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Assessment of livability in urban fabric: A comparative analysis

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ABSTRACT

BACKGROUND AND OBJECTIVES: Livability, as a concept and approach, aims to reduce environmental, economic, and social problems in cities and communities based on their needs and capacities. This broad concept encompasses a variety of meanings in terms of physical, socio-cultural, economic, and environmental dimensions, both subjectively and objectively. Therefore, ensuring livability standards in the urban fabric is of considerable importance and necessity. The present study seeks to provide a basic understanding of the livability status in the city of Kashan.

METHODS: To achieve this goal, employing a library method and a researcher-made questionnaire tool, 384 residents from seven old and five new neighborhoods were evaluated using a stratified (simple random) sampling method. The collected data were analyzed using SPSS software, one-sample t-test analysis, and structural equation modeling.

FINDINGS: The results showed that the livability status in the new districts was better than the livability in the old ones. The findings reveal that overall livability in Kashan falls short of the desired average, with economic, cultural, and social aspects scoring the lowest. Environmental quality, on the other hand, was assessed as satisfactory. When comparing livability across old and new districts, the study found that newer districts have a higher overall livability compared to older ones. To further understand the factors influencing livability, the study prioritized the six dimensions of livability: infrastructure, politics, economy, environment, society, and culture. The economic factor emerged as the most influential, followed by social and infrastructural factors. Within the economic factor, job opportunities were identified as the most impactful aspect, while social cohesion and physical infrastructure held the greatest importance within the social and infrastructural factors, respectively.

CONCLUSION: Importantly, the study highlights the role of effective urban management in enhancing livability, particularly in addressing economic disparities, fostering social inclusion, and improving infrastructure. Strategic interventions, such as targeted economic development policies, community engagement programs, and infrastructure investments, are essential for enhancing Kashan's livability and quality of life.

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INTRODUCTION

Importance and Necessity of Research, Goals, and Objectives

In today's rapidly urbanizing world, cities are facing a multitude of challenges, including environmental degradation, social inequities, and economic disparities (Medayese *et al.*, 2020). As cities continue to grow and evolve, there is an increasing need to create sustainable and livable urban spaces that promote the well-being of their inhabitants (Augustin *et al.*, 2023). Livability, a multifaceted concept encompassing various dimensions of urban life, has emerged as a key focus in urban planning and design discourses (World Health Organization, 2016). It encompasses a range of factors, including physical infrastructure, social cohesion, economic opportunities, environmental quality, and cultural vibrancy (Medayese *et al.*, 2020). Assessing and enhancing livability is crucial for promoting sustainable urban development and ensuring the quality of life for city dwellers (Augustin *et al.*, 2023). The concept of livability has gained significant attention in recent decades, driven by growing concerns about the livability of cities worldwide (Medayese *et al.*, 2020). Urbanization, characterized by the rapid growth and concentration of populations in cities, has brought about a range of challenges, including environmental degradation, social fragmentation, and economic inequalities (Augustin *et al.*, 2023). These challenges have raised concerns about the quality of life in cities and the need to create more livable urban environments (Medayese *et al.*, 2020). Livability is not merely the absence of problems or the presence of amenities; it is a positive concept that encompasses the overall quality of life in urban areas (Medayese *et al.*, 2020). It reflects the extent to which cities meet the needs and aspirations of their residents, providing them with opportunities to thrive and enjoy a fulfilling life (Augustin *et al.*, 2023). A livable city is:

- *Physically attractive and functional:* It has a well-designed and maintained physical infrastructure, including clean and safe streets, efficient transportation systems, and adequate housing options (Medayese *et al.*, 2020; Augustin *et al.*, 2023).
- *Socially cohesive and inclusive:* It fosters a sense of community, promotes social interaction, and provides opportunities for participation in civic life (Medayese *et al.*, 2020; Augustin *et al.*, 2023).
- *Economically vibrant and sustainable:* It offers diverse economic opportunities, supports local businesses, and promotes sustainable economic development practices (Medayese *et al.*, 2020; Augustin *et al.*, 2023).
- *Environmentally friendly and healthy:* It protects the environment, reduces pollution, and promotes sustainable resource management practices (Medayese *et al.*, 2020; Augustin *et al.*, 2023).
- *Culturally rich and diverse:* It celebrates its cultural heritage, promotes cultural diversity, and provides opportunities for cultural expression and engagement (Medayese *et al.*, 2020; Augustin *et al.*, 2023).

Iran, with its rich history, diverse cultures, and rapidly growing urban population, faces unique challenges and opportunities in terms of urban livability (Sadeghi *et al.*,2023; Ghasemi *et al.*, 2019). The country's urbanization rate has accelerated in recent decades, leading to the expansion of existing cities and the emergence of new urban centers (Sadeghi *et al.*, 2023). This rapid growth has put a strain on urban infrastructure, services, and the environment, posing challenges to livability (Ghasemi *et al.*, 2019). Despite these challenges, Iran has made significant strides in improving livability in its cities (Sadeghi *et al.*, 2023). The government has implemented various policies and initiatives aimed at enhancing urban infrastructure, promoting social cohesion, and fostering economic development (Ghasemi *et al.*, 2019). However, there is still a significant need for further research and interventions to address the persistent challenges and promote more livable urban environments in Iran (Sadeghi *et al.*, 2023; Ghasemi *et al.*, 2019). Kashan, a historical city located in the central province of Isfahan, Iran, provides a compelling case study for examining livability in the context of Iran's urban fabric (Sadeghi *et al.*, 2023). With its rich cultural heritage, diverse neighborhoods, and ongoing urban transformation, Kashan offers insights into the dynamics of livability in Iranian cities. Kashan's old districts, characterized by traditional architecture and narrow streets, exude a unique charm and sense of identity (Sadeghi *et al.*, 2023). These districts, with their intricate alleyways, mudbrick houses, and historic landmarks, are a testament to Kashan's rich history and cultural heritage. However, these districts

often face challenges related to aging infrastructure, limited accessibility, and a lack of modern amenities (Ghasemi *et al.*, 2019). The narrow streets and traditional houses of Kashan's old districts can hinder pedestrian movement and limit access to vehicles, particularly emergency services (Sadeghi *et al.*, 2023). Additionally, the aging infrastructure of these districts, including outdated water supply and sewage systems, can pose health and safety risks (Ghasemi *et al.*, 2019). Moreover, the lack of modern amenities, such as green spaces, playgrounds, and recreational facilities, can limit the livability of these districts for residents, particularly families with children (Sadeghi *et al.*, 2023). In contrast to Kashan's old districts, the newer developments showcase modern urban planning principles, offering wider streets, improved infrastructure, and access to modern amenities (Ghasemi *et al.*, 2019). These districts, often characterized by grid-like street patterns, multi-story buildings, and modern parks, reflect the city's efforts to modernize and accommodate its growing population. However, these newer districts may lack the character and sense of community found in the older districts (Sadeghi *et al.*, 2023). The wider streets and modern buildings can create a feeling of detachment and anonymity, while the lack of traditional architectural features can diminish the city's cultural identity (Ghasemi *et al.*, 2019). Additionally, the rapid development of these new districts may have outpaced the provision of social services and infrastructure, leading to challenges such as traffic congestion, pollution, and a lack of affordable housing (Sadeghi *et al.*, 2023). Despite the growing body of research on livability in Iran, there is a lack of studies that specifically focus on the comparative assessment of livability in old and new districts of Iranian cities (Sadeghi *et al.*, 2023; Ghasemi *et al.*, 2019). This study aims to address this gap by investigating the livability of Kashan City, with a particular focus on the comparison between its old and new districts in 2024. The objectives of this study are twofold:

• *Objective 1:* To assess the overall livability status of Kashan City, considering its various dimensions, including physical infrastructure, social cohesion, economic opportunities, environmental quality, and cultural vibrancy.

• *Objective 2:* To compare the livability of Kashan's old and new districts, identifying the key factors that contribute to the differences in livability levels between these two types of urban areas.

Effective urban management is crucial for enhancing livability and addressing the complex challenges faced by cities. By understanding the factors that influence livability in different urban contexts, policymakers and practitioners can develop targeted strategies to improve the quality of life for residents. This study aims to contribute to this knowledge base by providing a comparative analysis of livability in Kashan's old and new districts. The findings of this research are expected to inform the development of evidence-based urban management policies and practices that prioritize livability and sustainability.

Definitions

The term "livability" stems from the German verb "Leben," which means "to live", "to have life", "to create a life for someone," or "to live in a place for some time" (Srinivas, 2012). "Desirability of a place" is the chosen Persian translation for the English term "livability". Webster's Dictionary defines livability as "a place suitable for human habitation." Livability is also defined as the quality of life, living standards, or overall happiness of the population living in a place like a city. In the Oxford English Dictionary, "livability" is defined as "the worth of living" and "a place suitable for living," while "vitality" is defined as "being active and energetic" (Pandey *et al.,*2013). The presence of the word "live" or "life" in the construction of this word has led to the notion of livability taking on a primarily biological meaning. The use of this word in its biological sense, "that something is livable," dates back to at least the early 17th century in the poultry industry, where it indicated the likelihood of a chick hatching from an egg. In addition to its biological application, this term also has a distinct cultural-social background (Heidari *et al.,* 2023). Livability, a multifaceted concept, has become a central focus in urban planning and design discourses (Medayese *et al.*, 2020; Augustin *et al.*, 2023). It encapsulates the overall quality of life experienced by residents within an urban environment (World Health Organization, 2016). While there is no single, universally accepted definition, several key aspects contribute to its meaning:

• *Meeting needs and aspirations:* A livable city caters to the basic and higher-order needs of its

residents, offering them opportunities to fulfill their aspirations and live a satisfying life (Augustin *et al.*, 2023; UN-Habitat, 2016). This includes access to essential services like healthcare, education, and employment, as well as opportunities for cultural engagement, leisure activities, and personal growth (Augustin *et al.*, 2023).

- *Well-being and flourishing:* Livability goes beyond simply meeting basic needs; it fosters a sense of well-being and allows residents to flourish (Kiani & Javadiyan, 2019). This encompasses physical, mental, and social well-being, promoting a healthy and fulfilling life for all residents (World Health Organization, 2016).
- *Sustainability and quality of life over time:* A livable city not only provides a good quality of life for current residents but also ensures its sustainability for future generations (Tarigh Sheikh & Ameigde, 2022). This involves adopting environmentally responsible practices and ensuring that the city can support a good quality of life in the long term (Kiani & Javadiyan, 2019).

Aspects of livability

Livability, a multifaceted concept, plays a crucial role in shaping the overall well-being and satisfaction of a city's residents. It encompasses a range of interconnected elements that contribute to the quality of urban life. Let's delve deeper into some key aspects of livability, drawing on diverse sources to gain a comprehensive understanding:

A. Physical infrastructure: The quality and functionality of a city's built environment significantly impact livability (Medayese *et al.*, 2020; Augustin *et al.*, 2023). Efficient public transportation networks, well-maintained roads that prioritize pedestrians and cyclists, and accessible public transit options are essential for mobility and social inclusion (World Health Organization, 2020). Studies like the one by Newman and Jennings highlight the positive correlation between well-developed public transportation and a city's livability, particularly for residents with limited access to cars. (Newman & Jennings, 2008). Safe, secure, and affordable housing options cater to the diverse needs of residents, whether it's families seeking spacious accommodations or young professionals desiring smaller, more centrally located apartments (UN-Habitat, 2016). A report by the McKinsey Global Institute (2016) emphasizes the importance of affordable housing in fostering economic growth and social stability in cities (McKinsey Global Institute, 2016).

B. Social cohesion: A strong sense of community, belonging, and social interaction among residents is a critical aspect of livability (Medayese *et al.*, 2020; Augustin *et al.*, 2023). This fosters a sense of safety, facilitates civic participation, and contributes to a city's vibrancy. Close-knit communities and supportive social structures are essential pillars of social cohesion (Dalvand *et al.*, 2021). Putnam argues that strong social capital, characterized by trust and reciprocity within communities, enhances civic engagement and fosters a stronger sense of place (Putnam, 2000). A vibrant city welcomes people from various backgrounds, ethnicities, and cultures. This fosters a sense of belonging, acceptance, and social tolerance (Florida, 2002). Richard Florida's work on the "creative class" highlights how diversity attracts talent and innovation, contributing to economic growth and a more dynamic urban environment (Florida, 2002). A secure environment free from crime also allows residents to feel safe and comfortable in their surroundings. It fosters a sense of trust within communities, encouraging social interaction and engagement (UN-Habitat, 2016).

C. Economic opportunities: A supportive environment that encourages innovation and fosters small business growth contributes to a thriving economy (Florida, 2002). This can involve initiatives like business incubators, access to capital, and training programs to equip entrepreneurs with the skills needed to succeed.

D. Environmental quality: A healthy and sustainable environment is fundamental to livability (Medayese *et al.*, 2020; Augustin *et al.*, 2020). This includes protecting natural resources, promoting sustainable practices, and mitigating the impact of pollution. Clean air and water are essential for human health and well-being. Exposure to pollutants can lead to respiratory problems and other health issues (World Health Organization, 2020). Initiatives that promote clean energy sources, reduce reliance on private vehicles, and invest in green infrastructure can help improve air quality in urban environments. Efficient waste collection and disposal practices are crucial for a clean and healthy urban environment. Implementing recycling programs, composting

initiatives, and waste-to-energy solutions can contribute to a more sustainable city (World Bank, 2021).

E. Cultural vibrancy: A thriving cultural scene enriches the lives of residents and contributes to a city's attractiveness. Access to museums, theaters, public art installations, and cultural events fosters creativity, engagement, and a sense of place (MollaMirzaei & Sajjadzadeh, 2023). Preserving historical buildings and districts' cultural heritage contributes to a city's unique character and sense of identity. Striking a balance between preserving the past and adapting to future needs is crucial for a livable and sustainable city (Dalvand *et al.*, 2021).

F. Education and skills development: A strong education system and opportunities for skills development are essential aspects of livability. This allows residents to reach their full potential and contribute to the city's economic and social fabric. Access to quality education across all levels, from primary to higher education, equips residents with the skills and knowledge needed to succeed in a competitive world (UN-Habitat, 2016). Providing opportunities for continuous learning and skills development ensures that residents can adapt to changing job markets and contribute to a city's ongoing innovation (Florida, 2002).

G. Governance and effective leadership: Effective and transparent governance fosters a sense of trust and participation among citizens. Engaging residents in decision-making processes promotes a sense of ownership and fosters a more inclusive and responsive urban environment (UN-Habitat, 2016). Strong and accountable leadership is crucial for implementing policies that address the needs of all residents and promote a sustainable and equitable city (World Bank, 2017).

H. Technological infrastructure: Access to reliable and affordable technology infrastructure is increasingly important for livability. High-speed internet access connects residents to information, education, and economic opportunities. It fosters innovation and promotes participation in the digital economy (UN-Habitat, 2016). Implementing smart city technologies, such as intelligent transportation systems and energy grids, can contribute to a more efficient, sustainable, and livable urban environment (Rabitaille, 2022).

Approaches to livability

A cornerstone of contemporary livability approaches is the integration of sustainability principles. As highlighted by authors like Ruth & Franklin, cities face challenges like climate change and resource depletion. Livability strategies now prioritize environmental protection, resource efficiency, and sustainable practices. Examples include promoting green infrastructure, encouraging renewable energy use, and implementing circular economy principles in waste management (Ruth & Franklin, 2014). A just and equitable city is a more livable city. Contemporary approaches to livability recognize the importance of addressing social inequalities and fostering inclusive spaces (Hubbard, 1992). This involves ensuring access to quality education and healthcare for all residents, regardless of background (UN-Habitat, 2021). Additionally, it necessitates promoting social cohesion and reducing spatial segregation within cities (Hubbard, 1992). By creating a city where everyone feels safe and valued and has opportunities to thrive, livability efforts can enhance social well-being for all. Technological advancements offer exciting possibilities for enhancing livability. The rise of "smart cities" exemplifies this trend. By leveraging technology for data collection, analysis, and service delivery, cities can improve efficiency in areas like transportation, energy management, and waste reduction (Kumar, 2021). Additionally, technologies like e-governance platforms can promote citizen participation and enhance transparency in decision-making processes (Kumar *et al.*, 2022). The most effective approaches to livability prioritize active community engagement. Residents, with their unique knowledge of local needs and challenges, are valuable partners in shaping the city's future (Tennakoon & Kulatunga, 2019). Participatory planning processes can foster a sense of ownership and encourage residents to contribute to creating a more livable city (Tennakoon & Kulatunga, 2019). Furthermore, livability approaches must foster resilience in the face of unforeseen challenges, such as natural disasters or economic downturns (Ruth & Franklin, 2014). Cities that can adapt and bounce back from such events are ultimately more livable for their residents.

Livability framework

Cities are complex ecosystems where the

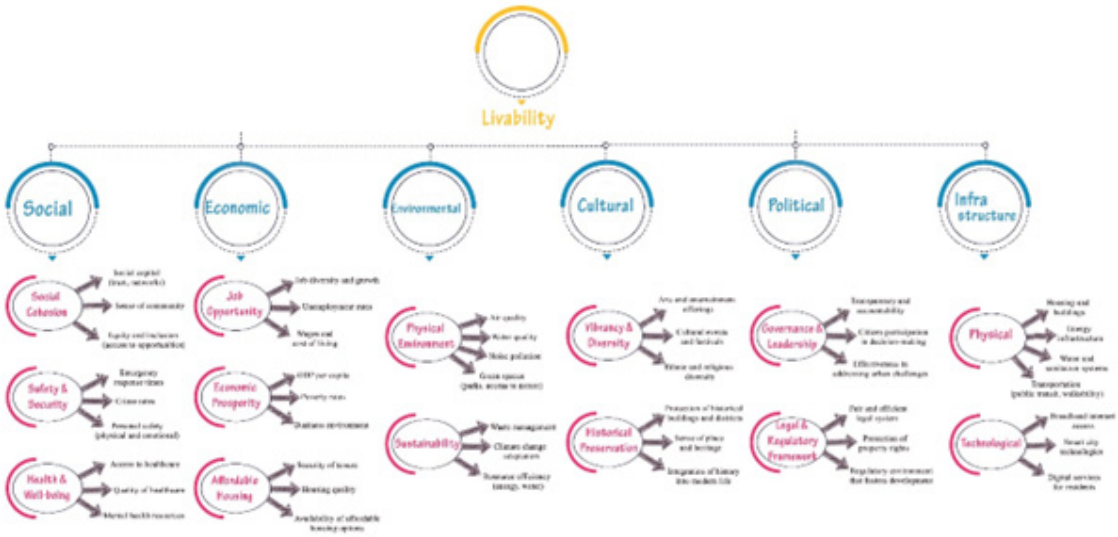

Fig. 1: Conceptual framework of research

quality of life for residents hinges on a multitude of factors. The concept of livability has evolved beyond simply meeting basic needs, encompassing a holistic approach that fosters well-being and societal progress. To guide this approach, a livability framework provides a structured way to assess a city's performance across various dimensions. This framework categorizes livability into key components, such as social cohesion, economic opportunity, environmental quality, and cultural vibrancy. Each component is further broken down into factors and specific criteria for evaluation. By analyzing these elements, cities can gain valuable insights into their strengths and weaknesses in terms of livability. This knowledge empowers them to develop targeted strategies and policies that enhance the overall well-being of their residents and create a truly livable urban environment.

METHODOLOGY

The provided text describes the research methodology of a study that measures livability in the old and new districts of Kashan City. The methodology is structured based on the onion layers of research methodology proposed by Saunders *et al.*, (2019). The text outlines each layer of the onion as follows:

A. Research philosophy: The research philosophy establishes the underlying worldview and assumptions guiding the research. In this case, the positivist paradigm is adopted, emphasizing an objective and measurable approach to reality. This aligns with the emphasis on quantitative data collection and statistical analysis.

B. Research approach: The research approach defines the overall strategy for conducting the research. The inductive /quantitative approach is chosen, reflecting the focus on gathering and analyzing numerical data to uncover patterns and relationships. This approach aligns with the positivist philosophy and the objective of understanding the relationships between variables affecting livability.

C. Research strategy: The research strategy specifies the specific methods and techniques employed to collect and analyze data. Given the positivist philosophy, quantitative approach, and research questions, the strategy of survey and interview is selected. This strategy aligns with the methods of data collection and analysis.

D. Research choice: The research choice determines the type of research conducted. Analytical research is chosen as the study aims to examine the relationships between variables affecting livability. This aligns with the quantitative approach and the focus on uncovering relationships.

E. Research timeframe: The research timeframe defines the period over which the data is collected and the research is conducted. A cross-sectional timeframe is chosen, indicating that data is collected

Table 1: Approaches toward livability

Author(s)	Year	Focus of Expertise	Meaning of Livability	Aspects of Livability	Factors for Assessment	Reference
Ruth & Franklin	2014	Urban Sustainability	Fulfilling basic needs & fostering well-being in an environmentally sustainable way.	Sustainability, Equity, Efficiency	Environmental quality, social cohesion, Economic opportunity, Resource management	(Ruth & Franklin, 2014)
Hubbard, Ph. j	1992	Environmental Psychology	Meeting basic needs & fostering a sense of place & belonging.	Social, Environmental, Psychological	Social interaction, Safety, Cleanliness, Aesthetic appeal, Access to Nature	(Hubbard, 1992)
Kiani & Javadiyan	2019	Urban Planning	The quality of life in a city that meets the needs of diverse residents.	Social, Economic, Environmental, and Infrastructure	Public services, Affordability, Job opportunities, educational opportunities, Transportation options	(Kiani & Javadiyan, 2019)
Medayese *et al.*	2020	Urban Studies	A dynamic concept encompassing physical, social, economic, and environmental factors.	Physical, Social, Economic, and Environmental	Housing, Transportation, Social networks, Job creation, Air quality, Green spaces	(Medayese et al., 2020)
Augustin *et al.*	2023	Urban Planning	A multi-dimensional concept shaping residents' well-being and satisfaction.	Social, Economic, Environmental, and Infrastructure	Social cohesion, Cultural offerings, Public Safety, Economic opportunities, Environmental Quality, Transportation	(Augustin et al., 2023)
MollaMirzaei & Sajjadzadeh	2023	Urban Economics	A vibrant city offering cultural richness, economic opportunities, and a high quality of life.	Cultural, Economic, Social, and Environmental	Arts & Culture, Job diversity, Social networks, Environmental sustainability	(MollaMirzaei & Sajjadzadeh, 2023)
Rabitaille, P. R.	2022	Smart Cities	A combination of physical, social, and technological elements that enhance resident well-being.	Physical, Social, Technological	Infrastructure, Social interaction, Smart governance, Technological innovation	(Rabitaille, 2022)
Florida, R.	2002	Urban Studies	A city attracting talent and fostering innovation through diversity and creativity.	Social, Economic	Diversity & Inclusion, Entrepreneurial environment, Job opportunities	(Florida, 2022)
Newman, P., & Jennings, I.	1989	Transport Planning	A city prioritizing walkable communities and efficient public transportation.	Physical, Environmental	Sustainable transportation, Walkability, Reduced reliance on cars	(Newman & Jennings, 2008)
Putnam, R. D.	2000	Political Science	A city fostering strong social networks, trust, and civic engagement.	Social	Social capital, Community engagement, Sense of belonging	(Putnam, 2000)
World Health Organization	2020	Public Health	A healthy living environment promotes physical and mental well-being.	Environmental, Social	Air quality, Clean water, Access to healthcare, Safety	(World Health Organization, 2020)
Dalvand *et al.*	2021	Urban Planning	A city preserving historical heritage while adapting to meet modern needs.	Cultural, Physical	Historical preservation, Architectural character, Infrastructure development	(Dalvand et al., 2021)
Strauss & Thomas	1998	Economics	A city with strong job opportunities contributing to resident wealth and well-being.	Economic	Job creation, Unemployment rates, Wages	(Strauss & Thomas, 1998)
UN-Habitat	2016	Urban Development	A city promoting inclusivity, participation, and sustainable urban planning.	Social, Political, and Environmental	Citizen participation, Affordable housing, Access to education, Public services, Environmental protection	(UN-Habitat, 2016)
World Bank	2021	Urban Development	A city efficiently manages resources and fosters economic growth.	Environmental, Economic	Waste management, Resource efficiency, Infrastructure investment	(World Bank, 2021)
Kumar, A. *et al.*	2022	Smart Cities	A city leveraging technology for efficient service delivery and citizen engagement.	Technological, Social	E-governance platforms, Data-driven decision-making, Citizen participation	(Kumar, A et al., 2022)
McLaren, D. & Agyeman, J.	2015	Environmental Justice	A city ensuring equitable access to environmental benefits and mitigating environmental burdens.	Environmental, Social	Environmental justice, Pollution exposure, Access to green spaces	(McLaren & Agyeman, 2015)
Banerjee, A. & Duflo, E.	2011	Development Economics	A city provides necessities and opportunities for citizens to improve their lives.	Economic, Social	Affordable housing, Access to healthcare, Education opportunities, Income equality	(Banerjee & Duflo, 2011)

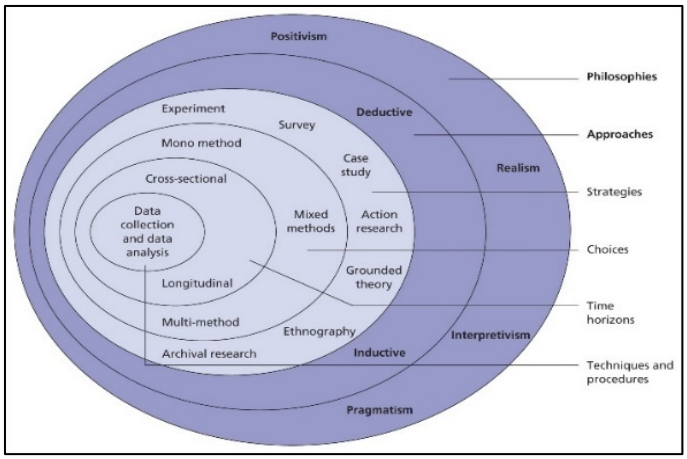

Fig. 2: Layers of Saunders' research method

Table 2: Determination of sample size by texture type of Kashan city

Texture	Neighbors name	Population	Number of questionnaires	Texture	Neighbors name	Population	Number of questionnaires
Old Urban Fabric	Post Mashhad Bala	11976	225	New Urban Fabric	Edare Gas	5123	159
	Bazar	5158			Valiasr	2355	
	Tahero Mansour	5878			AmirKabir	4281	
	Darbe Isfahan	9113			Danesh	4790	
	Mohtasham	6185					
	Post Mashhad Paeen	8745			Farhangian	1301	
	Soltan Amir Ahmad	4521					

at a single point in time. This aligns with measuring livability at a specific time.

F. Data collection and analysis methods: The data collection and analysis methods outline the specific techniques used to gather and interpret the data. Consistent with the previous layers, data collection methods include surveys (questionnaires), interviews (structured or semi-structured), and document reviews. Data analysis methods include descriptive statistics (t-test in SPSS) and Structural Equation Modeling (SEM) using Analysis of Moment Structures software (AMOS) to uncover relationships and test hypotheses.

The target population of this study is the total residents of Kashan city neighborhoods, amounting to 304,478 people, residing in the 7 old city neighborhoods (Posht Mashad Bala, Posht Mashad Payin, Mohtasham, Sultan Amir Ahmad, Darb Isfahan, Bazaar, Taher, and Mansour) and 5 new city neighborhoods (Edare Gas, Farhangian Alley, Vali Asr, Danesh, Amir Kabir) (Table2). The sample size was calculated using Cochran's formula to be 384 individuals,

Descriptive analyses of the collected data were conducted using SPSS software. The reliability test performed using Cronbach's alpha coefficient yielded

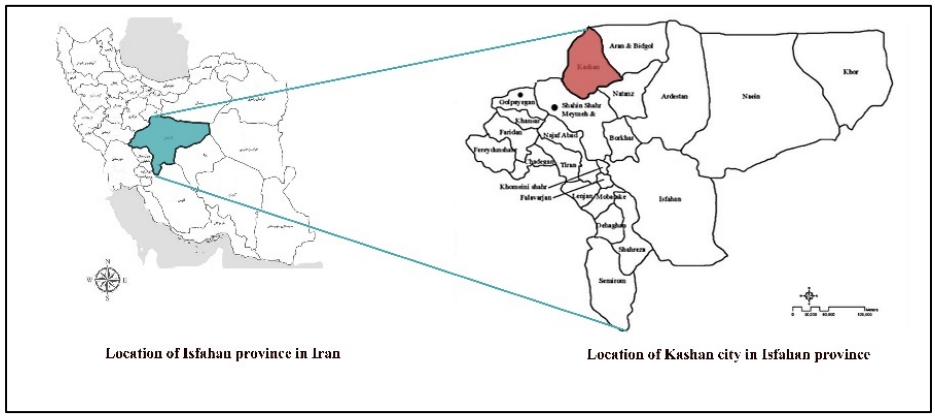

Fig. 3: Location of Kashan city method

an overall statistic of 0.82, indicating the reliability of the research findings at a 95% confidence level. To assess the livability of Kashan City, based on the research background and validity assessment by experts, a questionnaire was developed to examine the fit and consistency between the measurement tool (questionnaire) and the concept of livability. To examine the coherence and logic of the designed questionnaires and assess their structural validity, factor analysis and internal consistency tests were employed. Kashan, a city with a history of over 7,000 years, is located in Isfahan Province, in the heart of the Iranian desert.

This historic city, with an area of approximately 8,500 hectares and a population of 304,478, boasts stunning architecture, numerous natural and cultural attractions, and hospitable people, making it a captivating destination for tourists. The city's climate is dry and semi-arid, with hot summers (influenced by the central desert) and cold winters. The city of Kashan boasts an abundance of natural and historical attractions, along with a rich culture. However, despite these strengths, Kashan faces several challenges that hinder its livability. These challenges include limited green spaces, which negatively impact air quality, mental well-being, and overall livability. Air pollution is another significant concern, primarily due to vehicular emissions and industrial activities, leading to respiratory problems and other health issues. Traffic congestion, particularly during peak hours, further increases travel times, reduces air quality, and contributes to noise pollution. Water scarcity is another pressing issue in Kashan, caused by the arid climate and unsustainable water management practices. This strains water resources and limits access to clean water for residents. Additionally, Kashan's wastewater and solid waste management systems are inadequate to handle the growing volume of waste generated by the city's population, leading to potential environmental contamination and public health concerns. Finally, the lack of sufficient recreational and sports facilities hinders physical activity and overall well-being for residents. If these challenges are not addressed through proper planning, they could significantly impact Kashan's livability indices and the quality of life for its residents. Despite the livability challenges it faces, Kashan possesses several strengths and potential assets that can be leveraged to enhance its livability and establish itself as a sustainable and attractive urban destination. Kashan enjoys a strategic location along major transportation routes, providing access to regional markets and economic opportunities. This strategic positioning can facilitate trade, investment, and economic growth, contributing to the city's overall prosperity. Additionally, Kashan boasts a rich natural heritage encompassing desert landscapes, historical gardens, and natural springs. These natural attractions can serve as tourism draws, providing recreational spaces for residents and generating revenue for the local economy. Furthermore, Kashan's historical fabric is characterized by traditional architecture, wind towers, and underground water channels. This unique cultural heritage offers a distinct identity for the city and presents opportunities for heritage tourism.

Table 3: General status of descriptive information of the filled questionnaires

Describe	Number	Percent	Describe	Number	Percent
	Gender			Marital Status	
Female	190	49/5	Married	176	45/8
Male	194	50/5	single	208	54/2
	Education			Occupation	
Under diploma	113	29/4	Seller	84	21/9
Diploma	124	32/3	Worker	145	37/8
Bachelor	75	19/5	Employee	74	19/3
Master	68	17/7	Student	49	12/8
PhD	4	1/0	housekeeper	32	8/3

Table 4: Condition of livability dimensions of Kashan city with T-test

	Average test=3					
	T	df	Sig. (2-tailed)	Mean difference	95% confidence	
					Upper	Lower
Economy	50.841	383	.000	2.44792	2.3532	2.5426
Political	58.671	383	.000	2.74740	2.6553	2.8395
Culture	67.614	383	.000	3.34646	3.2491	3.4438
Environment	63.717	383	.000	3.41775	3.3123	3.5232
Infrastructure	50.512	383	.000	2.65969	2.5562	2.7632
Social	50.108	383	.000	2.55053	2.4505	2.6506
Livability	- 4.60	383	0.000	- 0.089	- 0.127	- 0.051

Finally, Kashan has a long tradition of producing exquisite handicrafts, such as carpets, ceramics, and rosewater. These handicrafts can contribute to the local economy, providing employment and showcasing the city's cultural richness. By implementing strategic planning and investing in these strengths, Kashan can effectively address its livability challenges, improve the quality of life for its residents, and establish itself as a sustainable and attractive urban destination.

RESULT AND DISCUSSION

To analyze and evaluate the livability components of Kashan city, based on Cochran's formula, 384 residents of this city were surveyed in two old and new textures. Since some of the livability components are relative and individual characteristics and living conditions have a great impact on the way they are viewed, part of the questionnaire was dedicated to descriptive information. Descriptive statistics of the research include gender, education, marital status, and occupation. The status of respondents' information is shown in Table 3.

Liveability of Kashan City

To assess the livability status and differences in the dimensions of livability in Kashan, a composite variable was constructed from each dimension, and a One-Sample t-test was used Table 4. As can be seen, the livability status of Kashan in terms of economic, cultural, and social dimensions is below the average under study and requires planning for improvement. Among these, the cultural dimension is the weakest with a t-statistic of – 6.18. The political and infrastructural dimensions, on the other hand, were rated as average by the respondents, with t-statistics of 1.67 and 1.61, respectively. However, the level of satisfaction with the environmental dimension was assessed as appropriate. The overall assessment of the livability status of Kashan shows that the quality of livability is inadequate and below the expected average. This is supported by the significance level of the test, the negative confidence intervals, and the t-statistic of -4.606.

Comparison of the livability of old and new neighborhoods

To assess the livability status in historical and new urban neighborhoods in Kashan City, a paired-sample T-test was employed for two independent normal populations. The results are presented in Tables 5 and 6.

Table 5: Frequency value, mean, standard deviation, and average standard in two old and new tissues

Texture	N	Mean	Std. Error Mean	Std. deviation
Old neighborhoods	225	2.796	0.365	0.365
New neighborhoods	159	3.071	0.344	0.344

Table 6: Frequency value, mean, standard deviation, and average standard in two old and new tissues

Livability	Levene's Test for Equality of Variances		Independent Samples Test					95% Confidence Interval of the Difference	
	Sig.	f	t	df	Sig.	Mean difference	Std. Error Difference	Upper	Lower
Equal variances assumed	0.547	0.364	- 7.45	382	0.000	- 0.275	0.036	- 0.206	- 0.347
Equal variances not assumed	-	-	- 7.526	352.187	0.000	- 0.275	0.036	- 0.203	- 0.347

In the first step, to utilize the results of this test, Levene's statistic is employed to examine the equality of variances. According to the outcome, a significance level of 0.547, which is greater than 0.05, indicates that the assumption of equal variances is upheld. Therefore, the results of the first row serve as the basis for judgment. Since the significance level of the test is less than 0.05, it implies that the means of the two populations are not equal. Furthermore, as the upper and lower bounds at the 95% confidence level are negative, the livability status in the old fabric is of lower quality compared to the new fabric Table 6.

Prioritizing dimensions and indices of Kashan city's livability

In the continuation of the research process for prioritizing livability indicators in the old and new neighborhoods of Kashan city, Analysis of Moment Structures (AMOS) was used. The purpose of this study was to identify the most influential variables of Kashan city livability variables. Therefore, based on the theoretical foundations of the research, a second-order factor model was developed based on six latent factors (Infrastructural, Political, Economic, Environmental, Social, and Cultural). In this study, using factor analysis, each of the variables that could identify each of the six latent factors was selected and entered into the modeling process Fig. 4.

Fig. 4 presents the second-order factor loading and also the most significant variables and their prominent impacts on the livability of Kashan City. The findings reveal that the economic factor holds the highest factor loading of 0.95, indicating its substantial influence on the city's livability. Following the economic factor, the social factor ranks second with a factor loading of 0.93, and the infrastructure factor comes next with a factor loading of 0.85. The environmental, political, and cultural factors follow with factor loadings of 0.68, 0.51, and 0.5, respectively. Within the *economic factor*, the job opportunities variable holds the highest impact with a factor loading of 0.57, followed by economic prosperity with a factor loading of 0.47. Affordable housing, on the other hand, exhibits the lowest impact with a factor loading of 0.35. The questionnaires employed in this study further break down these variables into sub-variables: job opportunities encompass job diversity and growth, unemployment rate, wages, and cost of living costs; economic property includes GDP (Gross Domestic Product) per capita, poverty rate, and business environment; and affordable housing comprises housing security, housing quality, and availability of affordable housing options. The *social factor* is primarily influenced by the social cohesion and solidarity variable, with a factor loading of 0.79. This variable holds the greatest impact on the social aspect of Kashan's livability. Following this, the safety and security variable ranks second with a factor loading of 0.72, while health and well-being exhibit the least impact among the social variables, with a factor loading of 0.55. The social cohesion and solidarity variable is further broken down into the following sub-variables: social capital, sense of place and community, and equal access to opportunities.

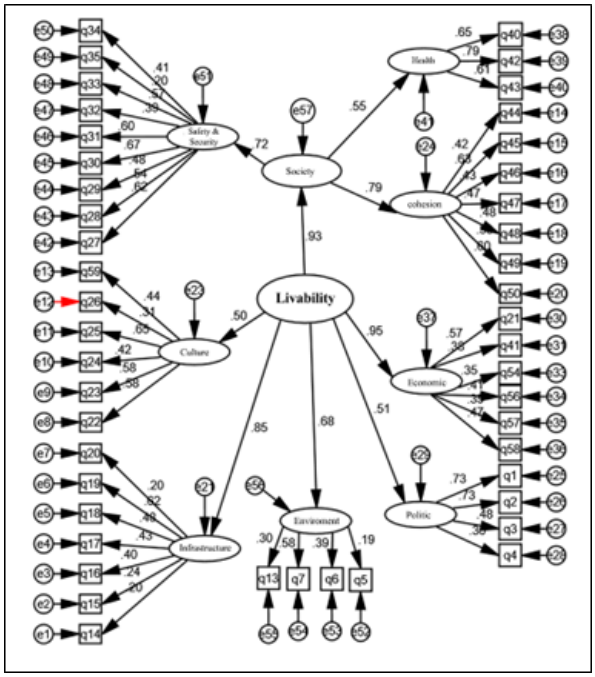

Fig. 4: The final model for prioritizing Kashan's livability indicators

The safety and security variable encompasses responsiveness in emergencies, crime rate, and personal safety (physical and emotional). Finally, the health and well-being variable includes access to healthcare, quality of healthcare, and mental health resources. Within the *infrastructure factor*, physical infrastructure holds the most significant impact with a factor loading of 0.62, while technological infrastructure exhibits the least impact with a factor loading of 0.2. The physical infrastructure variable is further categorized into the following sub-variables: housing and buildings, energy infrastructure, water and sanitation systems, and transportation. The technological infrastructure variable, on the other hand, encompasses broadband internet access, smart city technologies, and digital services for residents. The *environmental factor* comprises two primary variables: physical environment with a factor loading of 0.59, indicating the highest impact, and environmental sustainability with a factor loading of 0.19, representing the least impact. The sub-variables for the physical environment variable include air quality, water quality, noise pollution, and access to green spaces. The environmental sustainability variable encompasses waste management, climate change adaptation, and resource (water, energy) efficiency. The *political factor* consists of two main variables: the regulatory framework with a factor loading of 0.73, indicating the highest impact, and governance and leadership with a factor loading of 0.36, representing the least impact. The regulatory framework variable is further broken down into the following sub-variables: a fair and efficient legal system, protection of property rights, and a regulatory environment that facilitates development. The governance and leadership variable, on the other hand, encompasses transparency and accountability, citizen participation in decision-making, and efficiency in addressing urban problems. The *cultural factor* comprises two primary variables: cultural dynamics and diversity with a factor loading of 0.65, indicating the highest impact, and preservation of historical heritage with a factor loading of 0.31, representing the least impact. The cultural dynamics and diversity variable is further broken down into the following sub-variables: arts and entertainment offerings, cultural events and festivals, and ethnic and religious diversity. The preservation of historical heritage variable, on the other hand, encompasses the protection of historic buildings and sites, sense

Table 7: Default model weighted regression

			Estimate	S.E.	C.R.	P				Estimate	S.E.	C.R.	P
F10	**<---**	**f3**	1.000				**q20**	**<---**	**F4**	1.138	.735	1.548	.026
F4	**<---**	**f3**	.422	.199	2.122	.034	**q1**	**<---**	**f2**	1.000			
F2	**<---**	**f3**	.765	.190	4.037	***	**q2**	**<---**	**f2**	1.027	.177	5.817	***
F9	**<---**	**f3**	.430	.224	1.919	.043	**q3**	**<---**	**f2**	.518	.109	4.734	***
F1	**<---**	**f3**	1.000				**q4**	**<---**	**f2**	.396	.126	3.142	.002
F7	**<---**	**F10**	.321	.105	3.046	.002	**q21**	**<---**	**f1**	1.000			
F6	**<---**	**F10**	.426	.138	3.093	.002	**q41**	**<---**	**f1**	.574	.164	3.506	***
F5	**<---**	**f3**	1.000				**q54**	**<---**	**f1**	.520	.160	3.259	.001
F8	**<---**	**F10**	.529	.154	3.432	***	**q56**	**<---**	**f1**	.760	.201	3.774	***
q44	**<---**	**f7**	1.000				**q57**	**<---**	**f1**	.571	.175	3.259	.001
q45	**<---**	**f7**	1.643	.392	4.188	***	**q58**	**<---**	**f1**	.673	.161	4.182	***
q46	**<---**	**f7**	1.089	.308	3.531	***	**q40**	**<---**	**F6**	1.000			
q47	**<---**	**f7**	1.228	.334	3.681	***	**q42**	**<---**	**F6**	1.081	.181	5.967	***
q48	**<---**	**f7**	1.196	.320	3.739	***	**q43**	**<---**	**F6**	.821	.144	5.719	***
q49	**<---**	**f7**	1.746	.428	4.074	***	**q27**	**<---**	**F8**	1.000			
q50	**<---**	**f7**	1.812	.440	4.117	***	**q28**	**<---**	**F8**	.885	.165	5.375	***
q22	**<---**	**F5**	1.000				**q29**	**<---**	**F8**	.683	.140	4.876	***
q23	**<---**	**F5**	1.078	.191	5.642	***	**q30**	**<---**	**F8**	1.083	.172	6.291	***
q24	**<---**	**F5**	.809	.187	4.327	***	**q31**	**<---**	**F8**	.958	.166	5.786	***
q25	**<---**	**F5**	1.072	.176	6.087	***	**q32**	**<---**	**F8**	.650	.162	4.022	***
q26	**<---**	**F5**	.470	.143	3.293	***	**q33**	**<---**	**F8**	.930	.166	5.599	***
q59	**<---**	**F5**	.667	.151	4.425	***	**q35**	**<---**	**F8**	.310	.145	2.142	.032
q14	**<---**	**F4**	1.000				**q34**	**<---**	**F8**	.706	.166	4.248	***
q15	**<---**	**F4**	1.189	.698	1.703	.046	**q5**	**<---**	**F9**	1.000			
q16	**<---**	**F4**	2.276	1.138	2.001	.045	**q6**	**<---**	**F9**	1.630	.896	1.820	.039
q17	**<---**	**F4**	2.251	1.106	2.036	.042	**q7**	**<---**	**F9**	2.772	1.446	1.917	.045
q18	**<---**	**F4**	2.359	1.137	2.074	.038	**q13**	**<---**	**F9**	1.311	.767	1.710	.047
q19	**<---**	**F4**	2.734	1.277	2.141	.032							

Table 8: The main index of fit

Indicators	scores	Status
CMIN/DF	1.505	Suitable
GFI	0.716	Suitable
AGFI	0.687	Suitable
PRATIO	0.948	Suitable
RMSEA	0.058	Suitable

of place and heritage, and integration of history into modern life. Table 7 presents the non-standard values, critical ratio, and level of significance (P-value). The results of the table indicate that all lambda parameters have a significant difference from zero. The P-value in all the above relationships is less than 0.05, which shows that all the relationships in the model are supported by the empirical data.

After examining the significance of parameters with zero values, the final model of the research is evaluated using overall model fit indices. According to Table 8, the main model fit indices show that the research data has been able to well represent the conceptual model of the research, as the values of the obtained parameters are within the range of the desired fit.

CONCLUSION

The study investigated livability in Kashan, Iran, comparing its old and new districts. The findings reveal that overall livability in Kashan falls short of the desired average, with economic, cultural, and social aspects scoring the lowest. Environmental quality, on the other hand, was assessed as satisfactory. When comparing livability across old and new districts, the study found that newer districts have a higher overall livability compared to older ones. To further understand the factors influencing livability, the

study prioritized the six dimensions of livability: infrastructure, politics, economy, environment, society, and culture. The economic factor emerged as the most influential, followed by social and infrastructural factors. Within the economic factor, job opportunities were identified as the most impactful aspect, while social cohesion and physical infrastructure held the greatest importance within the social and infrastructural factors, respectively. The findings of this study highlight the critical role of effective urban management in enhancing livability across Kashan's districts. The observed disparities between old and new districts suggest the need for targeted interventions to bridge the gap and ensure equitable access to a high quality of life for all residents.

- *Strategic economic development:* Develop and implement strategic economic development plans that focus on diversifying the city's economy, fostering innovation, and creating job opportunities, particularly in the new districts. This can involve attracting new businesses, investing in skills development programs, and providing incentives for entrepreneurship. Effective urban management can bridge the economic gap between districts by directing resources toward the development of lagging areas.
- *Community engagement and social inclusion:* Prioritize community engagement initiatives that promote social cohesion and a sense of belonging in all neighborhoods. Encourage resident participation in decision-making processes and invest in programs that foster social inclusion, particularly in the older districts. This proactive approach can strengthen social bonds and create a more vibrant and inclusive urban environment across the city.
- *Infrastructure investment and maintenance:* Increase investment in upgrading and maintaining physical infrastructure across all districts, with a specific focus on housing, transportation, water and sanitation systems, and energy efficiency in the older districts. Effective urban management can prioritize infrastructure projects that address existing deficiencies and ensure all residents have access to essential services. This will not only improve the overall quality of life but also promote sustainable development in the long run.

By implementing these management recommendations, Kashan can create a more balanced and livable urban environment for its residents. This will not only address the identified disparities but also position the city as a model for sustainable urban development and improved well-being for all.

AUTHOR CONTRIBUTIONS

Y. Gholami supervised and performed the corrections, reviewed the article, and controlled the results of the research. E. Sherafati Moghaddam performed the literature review, took samples for the study, analyzed and interpreted the data, prepared the manuscript text, and edited the manuscript. A. Fouladi also performed an analytical model (using SPSS and Amos) and contributed to taking samples of the study and collecting data.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been completely witnessed by the authors.

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ABBREVIATIONS (NOMENCLATURE)

AMOS	Analysis of Moment Structures
SEM	Structural Equation Modeling
%	percent
T	It's a calculated value that measures how far a sample statistic (like the mean) is from a hypothesized population parameter (like the population mean).
df	degrees of freedom
Sig.	significance level
N	Number
Std.	the square root of the variance
f	a ratio of two variances.
S.E.	Standard Error
C.R.	Critical Ratio
P	The Significance Level
F10	Factor number 10
Q10	Question number 10
CMIN/DF	minimum discrepancy of confirmatory factor analysis/degrees of freedom.
GFI	goodness of fit index
AGFI	Adjusted Goodness of fit Index and indicates the degree of freedom
PRATIO	Parsimony Ratio
RMSEA	Root Mean Square Error of Approximation
GDP	Gross Domestic Product

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