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ORIGINAL ARTICLE

Explaining and Analyzing the Components Influencing Citizens' Environmental Behavior in Ahvaz City

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ABSTRACT

Environmental citizenship refers to possessing knowledge, attitudes, and skills related to the urban environment in a way that leads to pro-environmental behavior. Citizens with pro-environmental behaviors bear the greatest responsibility toward the urban environment and consequently the preservation of its natural, historical, and heritage values. The present study aims to analyze the mechanisms influencing citizens' place attachment to the urban environment by employing Structural Equation Modeling (SEM) and SmartPLS software. Additionally, the assessment of validity and reliability of the research model, as well as the data analysis, was conducted using SEM in LISREL software. The study measures the level of awareness and environmental behaviors of Ahvaz citizens, seeking ways to enhance pro-environmental behaviors and reduce damage caused by urbanization and industrialization. Structural Equation Modeling is a comprehensive approach for testing hypotheses about relationships between observed and latent variables. The results of this study reveal the impact of the dimensions of civic behavior and their relationship with environmental protection, including environmental awareness, participation in local programs, sustainable consumption, support for environmental policies, and the growth of critical thinking and innovation.

KEYWORDS

Citizens' Behavior, Environmental Indicators, Social and Economic Indicators, Access and Services Indicators, Ahvaz City.

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Introduction

Environmental citizenship refers to having knowledge, attitudes, and skills related to the urban environment in such a way that these lead to pro-environmental behavior. Citizens with pro-environmental behaviors bear the greatest responsibility toward the urban environment and, consequently, the preservation of its natural, historical, and heritage values. A city is a dynamic phenomenon; therefore, changes in its various sectors are necessary throughout development processes. Optimal changes are those that maintain the existing order among the city's different factors, respect urban values (including spatial, environmental, and heritage values) and cause the least damage to them.

In recent decades, citizens' environmental behavior has been recognized as a method for urban management and development, attracting significant attention from policymakers and planners. The goal of this process is to create a positive, distinctive, and competitive image of the city in the minds of residents, tourists, investors, and other stakeholders. Reviews of new urban developments indicate another issue: cities have not only faced the loss of their environmental values but also the destruction of their historical and heritage values—values whose loss would render the city and its citizens identityless.

A good and identity-rich urban environment is a place that corresponds, to some extent, with the individual, their culture, and their behaviors and serves as a means to establish a connection between the individual and their community, past and history, urban life, time, and surrounding environment. The rapid urbanization and excessive migration to urban areas in Iran have intensified and aggravated environmental problems. On the other hand, the growth and expansion of cities have added to the country's challenges, turning them into focal points of environmental issues.

Accordingly, this research aims to address this practical and scientific need by employing methods such as surveys of various citizens across different parts of Ahvaz City, focus group discussions, and interviews with local officials and social and environmental activists. The study seeks to examine factors such as environmental awareness, attitudes, social norms, physical infrastructure, the role of institutions and media, and cultural components in a combined and structured manner. The outcome of this effort will be a practical explanation that provides a clear view of the relationships among these factors and enables effective policies and programs to promote pro-environmental behavior.

Methodology

The present study is applied in terms of its objective and is classified as descriptive-analytical research in terms of type and method. Data collection was conducted using a questionnaire. The questionnaire items were designed based on a five-point Likert scale ranging from "very low" to "very high." The statistical population of this study consisted of the residents of Ahvaz City in the year 1404 (2025). A minimum sample size of 385 residents was considered to complete the questionnaires. Due to the homogeneity of opinions among all members and the lack of influence of specific demographic or spatial characteristics in the population, the sample was selected using convenience sampling.

Furthermore, to measure the study variables, standardized questionnaires on place attachment, trust, mobility, and environmental citizenship behavior were employed. The questionnaire indicators were derived from related studies and prior research; subsequently, they were localized based on the conditions of the study and the city under investigation. The assessment of the validity and reliability of the research model and data analysis were conducted using Structural Equation Modeling (SEM) in LISREL software.

Structural Equation Modeling is a comprehensive approach to test hypotheses about relationships between observed and latent variables. This method allows testing the acceptability of theoretical models within a specific population. Accordingly, first, using the measurement model of SEM, the validity of constructs was examined through related indices. Then, using first-order Confirmatory

Factor Analysis (CFA), the designed items for each construct were assessed.

Results

One of the primary dimensions examined is the city's physical indicators. The relationship between physical characteristics and citizens' behavior is complex and reciprocal; improvements in urban space quality, development of urban infrastructure, the presence of adequate and appropriate green spaces, and accessibility to environmental facilities can increase citizens' motivation and positive behaviors. Conversely, active citizen behavior also plays a role in enhancing the quality and management of these spaces. In other words, citizens who actively participate can play a key role in maintaining green spaces, preventing urban space degradation, and encouraging sustainable use of resources. In this context, urban planning that simultaneously considers both physical and social dimensions can pave the way for improving pro-environmental behaviors. This issue is especially important in Ahvaz due to its numerous environmental challenges and infrastructural deficiencies.

Social indicators are another fundamental component shaping civic behavior. Factors such as education level, the role of socialization institutions like family, school, and non-governmental organizations, social trust, collective identity, and political participation all influence individuals' motivation to engage in environmental behaviors. Environmental education, particularly when delivered through formal and informal institutions using interactive and participatory methods, can strengthen knowledge and positive environmental attitudes among individuals. Increasing trust between citizens and local institutions, as well as reinforcing a sense of belonging to the community, are recognized as essential prerequisites for sustained and responsible participation. In this regard, strengthening social and political institutions and providing suitable platforms for public engagement can lead to enhanced civic behaviors and improved quality of life in Ahvaz.

Economic dimensions are also significant indicators affecting citizen behavior. Family economic status, access to financial resources, employment opportunities, and the degree of equality in access to resources and services can play a decisive role in individuals' motivation to participate in environmental activities. Improving economic conditions and creating equal opportunities for all social groups increase the sense of security and motivation to support the environment. It is also crucial to note that positive civic behaviors are important not only socially but also contribute to economic sustainability and balance. For example, sustainable consumption and reducing resource waste lower costs for families and society. Therefore, developing policies and programs that reinforce positive interactions between economic indicators and civic behavior can lead to sustainable development in Ahvaz.

Environmental indicators are directly related to civic behaviors, and this relationship is also reciprocal and complex. Awareness of environmental issues and recognition of local threats such as air pollution, water contamination, and green space destruction can increase citizens' motivation to participate in environmental protection. Active participation in local programs such as environmental cleanups, tree planting, recycling, and supporting environmental policies are practical examples of positive environmental behaviors that ultimately lead to the preservation of natural resources and sustainable development. Education and cultural promotion in this field, fostering a sense of social responsibility, and developing collective cooperation are essential for achieving environmental goals. Developing a culture of cooperation and responsibility toward the environment in Ahvaz, which faces serious environmental challenges, is of great importance and requires special attention.

Another key component is the indicator of access and services, which plays a crucial role in shaping civic behaviors. Easy and equal access to public services, environmental information, and cultural and social facilities can increase citizens' participation in environmental activities and positive behaviors. Conversely, inequality in access to these facilities can lead to reduced motivation, negative civic behaviors, and increased social dissatisfaction. Therefore, urban policymakers

must improve infrastructure and facilitate access to services to institutionalize positive and sustainable behaviors. Developing appropriate infrastructure, timely information dissemination, and supportive policies can contribute to creating an active, responsible, and cohesive community.

Conclusion

The results of this study indicate that the factors influencing the environmental behavior of citizens in Ahvaz can be categorized into several key dimensions, which are discussed as follows:

First, environmental awareness plays a crucial role in shaping positive attitudes and behaviors. Enhancing public awareness through educational programs and information dissemination can pave the way for changing attitudes and ultimately fostering constructive civic behaviors.

Second, participation in local and social programs increases the sense of belonging and social responsibility. Activities such as environmental cleanups, tree planting, the use of renewable resources, and involvement in environmental campaigns represent active and effective civic behavior that contributes to improving the environmental conditions.

Third, sustainable consumption, which involves choosing eco-friendly goods and services, reducing waste production, and recycling. Citizens who adhere to these principles not only reduce their negative impact on the environment but also play a positive role in preserving natural resources.

Fourth, support for environmental policies, including active participation in decision-making processes, voting, and monitoring related policies and regulations. Such participation allows citizens to voice their concerns regarding environmental protection to officials and policymakers.

Fifth, the growth of critical thinking and innovation, through which citizens can propose innovative solutions and green technologies to address environmental challenges. This approach can enhance resource efficiency and promote sustainable development strategies.

Finally, it must be emphasized that strengthening and institutionalizing pro-environmental civic behaviors requires a comprehensive and inclusive approach that simultaneously addresses physical, social, economic, environmental, and service-related dimensions. Management policies and programs should be formulated based on precise analyses and an understanding of the influential factors and implemented collaboratively with the involvement of government agencies, the private sector, non-governmental organizations, and the citizens themselves. This path is the only way to achieve sustainable development, improve quality of life, and preserve the environment for present and future generations.

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تبیین و تحلیل مؤلفه‌های تأثیرگذار بر رفتار محیط‌زیستی شهروندان شهر اهواز

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چکیده

رفتار محیط‌زیستی به معنای داشتن دانش، نگرش‌ها و مهارت‌هایی در زمینه محیط‌زیست شهری است، به‌طوری‌که این موارد به رفتار طرفدار محیط‌زیست منجر شود. شهروندان با رفتارهای محیط‌زیستی، بیشترین مسئولیت را در قبال محیط شهری و بنابراین حفظ ارزش‌های طبیعی، تاریخی و میراثی آن دارند. پژوهش حاضر باهدف تحلیل سازوکارهای مؤثر بر تعلق مکانی شهروندان به محیط‌زیست شهری، از روش مدل‌سازی معادلات ساختاری (SEM) و نرم‌افزار SmartPLS بهره گرفته است. براساس یافته‌های پژوهش، مقادیر بار عاملی گویه‌ها بیش از ۰/۴ بوده و بنابراین مدل اندازه‌گیری از روایی مناسبی برخوردار است؛ همچنین شاخص برازش RMSEA مدل برابر با ۰/۰۸۲ می‌باشد که نشان‌دهنده برازش قوی مدل معادلات ساختاری است. شاخص محیط‌زیستی و پس از آن شاخص‌های اجتماعی و اقتصادی بیشترین تأثیر را بر رفتار محیط‌زیستی شهروندان اهواز دارند و مدل نهایی پژوهش از برازش و اعتبار آماری مطلوبی برخوردار است. در نتیجه این پژوهش، تأثیر ابعاد رفتار شهروندی و ارتباط آن با حفاظت از محیط‌زیست به‌دست‌آمده که شامل این موارد می‌باشد: آگاهی محیط‌زیستی، شرکت در برنامه‌های محلی، مصرف پایدار، حمایت از سیاست‌های محیط‌زیستی و رشد تفکر انتقادی و نوآوری می‌باشد.

واژه‌های کلیدی

رفتار شهروندان، شاخص محیط‌زیستی، شاخص اجتماعی – اقتصادی، شاخص دسترسی و خدمات، شهر اهواز.

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این مقاله تحت گواهی زیر منتشرشده و هر نوع استفاده غیرتجاری از آن مشروط بر استناد صحیح به مقاله و با رعایت شرایط مندرج در آدرس زیر مجاز است.
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Introduction

Environmental citizenship refers to the possession of knowledge, attitudes, and competencies related to the urban environment that translate into pro-environmental behavior. Citizens, through their environmental practices, assume primary responsibility for the stewardship of the urban environment and, consequently, for safeguarding its natural, historical, and heritage values. As a dynamic and evolving phenomenon, the city undergoes continuous transformation through development processes. Such transformations are considered optimal when they preserve the existing equilibrium among urban components, respect urban values—including spatial, environmental, and heritage dimensions—and minimize adverse impacts on them. In recent decades, pro-environmental behavior has increasingly been recognized as a strategic approach to urban governance and development, attracting the attention of policymakers and planners. The overarching objective of this approach is to construct a positive, distinctive, and competitive urban image in the minds of residents, tourists, investors, and other stakeholders (Bonakdar & Audirac, 2022). Nevertheless, a review of contemporary urban development trends reveals a parallel and troubling phenomenon: cities are confronted not only with the degradation of environmental assets but also with the erosion of historical and cultural heritage values—losses that may ultimately undermine urban identity. A well-functioning and identity-rich urban environment is one that resonates with individuals' cultural orientations and behavioral patterns, serving as a medium that connects residents to their community, history, collective memory, and surrounding environment. Rapid urbanization and the accelerated growth of migration toward Iranian cities have intensified environmental challenges. Urban expansion has further exacerbated these issues, transforming cities into focal points of environmental crises (Khatibi, 2013). Over the past decades, environmental policy and planning research has increasingly emphasized the role of citizens as key factors influencing sustainable urban development (Oktay & Asilsoy, 2022). Accordingly, scholars and decision-makers have sought effective instruments to enhance environmental awareness, strengthen environmental concern, and promote behavioral change among urban residents. Within the broad conceptualizations and measurements of pro-environmental conduct, the civic dimension of such behaviors is commonly framed as environmental citizenship behavior (Takahashi, 2017). This conceptual lens facilitates a deeper understanding of residents' supportive actions toward environmental protection and underscores the importance of fostering citizen engagement in governmental environmental programs. Participation in environmental citizenship behavior, however, often entails a social dilemma. Individuals face a dual-choice situation: contributing to collective environmental welfare or prioritizing short-term individual benefits, given that socially responsible behaviors can impose personal costs (Gleim, 2013). Self-interested individuals may be less inclined to engage in prosocial environmental actions. Social identity theory suggests that factors such as community participation and place attachment can mitigate such collective-action conflicts (Perkins & Manzo, 2016). Moreover, the physical attributes of the urban environment—recognized as determinants of place attachment—significantly influence citizen participation in health-oriented pedestrian infrastructures (Sedigh et al., 2018). Environmental degradation constitutes one of the foremost concerns of the twenty-first century, much of which originates from unsustainable human behaviors (Song et al., 2023). Human activities have adversely affected soil through waste disposal, construction debris accumulation, and hazardous material dumping in peri-urban areas, leading to contamination and erosion. Air quality has similarly deteriorated due to toxic chemical emissions, primarily resulting from combustion processes. Emissions from urban transportation systems, industrial machinery, and equipment—particularly carbon dioxide—pose serious threats to human health and ecological systems (Farahmand et al., 2013). Meaningful environmental improvement requires an integrated understanding of the interrelationship between the natural and cultural dimensions of human life, a concern that gained prominence in the late twentieth century (Jing Shen, 2024). Citizens play a

pivotal role in mitigating urban environmental challenges. They bear responsibility for enhancing their environmental knowledge, cultivating sensitivity toward local ecological issues, and actively participating in problem-solving initiatives. Consequently, identifying the determinants of environmental behavior constitutes a fundamental step toward behavioral change. Contemporary environmental issues have transcended purely technical domains and increasingly embody social and cultural dimensions (Sarunya Sujaritpong, 2025). Environmental preservation is thus deeply intertwined with social norms, cultural values, and collective practices. Transforming behavioral orientations toward more nature-centered perspectives represents a key strategy for preventing environmental degradation. In the context of Ahvaz, several distinctive characteristics underscore the importance of examining environmental citizenship behavior. First, the city's recurrent environmental crises—particularly dust storms and air pollution—have heightened both public and governmental attention to ecological issues. Second, the city's socio-economic diversity, reflected in variations in education, income, environmental experience, and access to information and services, potentially shapes individual and collective behavioral patterns. Third, the institutional configuration of urban governance—encompassing service provision, waste management, public communication, and regulatory enforcement—plays a crucial role in enabling or constraining behavioral change. Fourth, local cultural norms may either conflict with or indirectly reinforce environmental initiatives through social networks, communal practices, and traditional customs. Although international and national studies have identified factors such as environmental knowledge, attitudes, social influence, and infrastructural access as determinants of pro-environmental behavior, the specific environmental, social, and structural conditions of Ahvaz necessitate a more context-sensitive and integrative analysis. Particularly in industrial cities of southern Iran, including Ahvaz, empirical research that simultaneously examines and models the interaction among these variables remains limited. This study therefore adopts a comprehensive analytical framework to identify, categorize, and examine the determinants of environmental citizenship behavior among Ahvaz residents. Beyond its theoretical contribution, the practical implications of such analysis are substantial. By determining the relative influence of factors such as personal attitudes, infrastructural accessibility, urban regulations, educational resources, and social pressures, policymakers and urban planners can allocate resources more effectively. For example, if limited public awareness regarding waste separation emerges as a primary barrier, educational and informational campaigns should be strengthened. If structural constraints—such as inadequate recycling infrastructure—constitute major obstacles, targeted investment becomes imperative. Alternatively, if social networks and community norms significantly shape behavior, participatory and community-based interventions may prove more effective. Employing mixed methodological approaches—including citizen surveys across diverse urban districts of Ahvaz, focus group discussions, and interviews with local officials and environmental activists—this research seeks to examine environmental knowledge, attitudes, social norms, physical infrastructure, institutional roles, media influence, and cultural dimensions within an integrated structural model. The anticipated outcome is a policy-relevant analytical framework clarifying the interrelationships among determinants and enhancing the effectiveness of environmental behavior interventions. Ultimately, the promotion of environmental citizenship transcends crisis management; it contributes to social cohesion, environmental satisfaction, public health, and long-term quality of life. In a city such as Ahvaz—where environmental threats are tangible yet social and institutional capacities for transformation are significant—understanding and strengthening environmental citizenship behavior represents both a scholarly imperative and a strategic pathway toward sustainable urban development.

Theoretical Foundations of the Study

Environmental Citizenship

Environmental citizenship refers to an individual's perception of being ethically and socially committed to addressing environmental challenges and safeguarding the natural environment. According to Meid

(2013), this construct encompasses four principal dimensions: citizenship orientation, environmental behavior, environmental attitudes, and environmental knowledge. These dimensions collectively shape a proactive and responsible engagement with environmental issues. From the perspective of the Qur'anic worldview, environmental ethics should be oriented toward the elevation and flourishing of the natural world. The initial step toward achieving the growth and perfection of all beings lies in recognizing their intrinsic purpose and discerning the pathway to their development. With regard to environmental elements, such awareness not only contributes to their preservation and advancement but also guides humans toward the optimal and ethical utilization of environmental resources. When human interaction with the natural world is grounded in an understanding of the characteristics and inherent value of creation, it fosters a belief in the potential for the flourishing of all beings. Acceptance of the developmental capacity of environmental elements consequently refines and legitimizes the moral orientation of human conduct toward nature.

Environmental Citizenship Behavior

Environmental citizenship behavior denotes the possession of environmental knowledge, attitudes, and competencies related to urban ecosystems in a manner that translates into pro-environmental action. Citizens, through environmentally responsible behaviors, bear significant responsibility for the preservation of urban environments, including their natural, historical, and cultural heritage. Brown (2019) conceptualizes environmental citizenship behavior as encompassing motivation, self-efficacy, awareness of personal values, applied knowledge, and the capacity to operationalize civic education and environmental literacy into concrete action. In this sense, environmental citizenship behavior extends beyond awareness to include intentional, informed, and sustained engagement in environmental stewardship.

Examples of Environmental Citizenship Behavior

1. **Consumption Reduction and Recycling:** Efficient use of water and energy (e.g., turning off water taps, using energy-efficient lighting); -Separation of recyclable and organic waste; -Reduction of plastic consumption (e.g., using reusable fabric bags instead of plastic bags).
2. **Sustainable Transportation:** Use of public transportation, cycling, or walking instead of private vehicles; - Participation in car-sharing systems.
3. **Protection of Green Spaces and Nature:** Tree planting and plant maintenance; - Participation in cleaning parks, forests, and coastal areas; -Prevention of environmental degradation (e.g., illegal hunting or deforestation).
4. **Social Responsibility:** Promoting environmental awareness within families and communities; -Reporting environmental violations to relevant authorities; - Supporting green businesses and environmentally friendly products.
5. **Pollution Reduction:** Avoiding the use of harmful chemicals in natural settings; - Reducing fossil fuel consumption and adopting renewable energy sources; - Refraining from the unnecessary burning of waste (Krettenauer et al., 2022).

Theories and Models of Citizenship Behavior

Social Capital Theory of Citizenship Behavior

Social capital theory refers to the network of relationships, institutions, and norms that connect individuals and groups within a society. It posits that social capital comprises trust, cooperation, and shared norms that facilitate effective interaction among members of a community. Citizenship behavior, in turn, encompasses various forms of social conduct that contribute to enhancing the quality of communal life, including civic participation, altruistic actions, collaboration with local institutions, and voluntary engagement (Asilsoy et al., 2018). The influence of social capital on citizenship behavior can be examined through several mechanisms: 1. Enhancement of Trust: Social capital strengthens interpersonal and institutional trust, thereby increasing individuals' willingness to participate in collective initiatives and assist others. 2. Promotion of Cooperation: Robust

social networks encourage collaboration and collective action. In communities characterized by high social capital, individuals are more likely to prioritize public interests and work toward societal improvement. 3. Formation of Positive Social Norms: Social capital contributes to the development of shared values and norms that encourage constructive civic behavior.4. Empowerment at Individual and Collective Levels: Strengthened social capital equips individuals and groups with greater skills and resources to address social challenges effectively, thereby positively influencing citizenship behaviors. Consequently, social capital is recognized as a pivotal factor in promoting positive citizenship behaviors and reinforcing social cohesion within societies (Putnam, 2019).

Analytical Model of Citizenship Behavior

The analytical model of citizenship behavior examines individual conduct within societal contexts and the nature of interactions among citizens and between citizens and social institutions. This model incorporates several key dimensions that facilitate a comprehensive analysis of civic engagement: 1. Civic Commitment: Individuals who demonstrate commitment to their community and environment are more likely to engage actively in social and civic activities. 2. Participation: Behaviors reflecting active involvement in social, political, and cultural events and initiatives. 3. Abstention from Anti-Civic Conduct: Analysis of behaviors that harm society and differentiation between destructive and constructive actions. 4. Social Interaction: Patterns of communication and engagement with others that shape and influence citizenship behavior. 5. Awareness and Education: The level of awareness regarding citizens' rights and responsibilities, and the impact of educational systems on civic conduct. 6. Environmental and Cultural Factors: The influence of cultural values, societal norms, and contextual conditions on citizens' behaviors (Organ, 2016).

Research Background

In any scientific inquiry, a systematic review of prior research relevant to the subject under investigation is essential for identifying existing findings and, ultimately, for comparing the results of the present study with those of previous scholarly works. Accordingly, the following section presents a review of domestic studies, followed by international research pertinent to the research topic.

Mokhtari Malekabadi et al. (2014), in a study entitled "Analysis and Identification of Urban Environmental Behaviors," concluded that Iranian cities face numerous challenges, including air pollution, unfavorable environmental conditions, inadequate waste collection and treatment facilities, and traffic congestion. These challenges underscore the necessity of revising urban management policies.

Ahmadi Dekaa et al. (2018), in their study "Assessing the Feasibility of Institutionalizing Urban Environmental Culture on the Path toward Sustainable Urban Development," found that improving the quality of the urban environment is indispensable for achieving urban sustainability. They further emphasized that institutionalizing an urban environmental culture among citizens constitutes a key strategy for attaining a desirable urban environment.

Afrooz and Jafarnea (2018), in "Investigating the Impact of Environmental Attitudes on Citizens' Environmental Behaviors," reported a statistically significant relationship between individuals' connectedness to nature and their environmental behavior, as well as between social participation and environmental behavior.

Roosta and Hasanzade (2019), in "Examining the Impact of Environmental Components on Citizens' Acceptance of Health-Oriented Urban Pedestrian Pathways," concluded that the environmental attributes of pedestrian pathways exert a significant influence on citizens' Acceptance of health-oriented urban walkways.

Karimi Kondazi (2021), in "Assessing the Role of Informal Settlements in Increasing Environmental Pollution (Case Study: Kashan)," demonstrated that informal settlements constitute a major challenge in Kashan and contribute substantially to various forms of environmental degradation, particularly environmental pollution. The

findings indicated that marginalization plays a significant and measurable role in exacerbating environmental pollution in the city.

Sarkhosh et al. (2024), in "Investigating the Direct Impacts of Informal Settlements on the Increase of Environmental Pollution," concluded that informal settlements in developing cities are associated with multiple environmental challenges and forms of pollution. They further noted that the rapid growth of informal settlements and the concentration of populations outside formal urban service infrastructures intensify environmental pollution. Inadequate domestic sewage disposal systems and insufficient waste collection facilities were identified as primary sources of environmental contamination in peri-urban areas.

Krettenauer (2019), in "Connectedness to Nature and the Decline of Pro-Environmental Behavior in Adolescence: A Comparison between Canada and China," concluded that the development of pro-environmental behavior is contextually constrained and multidirectional, and that the promotion of environmental behavior is closely linked to connectedness to nature and moral emotions.

Brown (2020), in "Empathy, Place, and Identity Interactions for Sustainability: Global Environmental Change," found that a lack of empathy toward nature and others limits motivations for environmental conservation and sustainability enhancement.

Green (2023), in "Collective Action in Environmental Sustainability: Bridging the Gap," concluded that collective action can serve as a driving force for substantial environmental change and emphasized the necessity of cooperation at both local and international levels.

Houghton et al. (2023), in "Environmental Citizenship: Theory and Practice," analyzed theoretical models of environmental citizenship behavior and its implications for environmental policymaking, highlighting the role of social participation in strengthening such behaviors. Their findings suggest that public participation can enhance resource efficiency and reduce adverse environmental impacts.

Maria et al. (2023), in "The Role of Education in Promoting Environmental Citizenship," examined the impact of environmental education on environmental citizenship behavior and concluded that targeted educational interventions can enhance awareness and individual participation, thereby fostering more positive environmental behaviors.

Emily (2023), in "The Impact of Social Networks on Environmental Citizenship," analyzed the influence of social media on environmental awareness and behavior, demonstrating that digital platforms can function as powerful tools for raising awareness and mobilizing social movements.

Tara and Matthew (2024), in "Social Norms and Environmental Behavior: The Role of Community," investigated the relationship between social norms and environmental behavior and concluded that community norms exert a substantial influence on individual choices. Local collaborations and community-based initiatives were found to strengthen individual responsibility and generate significant behavioral changes in environmental domains.

Based on this body of literature, the conceptual model of the present study integrates Social Capital Theory and Social Identity Theory. The former is employed to explain the structural and institutional dimensions of environmental behavior, while the latter is utilized to elucidate its psychological dimensions and the role of place attachment in shaping environmental conduct.

Research Methodology

The present study is applied in terms of its objective and adopts a descriptive–analytical research design. Data were collected using a structured questionnaire. The questionnaire items were developed using a five-point Likert scale ranging from "very low" to "very high." The statistical population comprised residents of the city of Ahvaz in the year 1404 (2025–2026). The minimum required sample size was determined to be 385 respondents. Given the assumption of relative homogeneity in respondents' perspectives and the absence of significant influence from specific demographic or spatial characteristics within the target population, participants were selected through a convenience sampling method.

To measure the research variables, standardized questionnaires assessing place attachment, trust, mobility, and pro-environmental citizenship behavior were

employed. The questionnaire indicators were derived from relevant literature and prior empirical studies. Subsequently, the items were localized and adapted to reflect the contextual conditions of the study area and research objectives.

The assessment of the validity and reliability of the research model, as well as the data analysis, was examined using Structural Equation Modeling (SEM) implemented in LISREL. Structural Equation Modeling represents a comprehensive statistical approach for testing hypotheses concerning relationships among observed and latent variables. This method enables the evaluation of the adequacy and goodness-of-fit of theoretical models within a specific population. Accordingly, the measurement model was first assessed to examine the validity of construct measurement through its respective indicators. First-order Confirmatory Factor Analysis (CFA) was then conducted to evaluate the measurement quality of the items designed for each construct.

Content validity of the questionnaire was assessed through expert judgment. Five university faculty members and senior urban management specialists in the fields of urban environmental studies and urban planning reviewed the instrument in terms of clarity, relevance of items to theoretical constructs, and comprehensive coverage of dimensions. Their feedback led to necessary revisions and refinements. Face validity was further examined through a pilot study involving 30 citizens. This preliminary administration aimed to evaluate the clarity, simplicity, and comprehensibility of the items. Based on respondents' feedback, modifications were made to wording and item sequencing to enhance clarity and coherence.

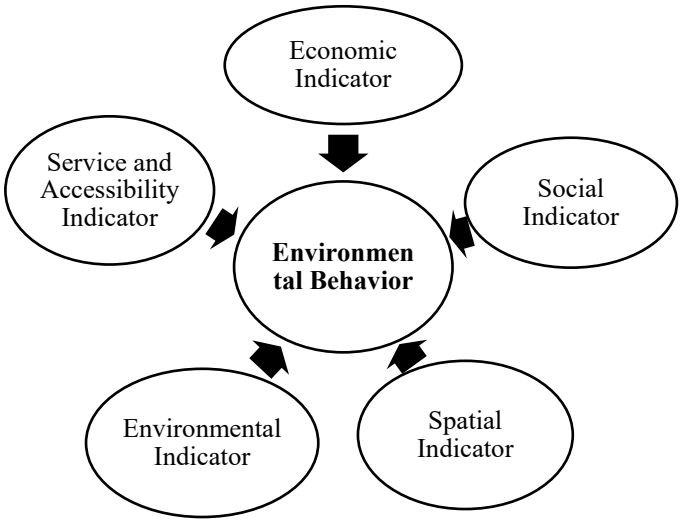

Figure 1. The Conceptual Framework of the Study

Research Findings

Kolmogorov–Smirnov test

The Kolmogorov–Smirnov test is a non-parametric statistical procedure employed to compare probability distributions and to determine whether two datasets originate from the same underlying distribution. This test is particularly useful for assessing the goodness-of-fit between an empirical distribution and a specified theoretical distribution, as well as for comparing two independent empirical distributions. Owing to its distribution-free nature, the test does not assume normality and is therefore suitable for a wide range of data types.

Table 1. Results of the Kolmogorov–Smirnov test for Evaluating Data Distribution.

Variables and Indicators	Significance Level	K–S Statistic	Distribution Status
Physical Index	0.091	0.895	Normal
Economic Index	0.089	0.862	Normal
Social Index	0.099	0.958	Normal
Services and Accessibility Index	0.088	0.842	Normal
Environmental Index	0.095	0.932	Normal

Table 2. Demographic Characteristics of the Respondents

Variable	Category	Frequency (n)	Percentage (%)	Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	275	71.41%	Employment Status	Government Employee	93	24.15%
	Female	110	28.57%		Private Sector Employee	79	20.51%
Marital Status	Married	226	58.71%		University Student	72	18.70%
	Single	159	41.29%		Retired	38	9.87%
Educational Attainment	Below Diploma	68	17.48%		Housewife	45	11.68%
	High School Diploma	75	19.48%		Unemployed	32	8.31%
	Associate Degree	120	31.16%		Self-Employed	26	6.75%
	Bachelor's Degree	80	20.77%	Participation Frequency	Daily	92	23.89%
	Postgraduate Education	42	10.90%		Weekly	59	15.32%
					Monthly	128	33.24%
					Less than Once per Month	72	18.70%
Total	-	385	100%		Almost Never	34	8.83%

In conducting structural analysis and factor analysis, it is first necessary to ensure the adequacy of the data in terms of sample size and the interrelationships among variables. Given that the KMO index exceeds 0.60 and the significance level of Bartlett's test is less than 0.05, it can be concluded that the collected data are appropriate for factor analysis.

Table 3. KMO Index and Bartlett's Test

Bartlett's test	KMO index	Test statistic value	Degrees of freedom	Significance level
	./975	9925/85	./485	./0001

In structural equation modeling (SEM), it is necessary to test two models. The first model is the measurement model for the research variables. The measurement model represents the factor loadings of the observed variables on each latent construct. The factor loading values of the items associated with each variable exceed 0.40; therefore, the measurement model is confirmed, as presented in Tables 4, 5, and 6.

Table 4. Factor Loadings of the Physical and Environmental Indicator Variables

Variables	Physical Index	Factor Loading	Environmental Index	Factor Loading
Q1	Condition of buildings in terms of structural strength	0.781	Desirability of green spaces and urban open spaces	0.722
Q2	Desirability of the number of rooms and area	0.425	Efficiency of waste collection, disposal, and city cleanliness	0.651
Q3	Desirability of building locations relative to communication routes	0.441	Efficiency of the urban sewage system	0.680
Q4	Desirability of the appearance and form of buildings	0.560	Desirability of city air quality	0.440

Variables	Physical Index	Factor Loading	Environmental Index	Factor Loading
Q5	Quality and desirability of sidewalk widths	0.680	Desirability of noise pollution levels	0.408
Q6	Aesthetic appeal of city buildings	0.655	Creation of green and open spaces throughout the city	0.484
Q7	Satisfaction with the urban built environment	0.699	Environmental issues and water scarcity in the city's future development	0.865

Table 5. Factor Loadings of the Economic and Social Indicator Variables

Dialect / Variable	Economic Index	Factor Loading	Social Index	Factor Loading
Q1	Earning income for living in the city	0.423	Sense of belonging and attachment to place of residence	0.852
Q2	Availability of employment opportunities in the city	0.558	Level of participation and responsibility in decision-making processes	0.683
Q3	Urban actions and activities aimed at poverty reduction	0.419	Extent of neighborhood relations and face-to-face interactions	0.657
Q4	Attention to municipal taxes and fees based on social class	0.407	Residents' trust in each other within the neighborhood	0.585
Q5	Investment opportunities in the city	0.565	Crime occurrence at the neighborhood level	0.629
Q6	Job and economic stability to foster citizens' sense of security and trust	0.596	Adequacy of security and law enforcement centers	0.728
Q7	Payment of municipal taxes and fees by citizens	0.628	Organization of festivals and celebrations for neighborhood residents	0.647
Q8	Desirability of citizens' life in the city based on their income	0.522	Level of satisfaction and continuity of residence in the neighborhood	0.890

Table 6. Factor Loadings of the Service and Accessibility Indicator Variables

Items	Variables	Factor Loading
Q1	Desirability of the quality of access to educational facilities	0.562
Q2	Desirability of the quality of access to healthcare facilities and services	0.524
Q3	Desirability of the quality of access to recreational and sports facilities	0.485
Q4	Desirability of the quality of urban equipment and infrastructure	0.467
Q5	Desirability of the quality of access to library facilities	0.497
Q6	Desirability of the quality of access to commercial centers and shopping facilities	0.651
Q7	Desirability of the quality of access to religious centers and Hussainiyas	0.620
Q8	Desirability of the quality of access to urban public transportation	0.583
Q9	Desirability of the condition of urban facilities and services	0.467

Table 7. Results of the Study Indicator Variables Based on the Structural Model

Indices	NFI	AGFI	GFI	RMSEA	χ^2/df	df	χ^2
Acceptable Threshold	Criterion: greater than 0.95	Criterion: greater than 0.95	Criterion: greater than 0.95	Criterion: less than or equal to 0.07	Criterion: less than 3	Criterion: greater than 1	Criterion: greater than 2
Results	0.96	0.97	0.954	0.082	2.84	3.79	4.68

The Cronbach's alpha coefficients for all constructs exceeded 0.6, indicating acceptable reliability for social science research. An alpha value above 0.7 for the social construct (0.83) demonstrates excellent reliability of this measure, while the other constructs, with values ranging from 0.62 to 0.71, show satisfactory reliability. All AVE values were above 0.5, indicating good convergent validity of the variables. Only in the physical construct was the CR slightly below the 0.7 threshold; however, considering the adequacy of the other indices, the research instrument overall demonstrates acceptable reliability and validity.

The integrated analysis of the indices indicates that the environmental index, as the most significant natural element in the urban fabric of Ahvaz, plays a key role in shaping urban livability, city identity, and citizen behavior. Results from the structural equation modeling of the indices suggest that citizens' behavior regarding environmental perception exhibits complexity across aesthetic, ecological, social, and economic dimensions. The economic and social indices are two constructs that show favorable reliability and validity, indicating that people have a relatively positive relationship with both natural and human-made features in relation to environmental behavior. Such an assessment may stem from factors including: a sense of attachment and belonging to the place of residence, participation and responsibility in decision-making processes, neighborhood relations and face-to-face interactions, trust among local residents, crime rates at the neighborhood level, and the adequacy of security and law enforcement facilities. Consequently, a discrete relationship can be inferred between the natural landscape and the actual quality of the environmental context.

Table 8. Reliability and Validity of the Research Indicators

Construct	Cronbach's Alpha	rho_A	rho_C (CR)	AVE	Status
Physical Index	0.631	0.741	0.449	0.527	AVE acceptable; however, CR is slightly below the 0.70 threshold.
Social Index	0.830	0.860	0.683	0.575	CR excellent; AVE acceptable.
Economic Index	0.625	0.739	0.676	0.624	Acceptable reliability and validity.
Environmental Index	0.640	0.739	0.766	0.547	Acceptable reliability and validity.
Services and Accessibility Index	0.707	0.741	0.511	0.541	Acceptable reliability and validity.

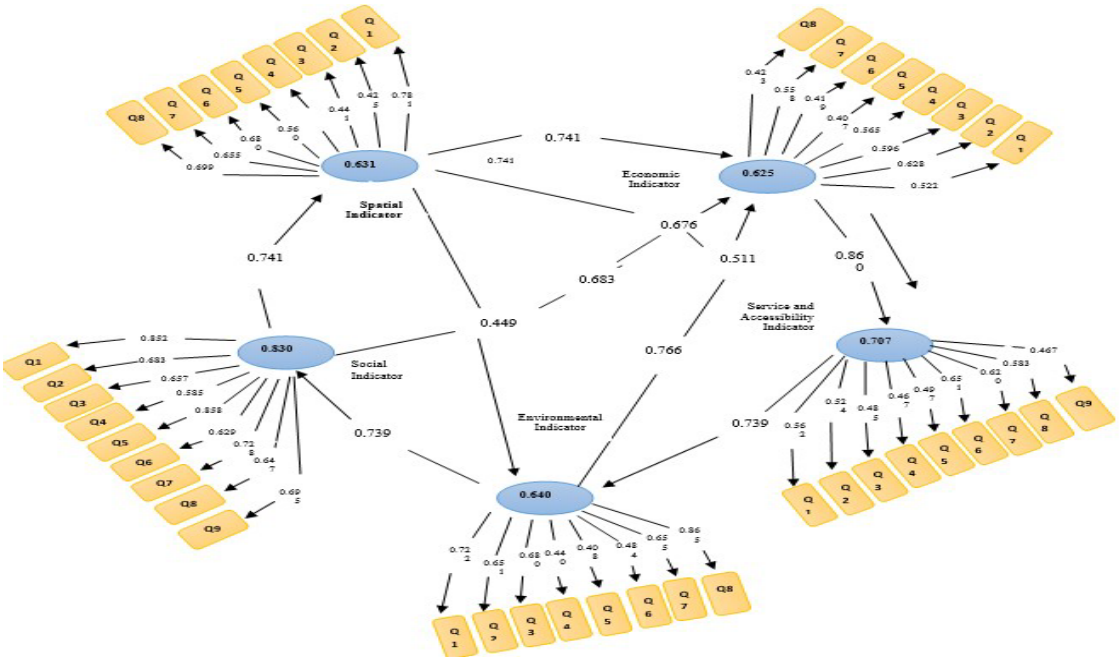

Figure 2. Analysis of the Factors Influencing the Environmental Behavior of Ahvaz Citizens Based on the Structural Equation Model

The conceptual research model, aimed at examining the role of environmental and social factors and their impact on citizens' environmental behavior, was tested using Structural Equation Modeling (SEM) in SmartPLS software. The model comprised five constructs, each operationalized through a set of observable indicators designed to comprehensively assess citizens' perceptions of the various dimensions influencing the human–environment relationship. As shown in Table 9, the model demonstrates a satisfactory fit according to the fit indices, and significant relationships between the variables of each construct and civic behavior were observed and confirmed. Based on these findings, the analysis of the indices and conclusions regarding civic behavior are presented as follows.

Model Fit Assessment

In SEM analysis, various indices are used to evaluate the adequacy of model fit. In this study, indices such as RMSEA, CFI, TLI, and χ^2/df were considered. According to established references, acceptable ranges for these indices are well-defined. For instance, an RMSEA value ≤ 0.08 indicates acceptable fit, while a value ≤ 0.05 indicates excellent fit. Similarly, CFI and TLI values ≥ 0.90 indicate adequate fit, and values ≥ 0.95 represent excellent fit. A χ^2/df ratio ≤ 3 generally confirms acceptable model fit. The values obtained in the present study show an RMSEA of 0.082, close to the acceptable threshold, and the other fit indices fall within the appropriate range. Therefore, it can be concluded that both the measurement and structural models tested exhibit acceptable fit, and the analyses based on them are valid. For clarity, it should be noted that the obtained indices were compared with criteria provided in authoritative SEM sources, and their alignment with these benchmarks indicates the robustness of the model and the reliability of the research results.

Table 9. Summary of the Research Hypotheses and Their Confirmation or Rejection Status

Hypothesis No.	Hypothesis	Independent Variable	Dependent Variable	Analysis Results	Hypothesis Status
H1	The environmental index has a positive and statistically significant effect on citizens' environmental behavior.	Environmental Index	Citizens' Environmental Behavior	The strongest effect among all indices (factor loading > 0.4, RMSEA = 0.082).	Supported
H2	The social index has a positive and statistically significant effect on citizens' environmental behavior.	Social Index	Citizens' Environmental Behavior	The second most substantial effect after the environmental index.	Supported
H3	The economic index has a positive and statistically significant effect on citizens' environmental behavior.	Economic Index	Citizens' Environmental Behavior	The third strongest effect following the social index.	Supported
H4	The physical (built environment) index has a positive and statistically significant effect on citizens' environmental behavior.	Physical (Built Environment) Index	Citizens' Environmental Behavior	A significant effect on place attachment and environmental participation.	Supported
H5	The services and accessibility index has a positive and statistically significant effect on citizens' environmental behavior.	Services and Accessibility Index	Citizens' Environmental Behavior	A positive effect, though comparatively weaker than the other indices.	Supported

Conclusion

The findings and discussion of the present study indicate that environmental citizenship and pro-environmental behaviors in the city of Ahvaz are influenced by a combination of social, economic, environmental, and physical factors, which interact with each other significantly. Based on the results of structural equation modeling (SEM), all factor loadings of the indicators exceeded 0.4, indicating satisfactory construct validity, and the model's RMSEA index was 0.082, demonstrating a good fit for the structural equation model. Among the components, the environmental index exerted the greatest influence on citizens' environmental behaviors, with factor loadings for certain indicators—such as the quality of green spaces and urban air quality—being 0.865 and 0.680, respectively. Economic and social indices followed in rank. These findings align with previous studies, such as Afrooz & Jafarnea (2018), which showed that attitudes and connections with nature have a direct relationship with environmental behavior. Studies by Roosta & Hasanzade (2019) and Karimi Kondazi (2021) also emphasize the role of physical and economic environments in enhancing citizen participation.

Data analysis revealed that environmental components—such as waste management, air quality, noise pollution, and the provision of green spaces—directly influence civic behaviors, with individuals showing increased sensitivity and engagement in response to environmental issues. This result is consistent with Maria et al. (2023), who found that targeted environmental education and awareness programs can raise both individual knowledge and participation. Moreover, economic indicators play a significant role in environmental behavior; for example, the availability of employment and investment opportunities in the city increased participation in pro-environmental behaviors, aligning with findings from Mokhtari Malekabadi et al. (2014) and Ahmadi Dekaa et al. (2018). These results suggest that improving citizens' economic status and providing sustainable employment opportunities creates the conditions for adopting and implementing environmental behaviors.

Social indices, particularly social capital and community norms, also have a notable impact on environmental behaviors. Participation in collective activities, collaboration with local institutions, and engagement in social networks are effective in promoting pro-environmental behaviors by increasing trust and establishing positive social norms, thereby motivating citizens to participate in environmental activities (Putnam, 2019; Tara & Matthew, 2024). Factor loadings for items such as participation in local programs and support for environmental policies exceeded 0.7, indicating the strong influence of these factors.

Structural relationship analysis showed that citizens' commitment to their community and surrounding environment, environmental awareness, and personal attitudes toward environmental issues have direct effects on environmental behavior. SEM path coefficients for these relationships ranged from 0.45 to 0.72, significantly above the minimum threshold of 0.4, demonstrating the strong role of these components in shaping environmental behavior. Specifically, environmental awareness (path coefficient = 0.72) had the greatest effect on environmental behavior, followed by participation in local activities (0.65) and sustainable consumption (0.61). These findings confirm that environmental behaviors result from a complex interaction of cognitive, psychological, and social factors, and that individual actions alone are insufficient; they must occur within a broader social and institutional framework.

Demographic data indicated that daily participation in environmental activities was 23.9%, while the highest monthly participation reached 35.8%, reflecting varying behavioral patterns based on activity timing. The demographic distribution also showed that women participated slightly more than men in environmental activities, a difference potentially associated with literacy, attitudes, and social pressures. These findings are consistent with social capital theory, which posits that social networks and collective relationships can increase participation levels and reinforce individual motivations (Asilsoy et al., 2018).

The results suggest that improving environmental behavior in Ahvaz requires a comprehensive, multidimensional approach that simultaneously addresses environmental, economic, social, and physical factors. Targeted education and awareness, the creation of

economic and sustainable employment opportunities, the strengthening of social capital, and the development of green spaces and healthy urban environments all contribute to increased citizen participation in pro-environmental behaviors. Additionally, attention must be paid to potential conflicts between individual and collective interests, as some environmental behaviors require short-term sacrifices and investments of time and resources from citizens. Analysis of the factors influencing environmental behavior indicates that coordinated management of these factors can lead to positive and sustainable changes in citizen behavior and reduce environmental impacts.

Ultimately, the findings of the present study indicate that active citizen participation in environmental behaviors can play a pivotal role in reducing pollution, managing waste, and preserving urban green spaces. The conceptual model of the research, based on social capital and social identity theories, effectively explains the interactions among environmental, social, and economic components, demonstrating that promoting environmental citizenship extends beyond mere education or individual attitude change and requires structural, institutional, and cultural transformations within the urban environment. Accordingly, policymakers and urban planners can design targeted, multidimensional strategies that both enhance urban environmental quality and strengthen social cohesion, thereby improving citizens' quality of life. The results also highlight the importance of collective action and local participation in environmental sustainability, showing that creating favorable conditions for collaboration and investment in local social networks can effectively increase citizens' motivation for environmental behaviors. The highest and lowest factor loadings and SEM path coefficients in this analysis demonstrate the varying strength of environmental, social, and economic variables in fostering sustainable behaviors, providing a practical framework for urban decision-making and planning. Therefore, this study not only contributes to the scientific understanding of environmental citizenship in Ahvaz but also lays the groundwork for implementing sustainable policies and strengthening citizens' environmental commitment, offering a model for other industrial and crisis-prone cities.

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