
	Lighting	Adequate and desirable lighting of spaces at night, nighttime illumination without blind spots or unsafe areas
Environmental	Vegetation cover	Adequate vegetation and green space, presence of green corridors, equitable distribution of green land uses, and availability of shaded areas
	Cleanliness	Hygiene and cleanliness, absence of pollution (noise, air), absence of air pollution, availability of waste bins at appropriate intervals, presence of unpleasant odors in the area, pollution caused by vehicle movement and noise, and quality of waste collection services

5. Findings

5.1. Examination of intelligent transportation components

To assess the status of urban smart transportation components, one-sample t-tests were used. In this test, four main indicators were examined, including the sample mean, t-statistic, mean difference, and significance level. The overall results indicate that the smart transportation components are not in a desirable state: the overall mean for smart transportation, computed by aggregating all examined components, equals 2.21, which is below the average desirable level. The mean values of all are also lower than the standard value. The t-statistics for all components are negative and at a high level. Since the significance level for every component is less than 0.05, these negative differences are statistically significant. Therefore, the findings indicate that the current condition of the smart transportation components in Yasuj is generally lower than the desired and expected level, with a considerable gap observed between the current status and the standard criteria.

Table 4. Results of one-sample t-tests for urban transport smartification components

Component (ITS dimension)	Mean	t (t-statistic)	Mean difference	Significance (p)
Sustainability	2.41	−14.772	−0.583	0.000
Accessibility	2.08	−20.015	−0.911	0.000
Safety & security	2.10	−19.544	−0.890	0.000
Awareness & knowledge	2.15	−17.553	−0.846	0.000
Satisfaction	2.25	−16.197	−0.744	0.000
Efficiency	2.09	−20.584	−0.903	0.000
Acceptance & participation	2.44	−10.547	−0.552	0.000
Overall smartification (aggregate)	2.21	—	—	—

5.2. Examination of urban vitality indicators and components

Next, the status of urban vitality in Yasuj was examined by component and indicator. According to the results, the vitality indicators are not at desirable levels. Results for the socio-cultural component show that sense of place/belonging and inclusiveness yield the highest and lowest means, respectively (mean= 2.51 and 2.09). Among the functional-physical component indicators, facilities and equipment, as well as accessibility, both key indicators for public-space vitality, have means below the standard (2.05 and 2.07, respectively). Given their large negative t-statistics and p-values below 0.05, these two indicators play a decisive role in the observed low vitality of Yasuj's public spaces. Within that component, environmental comfort (mean= 2.89) has a relatively better status compared to other indicators. In the aesthetics component, diversity & attractiveness (mean= 2.07) and lighting (mean= 2.96) show the highest and lowest means, respectively. For the environmental component, both examined indicators are close to the standard level. Because t-statistics for all indicators are negative and significant ($p < 0.05$), we conclude that the current status of urban vitality indicators in Yasuj is overall lower than the desired level, and a meaningful gap exists between the observed situation and the standard level. The results indicate that urban vitality in Yasuj is not in a desirable condition. Among the components, the environmental and socio-cultural components have the highest and lowest means, respectively (means= 2.64 and 2.24).

Table 5. Results of one-sample t-tests for urban vitality indicators

Indicator/component	Mean	t (t-statistic)	Mean difference	Significance (p)
Safety & security	2.16	−16.541	−0.838	0.000
Presence (public life)	2.20	−16.331	−0.796	0.000
Inclusiveness	2.09	−15.350	−0.906	0.000
Sense of place/belonging	2.51	−9.266	−0.484	0.000
Socio-cultural component (aggregate)	2.24	—	—	—
Accessibility	2.07	−14.535	−0.921	0.000
Recreation & comfort	2.20	−12.346	−0.794	0.000

Indicator/component	Mean	t (t-statistic)	Mean difference	Significance (p)
Environmental comfort	2.89	−2.685	0.106	0.008
Facilities & equipment	2.05	−18.338	−0.947	0.000
Functional-physical component	2.30	—	—	—
Urban landscape	2.59	−8.966	−0.401	0.000
Diversity & attractiveness	2.07	−17.053	−0.929	0.000
Legibility/readability	2.43	−9.740	−0.562	0.000
Lighting	2.96	−1.608	−0.126	0.000
Aesthetic component	2.51	—	—	0.000
Vegetation cover	2.66	−5.293	−0.333	0.000
Cleanliness	2.63	−5.801	−0.367	0.000
Environmental component	2.64	—	—	—

Pearson correlation coefficients were calculated to examine relationships between smart transportation (independent variable) and each vitality component (socio-cultural, functional-physical, aesthetic, and environmental). If the significance value is less than 0.05, the correlation is considered statistically significant (regardless of strength). Results (Table 6) indicate that smart transportation has a direct and significant correlation with all urban vitality components. Correlation strengths vary: the socio-cultural component shows the strongest correlation (r= 0.476), followed by the functional-physical (r= 0.383) and aesthetic (r= 0.312) components. The environmental component shows a weaker correlation (r = 0.218) compared with the others.

Table 6. Pearson correlation results between intelligent transportation and urban vitality components

Independent variable	Dependent variable	Test	Value
Smart transportation	Socio-cultural component	Pearson	0.476
		Significance (p)	0.000
	Functional-physical component	Pearson	0.383
		Significance (p)	0.000
	Aesthetic component	Pearson	0.312
		Significance (p)	0.000
	Environmental component	Pearson	0.218
		Significance (p)	0.000

5.3. Evaluation of the measurement model

The purpose of evaluating the measurement model is to determine model fit, as well as to assess its validity and reliability. Ensuring adequate validity and reliability is a fundamental prerequisite for the application of structural equation modeling. Accordingly, to confirm the accuracy and credibility of the research instrument, the validity and reliability of the constructs were examined within the measurement model. Two key criteria were assessed: internal reliability (Cronbach's alpha, composite reliability, and factor loadings) and convergent validity (average variance extracted, AVE). Cronbach's alpha values must exceed 0.70. Due to certain limitations associated with Cronbach's alpha, composite reliability (CR), a superior reliability measure, was also used and should likewise exceed 0.70. Results show that both Cronbach's alpha and CR values for all constructs are above 0.70, confirming acceptable internal reliability. According to Table 6 and Figure 2, Cronbach's alpha values for the constructs of sustainability (0.736), accessibility (0.890), safety and security (0.771), awareness and knowledge (0.869), satisfaction (0.876), efficiency (0.709), and acceptance and participation (0.823) all exceed the standard value.

Their composite reliability values (0.706, 0.738, 0.778, 0.813, 0.771, 0.887, and 0.863, respectively) also surpass the permissible limit of 0.70, indicating satisfactory reliability. Convergent validity was assessed using AVE. For all constructs, AVE exceeds 0.50, confirming an acceptable level of convergent validity. The urban vitality construct also demonstrates strong reliability, with Cronbach's alpha and CR values of 0.896 and 0.838, respectively, both above 0.70. Its AVE value of 0.663 additionally exceeds 0.50, confirming convergent validity. These results collectively demonstrate that the measurement model possesses the required validity and reliability, and the instrument is suitable for subsequent structural model analysis. Furthermore, findings show that most items exhibit factor loadings above 0.40. Items ST3, ST4, ST18, and ST24 fall within the 0.30–0.40 range. Although weak, they remain acceptable based on Salaripour and Rezaei (2025), who consider loadings between 0.30 and 0.60 to have adequate, albeit weak, reliability. In contrast, items ST10, ST12, and ST20 show weak factor loadings. For the urban vitality construct, factor loadings indicate that the items related to safety and security, presence, facilities and equipment, urban landscape, diversity and attractiveness, legibility, and inclusiveness all exceed 0.40.

Table 7. Results of evaluating the reliability and validity of research variables

Latent variable	Abbreviations	Factorial load	Cronbach's alpha	Combined reliability	Extracted variance
Sustainability	ST1	0.451	0.736	0.706	0.575
	ST2	0.552			
	ST3	0.391			
	ST4	0.353			
	ST5	0.776			
Accessibility	ST6	0.571	0.890	0.738	0.617
	ST7	0.724			
	ST8	0.827			
	ST9	0.816			
	ST10	0.029			
Safety & security	ST11	0.231	0.771	0.778	0.615
	ST12	0.169			
	ST13	0.658			
	ST14	0.806			
	ST15	0.723			
Awareness & knowledge	ST16	0.775	0.869	0.813	0.637
	ST17	0.778			
	ST18	0.307			
	ST19	0.798			
	ST20	0.240			
Satisfaction	ST21	0.810	0.876	0.771	0.685
	ST22	0.803			
	ST23	0.706			
	ST24	0.388			
	ST25	0.450			
	ST26	0.475			

Latent variable	Abbreviations	Factorial load	Cronbach's alpha	Combined reliability	Extracted variance
Efficiency	ST27	0.602	0.709	0.887	0.561
	ST28	0.472			
	ST29	0.233			
	ST30	0.766			
	ST31	0.719			
Acceptance & participation	ST32	0.672	0.823	0.862	0.648
	ST33	0.754			
	ST34	0.621			
	ST35	0.374			
	ST36	0.713			
	ST37	0.791			
	ST38	0.758			
	ST39	0.656			
	ST40	0.664			
Urban vitality	Safety & security	0.720	0.896	0.838	0.663
	Presence (public life)	0.670			
	Inclusiveness	0.371			
	Sense of place/belonging	0.137			
	Accessibility	0.185			
	Recreation & comfort	0.158			
	Environmental comfort	0.288			
	Facilities & equipment	0.484			
	Urban landscape	0.564			
	Diversity & attractiveness	0.427			
	Legibility	0.493			
	Lighting	0.082			
	Vegetation cover	0.090			
	Cleanliness	0.141			

In the next step, the structural model was analyzed to test the research hypotheses, evaluate causal relationships between smartification components and urban vitality, and determine the statistical significance of these relationships. Path coefficients and t-statistics for the relationships among latent variables were computed. Findings show that some path coefficients are positive and statistically significant, indicating support for the corresponding hypotheses; these components exert meaningful effects on urban vitality. Conversely, some path coefficients are small or statistically insignificant, suggesting that the predicted relationships between these components and the dependent variable are not supported. The main criterion in this analysis is the value of the t-statistic: hypotheses are supported when t exceeds 1.64, 1.96, and 2.58 at confidence levels of 90%, 95%, and 99%, respectively. Based on the results, the components of sustainability, accessibility, safety and security, efficiency, and acceptance and participation exceeded these thresholds, with t-values of 2.681, 2.726, 1.842, 2.484, and 2.657, respectively. Their corresponding hypotheses are therefore accepted. In contrast, the components of awareness and knowledge and satisfaction, with t-values of 0.401 and 0.606, fall below the critical levels and thus do not exert significant effects on urban vitality. Overall, the analysis of path coefficients indicates that different dimensions of smartification play varying roles in explaining urban vitality. This variation highlights the need for careful prioritization in urban policy and planning, focusing on the components with the highest explanatory power.

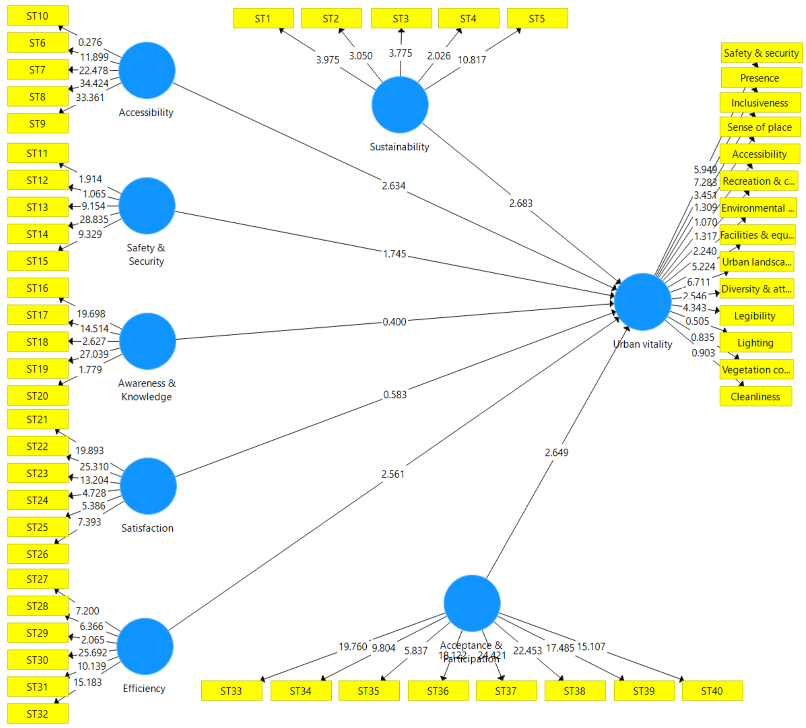

Figure 2. Results of analyzing the research model with path coefficients and factor loadings in the standard mode

To assess the extent to which smartification components contribute to urban vitality, factor loadings obtained from the structural equation model were utilized. Results show that the conceptual model enjoys an acceptable level of fit, and the measurement indicators adequately capture the latent constructs. Findings reveal that the effects of smartification dimensions are not uniform. The components of efficiency, accessibility, and sustainability, with coefficients of 0.245, 0.208, and 0.208, respectively, play the most substantial roles in explaining urban vitality. In contrast, safety and security and acceptance and participation exhibit lower levels of influence, while awareness and knowledge and satisfaction show very weak and non-significant effects (0.037 and 0.039, respectively). These results highlight the heterogeneous influence of smartification components and emphasize the need to prioritize strategically significant and high-impact components in urban development policies. Furthermore, the coefficient of determination (R^2 = 0.648) shows that the smart transportation components collectively explain approximately 64% of the variance in urban vitality in Yasuj.

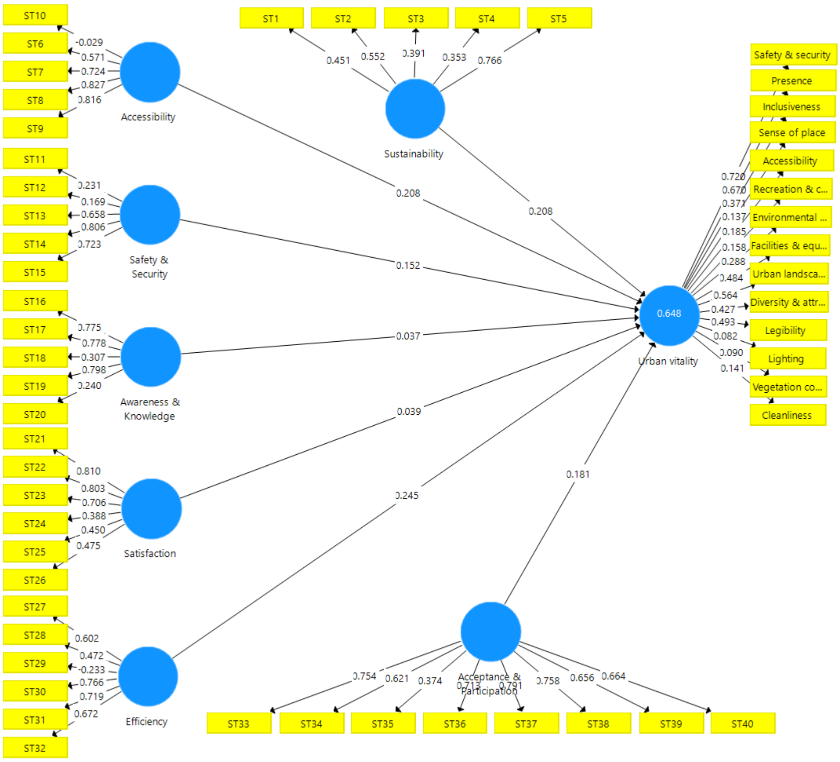

Figure 3. Results of measuring the impact of smart transportation components on vitality in the t-statistic mode

Table 8. Results of examining significant paths

Hypothesis	Significance coefficient	Path coefficient	Test result
The sustainability component has a significant impact on promoting urban vitality in Yasuj.	2.681	0.208	Confirmation
The accessibility component has a significant impact on improving urban vitality in Yasuj.	2.726	0.208	Confirmation
The safety and security component has a significant impact on promoting urban vitality in Yasuj.	1.842	0.152	Confirmation
The knowledge and awareness component has a significant impact on promoting urban vitality in Yasuj.	0.401	0.037	Non-acceptance
The satisfaction component has a significant impact on improving urban vitality in Yasuj.	0.606	0.039	Non-acceptance
The efficiency component has a significant impact on improving urban vitality in Yasuj.	2.484	0.245	Confirmation
The acceptance and participation component has a significant impact on promoting urban vitality in Yasuj.	2.657	0.181	Confirmation

To evaluate the effect of smart transportation components on different dimensions of urban vitality, the study's structural model was analyzed. Results indicate that Cronbach's alpha and composite reliability values for all constructs exceed 0.70, and convergent validity values are above 0.50, confirming acceptable reliability and validity levels. Examination of path coefficients and t-statistics further demonstrates that the relationships between the independent variable and the vitality components are statistically significant. Specifically, the effect of smart transportation on the socio-cultural dimension was found to be significant, with a path coefficient of 0.604 and a t-statistic of 18.665. Significant relationships are also observed for the functional-physical (0.296, 3.544), aesthetic (0.345, 6.871), and environmental (0.283, 5.880) dimensions. The coefficient of determination (R^2) indicates that the socio-cultural dimension has the highest explanatory power (R^2 = 0.365), suggesting that approximately 36% of the variance in this dimension is explained by smart transportation.

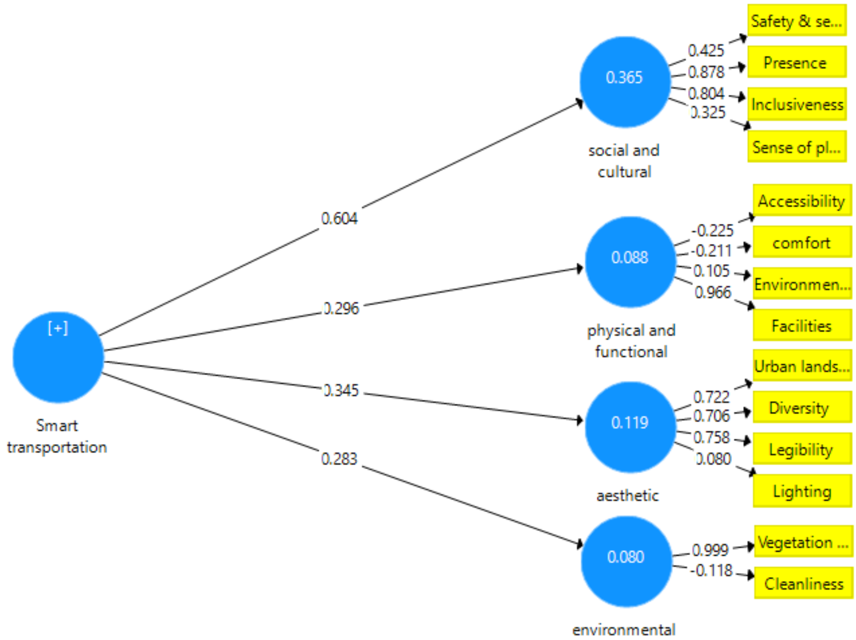

Figure 4. Results of analyzing the research model with path coefficients and factor loadings in the standard mode

Table 9. Results of examining significant paths

Hypothesis	Significance coefficient	Path coefficient	Test result
Smart transportation has a significant impact on promoting vitality in the social and cultural dimensions.	18.665	0.604	Confirmation
Smart transportation has a significant impact on improving vitality in the physical and functional dimension.	3.544	0.296	Confirmation
Smart transportation has a significant impact on improving vitality in the aesthetic dimension.	6.871	0.345	Confirmation
Smart transportation has a significant impact on promoting vitality in the environmental dimension.	5.880	0.283	Confirmation

Finally, the goodness of fit (GOF) index was examined. This index, introduced by Tenenhaus, serves as an overall measure of fit for structural equation models. The GOF criterion is used to assess the degree of alignment between observed data and model-estimated data. Ranging from zero to one, this index provides a comprehensive picture of model adequacy. Values of 0.01, 0.25, and 0.36, respectively, indicate weak, moderate, and strong model fit. In the present study, the GOF value was calculated as 0.636, which represents a desirable level of model fit and demonstrates the model's considerable ability to explain and predict the relationships among the variables. Therefore, it can be concluded that the model possesses adequate robustness for analyzing and interpreting the observed patterns and offers reliable support for examining the phenomenon under study.

$$GOF = \sqrt{0/625 \times 0/648} = \sqrt{0/405} = 0/636$$

6. Discussion

The findings indicate that the level of transport smartification and urban vitality in Yasuj is below the desirable standard, highlighting the presence of structural gaps within the mobility system and urban spaces. Weaknesses in urban management and planning, insufficient investment in smart infrastructure, prioritization of more urgent urban needs, and low citizen participation represent key factors contributing to this condition. This result aligns with Almatar (2024), who identifies institutional challenges and resource shortages as major barriers to achieving smart transportation. Similarly, emphasis on structural shortcomings within the transportation system corresponds with Algherbal and Ratrout (2025), who argue that ineffective infrastructure prevents optimal utilization of technology. Structural model analysis in the present research reveals that the relationship between smart transportation and urban vitality is positive and significant, with smart transportation explaining 64.8% of the variance in vitality. This high proportion underscores the importance of smart tools in shaping the quality of urban life. Consistency between this finding and studies such as Doan and Zhang (2025) and Li and Zhao (2025), which consider accessibility and connectivity fundamental components of urban vitality, suggests that smart transportation directly facilitates public presence and social activity. According to the results, the three components of efficiency, accessibility, and sustainability play the greatest roles in explaining urban vitality. This indicates that citizens place primary emphasis on the practical and functional aspects of transportation. This point aligns with Elassy et al. (2024), who identify smart transportation as a major driver of efficiency and safety. These three components serve as core prerequisites for active public presence in urban spaces, and strengthening them can enhance the quality of urban experiences and foster social interactions. This correspondence can also be observed in Zhang et al. (2025), who highlight the importance of sustainability in urban transportation. In contrast, the components of awareness and knowledge, as well as satisfaction, do not show significant effects on vitality. This suggests that mere information provision or the existence of technology, without an actual improvement in service quality, cannot alter citizen behavior. This outcome is consistent with Wang et al. (2021), who found that inclusiveness and user experience are more critical than simply introducing technology. Therefore, the results imply that in Yasuj, satisfaction and awareness currently reflect the low quality of existing services rather than serve as drivers of vitality. A notable finding of the present study is the strong influence of smart transportation on the social–cultural dimension of vitality. This indicates that smart technology, beyond its technical function, plays a social role by strengthening interactions, place attachment, and spatial inclusiveness. These findings align with international studies such as Wang et al. (2021), which emphasize the need to reinforce the human and social dimension of smart transportation. This study also fills an important gap in the existing literature. While many previous works, such as Li et al. (2025) and Zinia et al. (2025), focus on policy, economic, or physical aspects of smart transportation, the present study, through a component-based analysis and determining the contribution of each dimension to vitality (R^2= 0.648), provides a more precise understanding of the relationship between transportation technologies and urban life quality. Offering evidence from a small and developing city such as Yasuj is another strength, demonstrating that global smart-city frameworks can be examined in smaller cities, albeit with different challenges, capacities, and priorities. Overall, the findings underscore that enhancing urban vitality in Yasuj requires a strategy focused on strengthening efficiency, improving accessibility, and investing in sustainability components, alongside addressing structural deficiencies and improving the quality of smart transportation services. These insights can serve as a practical guide for urban planners and policymakers striving toward a more dynamic, human-centered, and intelligent city.

7. Conclusion

The present study examined the role of smart urban transportation in enhancing the vitality of Yasuj. Findings showed that although smartification can serve as a powerful catalyst for promoting urban dynamism and vibrancy, a significant gap exists between its potential and the city's current conditions. Analyses indicated that part of this gap stems from infrastructural, managerial, and participatory weaknesses in smart transportation, which have prevented the technology from fulfilling its potential in improving the presence quality, social interactions, legibility, security, and the attractiveness of urban spaces. Results further reveal that the influence of smart transportation varies across different dimensions of vitality. The more fundamental dimensions, including efficiency, accessibility, and sustainability, play a stronger role in improving urban life, whereas components related to awareness, satisfaction, and social acceptance require foundational support, cultural development, and strengthened managerial capacity. These findings emphasize that success in enhancing urban vitality is achieved when policy frameworks move beyond merely providing technology and instead prioritize improving user experience, service quality, and creating a genuine sense of belonging and participation. Nonetheless, the research faces certain limitations, such as its focus on a single city, reliance on perceptual data from citizens, and the absence of temporal dynamics in the analysis. Accordingly, future studies are encouraged to incorporate spatial-temporal data, conduct inter-city comparisons, examine policy impacts, and investigate the role of institutional and managerial structures in the success of smart transportation, thereby offering more comprehensive insights for planning toward enhanced urban vitality.

Authors' Contributions

The authors contributed equally to all sections and stages of the research.

Acknowledgments

The authors extend their appreciation to all individuals who contributed to the successful completion of this study.

Conflict of Interest

The authors declared no conflict of interest regarding the authorship or publication of this article.

References

Abdalla, W., Renukappa, S., Suresh, S., Das, S., & Veenith, T. (2026). Assessing drivers for managing knowledge in the context of smart cities. *Cities*, 168, 106411. https://doi.org/10.1016/j.cities.2025.106411

Algherbal, E. A., & Ratrout, N. T. (2025). Smart cities and intelligent transportation systems: integration of autonomous vehicles and their impact on congestion and safety. *Transportation Research Procedia*, 84, 504-511. https://doi.org/10.1016/j.trpro.2025.03.102

Almatar, K. M. (2024). Smart transportation planning and its challenges in the Kingdom of Saudi Arabia. *Sustainable Futures*, 8, 100238. https://doi.org/10.1016/j.sftr.2024.100238

Bozkurt, Y., Rossmann, A., Pervez, Z., & Ramzan, N. (2025). Assessing data governance models for smart cities: Benchmarking data governance models on the basis of European urban requirements. *Sustainable Cities and Society*, 106528. https://doi.org/10.1016/j.scs.2025.106528

Cai, X., He, Z., & Wen, C. (2025). Does the urban renewal program increase urban vitality? Causal evidence from Beijing City, China. *Applied Geography*, 183, 103732. https://doi.org/10.1016/j.apgeog.2025.103732

Deng, C., & Zimo, L. (2023). The comment trial and comparison of urban vitality based on POI data: A case study of Shenzhen. *Applied and Computational Engineering*, 6(1), 134-141. https://doi.org/10.54254/2755-2721/6/20230747

Doan, Q. C., & Zhang, X. (2025). A systematic review of urban vitality studies: Trends and research opportunities. *Land Use Policy*, 158, 107745. https://doi.org/10.1016/j.landusepol.2025.107745

Elassy, M., Al-Hattab, M., Takruri, M., & Badawi, S. (2024). Intelligent transportation systems for sustainable smart cities. *Transportation Engineering*, 16, 100252. https://doi.org/10.1016/j.treng.2024.100252

Esmaili A., Ghorbani R., & Mahmoudzadeh H. (2024). An Analysis of the Challenges and Barriers of Smart Urban Transportation in Tabriz Metropolis based on the Internet of Things. *Quarterly Journals of Urban and Regional Development Planning*, 9(31): 185-219. https://doi.org/10.22054/urdp.2024.78634.1623 [In Persian]

Feizi, A., Joo, S., Kwigizile, V., & Oh, J. S. (2020). A pervasive framework toward sustainability and smart-growth: Assessing multifaceted transportation performance measures for smart cities. *Journal of Transport & Health*, 19, 100956. https://doi.org/10.1016/j.jth.2020.100956

Golkar K., Estelaji A., & Zivyar P. (2025). Explaining the Role of Smart Transportation in the Socio-Economic Development of the City (Case Study: Tehran). *Geography*, 83(22): 69-91. https://doi.org/10.22034/iga.2025.2046074.1350 [In Persian]

Hosseini A., & Saberi A. (2023). Analysis of the Role of Public Spaces in Improving the Vitality of Urban Neighborhoods (Case Study: Bensanjan Neighborhood of Yasouj City). *Geography and Urban Space Development*, 10(1): 175-198. https://doi.org/10.22067/jgusd.2022.78060.1233 [In Persian]

Hosseini A., Fanni Z., & Momeni A. (2022). Comparative Analysis of Urban Vitality in Old and New Neighborhoods with the Approach of the Right to the City: The Case Study of Neighborhoods in Yazd City. *Geographical Urban Planning Research (GUPR)*, 10(2): 29-51. https://doi.org/10.22059/JURBANGEO.2022.344362.1707 [In Persian]

Jacobs, J. (1961). Jane Jacobs. The Death and Life of Great American. *Cities*, 21(1), 13-25 http://www.petkovstudio.com/bg/wp-content/uploads/2017/03

Jafari, M., Kavousi-Fard, A., Sheikh, M., Jin, T., & Karimi, M. (2024). A copula-based secured intelligent dynamic-static energy community transportation system for smart cities. *Sustainable Cities and Society*, 107, 105432. https://doi.org/10.1016/j.scs.2024.105432

Jalaladdini, S., & Oktay, D. (2012). Urban public spaces and vitality: a socio-spatial analysis in the streets of Cypriot towns. *Procedia-Social and Behavioral Sciences*, 35, 664-674. doi.org/10.1016/j.sbspro.2012.02.135

Jiang, J., Li, Y., Li, Y., Li, C., Yu, L., & Li, L. (2024). Smart transportation systems using learning method for urban mobility and management in modern cities. *Sustainable Cities and Socie-*

ty, 108, 105428. https://doi.org/10.1016/j.scs.2024.105428

Jiang, Y., Han, Y., Liu, M., & Ye, Y. (2022). Street vitality and built environment features: A data-informed approach from fourteen Chinese cities. *Sustainable cities and society*, 79, 103724. https://doi.org/10.1016/j.scs.2022.103724

Jnr, B. A. (2025). Leveraging distributed ledger technologies for shared seamless electric mobility-as-a-service to improve sustainable public transportation in smart cities. *Sustainable Futures*, 100757. https://doi.org/10.1016/j.sftr.2025.100757

Karimi-Aghcheh R., Darabi S., & Kozegar-Kaleji L. A. (2023). *Evaluating the Status of Urban Transportation Infrastructure in Line with Urban Prosperity (Case Study: Ilam City).* Third International Conference on Architecture, Civil Engineering, Urban Development, Environment, and Horizons of Islamic Art in the Declaration of the Second Step of the Revolution. https://www.symposia.ir/ICACU03 [In Persian]

Kirejev, M., Gerstlberger, W., & Niine, T. (2025). Political ideologies and strategic management in municipal transportation: A comparative analysis of smart and sustainable development approaches. *Cities*, 162, 105988. https://doi.org/10.1016/j.cities.2025.105988

Kozegarkaleji L., Saberi A., & Tir M. (2023). An Analysis of Indicators of Vitality in Public Spaces with an Emphasis on the Security of Citizens (Case Study: Bensenjan Neighborhood of Yasuj). *Urban Structure and Function Studies*, 10(36); 173-203. https://doi.org/10.22080/USFS.2023.24950.2337 [In Persian]

Lee, S., & Cho, N. (2025). Nonlinear and interaction effects of multi-dimensional street-level built environment features on urban vitality in Seoul. *Cities*, 165, 106145. https://doi.org/10.1016/j.cities.2025.106145

Li, Q., Yu, X., Xu, H., Wang, D., Guo, Z., & Liu, L. (2025). Influential analysis of smart transportation policy on common prosperity using causal mediation effect inference. *Case Studies on Transport Policy*, 101529. https://doi.org/10.1016/j.cstp.2025.101529

Li, Y., Yabuki, N., & Fukuda, T. (2022). Exploring the association between the built environment of streets and street vitality using deep learning methods. *Sustainable Cities and Society*, 79, 103656. https://doi.org/10.1016/j.scs.2021.103656

Madrid-Solorza, S., Marquet, O., Fuentes, L., & Miralles-Guasch, C. (2023). Urban vitality conditions and neighborhood satisfaction in a Latin American city: The case of Santiago de Chile. *Journal of Urban Planning and Development*, 149(3), 05023018. https://doi.org/10.1061/JUPDDM.UPENG-4332

Molavi M., Hamidi A., Faridi Foshtomi A., & Ariapasand Z. (2021). Evaluation of the Role of Urban Pedestrian Streets in Improving the Urban Vitality and Social Interactions (Case Study: Pedestrian Street of Rasht). *Geographical Urban Planning Research (GUPR)*, 9(3): 881-908. https://doi.org/10.22059/JURBANGEO.2021.319408.1465 [In Persian]

Moura, F., & de Abreu e Silva, J. (2021). Smart cities: definitions, evolution of the concept, and examples of initiatives. In *Industry, innovation and infrastructure* (pp. 989-997). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-95873-6_6

PoorAhmed A., Saberi A. (2025). Evaluation of the Status of Yasouj in terms of City Development Strategy (CDS) Indicators. *Applied Research in Geographical Sciences*, 25(76): 26-47. http://jgs.khu.ac.ir/article-1-4176-fa.html [In Persian]

Pourahmad A., Zanganeh S. S., & Saberi A. (2023). Analysis of Spatial Justice in Access to Urban Services (Case study: Yasouj City). *Geography and Development*, 21(71): 1-32. https://doi.org/10.22111/GDIIJ.2023.7588 [In Persian]

Praharaj, S. (2025). Command and control governance in the 100 smart cities mission in India: Urban innovation or utopias? *Applied Geography*, 184, 103766. https://doi.org/10.1016/j.apgeog.2025.103766

Qiao, W., & Zheng, H. (2025). Predicting urban vitality and pedestrian road safety in urban areas based on machine learning. *Cities*, 166, 106193. https://doi.org/10.1016/j.cities.2025.106193

Sanatgar M., Momeni M., & Khademolhoseny A. (2025). Understanding the smart public transportation model from the perspective of citizens (Case study of 15 districts of Isfahan city). *Journal of Vision Future Cities*, 6(1): 89-105. http://jvfc.ir/article-1-425-fa.html [In Persian]

Sayadat Hasan Noran, S. S., Shirazi Irani, S., & Saberi, A. (2025). Measuring the Dimensions of Good Urban Governance and Key Factors Influencing Its Situation in Ethnic Cities (Case Study: Yasouj City). *Safe City*, 8(1): 18-41. https://doi.org/10.22034/ispdrc.2024.2031182.1111 [In Persian]

Shahrokhifar Z., TahmasebiMoghaddam H., & Shamai A. (2022). Analysis of the Role of Urban Beautification in Promoting the Vitality of Urban Spaces in District 7 of Tehran Municipality. *Geographical Urban Planning Research (GUPR)*, 10(3): 81-103. https://doi.org/10.22059/JURBANGEO.2022.325129.1533 [In Persian]

Wang, C. H., Steinfeld, E., Maisel, J. L., & Kang, B. (2021). Is your smart city inclusive? Evaluating proposals from the US Department of Transportation's Smart City Challenge. *Sustainable Cities and Society*, 74, 103148. https://doi.org/10.1016/j.scs.2021.103148

Xavier, L. F. B., de Araújo, A. P. H. G., & Taques, F. H. (2025). Evaluation of Brazilian cities from the perspective of smart cities: An analysis of cluster and information technology initiatives. *Urban Governance*. https://doi.org/10.1016/j.ugj.2025.08.004

Yildirim, B., Ayyildiz, E., & Aydin, N. (2025). A strategic sustainability framework for smart city investment prioritization. *Sustainable Cities and Society*, 106705. https://doi.org/10.1016/j.scs.2025.106705

Zhang, Y., Wang, X., Ye, Y., Wang, L., Zhang, Y., & Yao, S. (2025). Spatially heterogeneous impacts of urban vitality on carbon emissions: A multi-source data-driven mechanistic analysis. *Sustainable Cities and Society*, 106622. https://doi.org/10.1016/j.scs.2025.106622

Zhenye, Z., Zhang, X., Siddique, A., Faridi, M. Z., & Ali, S. (2025). Steering through uncertainty: How economic policy instability shapes smart transportation budgets. *Transport Policy*, 170, 178-192. https://doi.org/10.1016/j.tranpol.2025.05.013