

Analyzing How the Contextualization of Infill Buildings Affects Spatial Flexibility in the Historical Fabric of Dezful City

Amin Mohtashamifar^a- Saeed Azemati^{b*} - Azam Esmacili^c

^a M.A. of Architecture, Faculty of Art and Architecture, Islamic Azad University, East Tehran Branch, Tehran, Iran.

^b Assistant Professor, Faculty of Art and Architecture, Islamic Azad University, East Tehran Branch, Tehran, Iran (Corresponding Author).

^c Assistant Professor, Faculty of Art and Architecture, Islamic Azad University, East Tehran Branch, Tehran, Iran.

Received 12 June 2024;

Revised 30 July 2024;

Accepted 27 August 2024;

Available Online 20 March 2026

ABSTRACT

In recent years, vernacular architecture has attracted more attention than in the past. The historical fabrics within contemporary cities present significant challenges for modern cities. New construction often separates historical fabrics, leading to the neglect and devaluation of these areas. The present study aims to examine how the contextualization of infill buildings influences visual coherence and spatial flexibility in the historical fabric of Dezful City. This research employs a mixed-method approach. Initially, components of contextualism that influence visual coherence and spatial flexibility are identified through a literature review focused on vernacular architecture and spatial affordances. Next, open-ended interviews are conducted with experts in architecture, urban planning, and restoration to refine these components and enhance the reliability of the aforementioned concepts. The relationships between the identified variables are analyzed using data collected from a questionnaire. Friedman's test is employed to assess the normality of the data in SPSS 26 software. Additionally, regression analysis is performed using LISREL software, and graphs depicting the coefficients of the research variables are created using Gephi software. The findings indicate a significant relationship between the components that promote visual coherence and spatial flexibility ($R=0.96$). The regression analysis reveals that lightweight structures (14.93), spatial diversity (15.32), multifunctional spaces (14.76), and building form (14.71) account for a portion of the variance in positive attitudes towards flexibility and visual coherence. The structural equation modeling demonstrates a good fit to the real-world data, confirming the significant impact of contextual components on the flexibility variable.

Keywords: Contextualism, Vernacular Architecture, Spatial Flexibility, Dezful City, Visual Perception.

* E_mail: saeed.azemati@iaud.ac.ir

1. INTRODUCTION

Vernacular architecture has attracted more attention in recent years compared to the past. To fully understand this type of architecture, it is essential to identify a characteristic that is common across its various historical and geographical forms (Naqavi and Kiaei 2018). The historical sites and old cores of our cities face numerous challenges, particularly concerning new structures in these areas. In Iran, many residential areas have experienced urban expansion, the establishment of large urban services, and substantial growth in commercial, service, and administrative activities, alongside population displacement and growth in the current century. Previously, these areas showcased a blend of buildings constructed in different historical periods, with harmony between the landscape and the architectural appearance being their dominant feature (Abouei and Jafari 2022). Today, the historical fabrics within contemporary cities present significant challenges. New construction often disrupts these historical fabrics, leading to their neglect and devaluation (Hashempour et al. 2018). Vernacular architecture consists of local or regional structures built using traditional indigenous materials and resources. In Dezful City, vernacular architecture has developed based on the cultural and climatic conditions of its surrounding environment. The economic potential latent in historical fabrics,

attributed to the existence of necessary infrastructure and the alignment of these areas with residents' culture, has encouraged people to live and work there. Additionally, these locations have architectural and urban values, making them a fundamental issue in urban development. Infill buildings built among historical structures, due to differing architectural styles and designs, often clash with their surroundings. Since these infill buildings are not from the same period as the historical buildings around them, in many cases, they exhibit different physical, spatial, and architectural characteristics (Bahmani et al. 2016). Throughout history, stability and strength have been central to the design of buildings and structures, which inevitably leads to changes in the interior layout and fabric of older buildings. The present study seeks to investigate how the contextualization of infill buildings influences visual coherence and spatial flexibility in the historical fabric of Dezful City. The primary research question is: to what extent do the components of contextualization influence visual coherence and flexibility in the historical fabric of Dezful? To answer this, the next section reviews relevant literature and previous research to identify the components necessary for examining the effect of visual coherence and spatial flexibility on contextual design in detail.

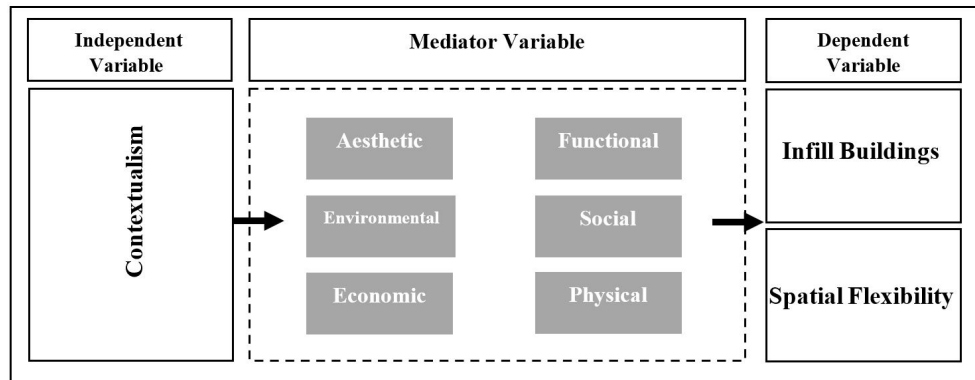


Fig. 1. Conceptual Research Model

2. RESEARCH BACKGROUND

To reach the research goal, this section reviews the literature on vernacular architecture, contextual architecture, and spatial flexibility, summarizing the results. It also provides a detailed examination of research regarding vernacular architecture and contextualism. The concept of infill development has evolved as the world has progressed and expanded. Discussions concerning new structures in historic settings emerged alongside advancements in technology and modern urban planning during the nineteenth century, a period characterized by a tension between traditional cities and innovative

development approaches (Ghanbari 2015). In his book "Architecture in Context: Fitting New Buildings with Old," Brent C. Brolin outlines various methods for designing new buildings that harmonize with their architectural context. Designers can either replicate architectural elements from surrounding structures or opt for entirely new forms that enhance the visual characteristics of existing buildings (Bahramifar et al. 2022). Bahmani et al. (2016), in their study entitled "Study of Contextual Factors in the Physical Structure of Houses and the Old Fabric of Sanandaj," emphasize the importance of identifying contextual factors of architecture. They argue that paying

attention to design principles and components, while adapting spaces to the needs of contemporary life, creates a connection between the past and the present. If context includes the region's cultural assets, a common understanding of the landscape and context can be achieved. The city's sociocultural relationships and economic system also play crucial roles in defining context (Naqavi and Kiaei 2018). In this regard, Jencks (2002) also writes: "Contextual architecture primarily aims to understand the spiritual and physical values of the context and transfer them to future architecture." He asserts that harmonizing

new buildings with traditional architecture and urban scale is fundamental to the theory of contextualism in architecture. Hall (2004) argues that architecture must pay special attention to context, as it can provide numerous suggestions as concepts for architectural design. According to Hall, context encompasses not only the setting in which the building is, but also design concepts. He remarks: "We are constantly faced with new contexts and situations, and we must base the design process on existing conditions" (Alamdari et al. 2020).

Table 1. Research Background

Authors	Year	Issues Examined
Bahmani et al.	2016	Contextual and Cultural Influences, Building Houses in Sanandaj, Recreating and Understanding Contextual Architecture
Naqavi and Kiaei	2018	Definitions and Characteristics of Vernacular Architecture, Contextualism, and Contextual Dimensions
Hashempour et al.	2018	Contextualism, Recreation, Value, and Significance of the Historical Fabric
Kiaei et al.	2019	The Impact of the Spatial System, Traditional Houses, Contemporary Houses, Changeability, Diversity, and Adaptability
Alamdari et al.	2020	Contextualism, Contextual Architecture Indicators, and Architectural Design Process
Iraji	2020	Local Components, Rural Housing, Climate Design, Energy Saving
Khodadadi et al.	2022	Local Values, Diversity of Vernacular Housing, and Examination of Vernacular Architecture Theories
Torshabi et al.	2021	Flexibility, Vernacular and Rural Housing, Flexible Housing, and Housing Typology in Sistan and Baluchestan
Khalaj Amirhosseini and Behzadpour	2022	Vernacular Architecture, Modern Architecture, Confrontation of Modernity and Tradition, and Sustainability

3. THEORETICAL FOUNDATIONS

Contextualism refers to being harmonized with historical and socio-cultural physical contexts. Every phenomenon is influenced by its surrounding environment and, in turn, affects it, leading to interactions. Context encompasses conditions and realities that define a specific situation, aiding in its understanding. It includes the environment in which architecture is created and shapes its content. Contextual architecture emphasizes the significance of considering the surrounding environment of an architectural work. It posits that achieving balance between architecture and its environment can enhance both the structure and its context. As contextualism serves as a model for creating a more desirable environment, it requires architects and designers to recognize and understand the context and its surroundings. Contextual architecture seeks to illustrate the broader potential of the visual environment compared to architecture alone. Its primary message is the importance of acknowledging the physical environment that envelops an architectural work (Mohammadpour et al. 2012). The fundamental principle guiding this approach is the

observation of continuity and connection over time. In general, contextualism asserts that the past must not be overlooked; rather, it is crucial to establish a connection between the past, present, and future. This approach strives to preserve the values and accomplishments of historical architecture while integrating them with the needs and realities of the present and future. Tulaei defines three dimensions for contextualism: 1) Physical contextualism: This emphasizes the overall form and structure that already existed, ensuring that new buildings harmonized with this overall form; 2) Historical contextualism: This examines and maintains the order and relationships among city components over time, seeking to blend the past with the present in architectural design; and 3) Sociocultural contextualism: This considers the shared meanings, values, and goals of cities the main components form their bodies (Damani Gol and Pourmousavi 2022). Overall, contextualism should not be viewed as a static factor in time, but as a dynamic, variable, and fluid element. Consequently, architectural principles cannot be designed statically within contexts that are variable, fluid, and moving. Each building must be designed and executed in

accordance with its cultural, social, historical, physical, and natural conditions. This approach ensures that the building becomes a harmonious

part of its environment and context, ultimately contributing positively to the surrounding area (Rahimi et al. 2021).

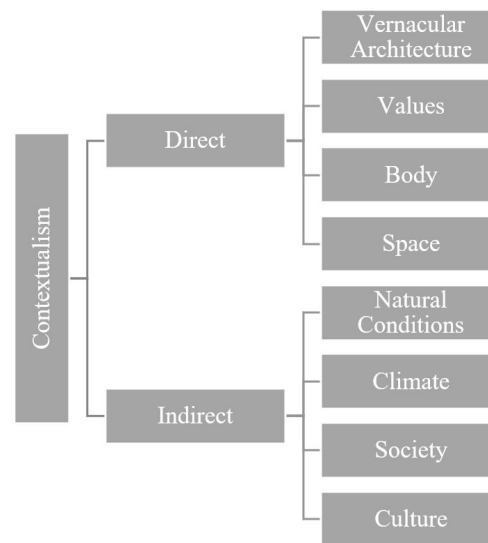


Fig. 2. Components Affecting Contextualism from the Theorists' Perspective

Vernacular architecture is a branch of architecture that is shaped by regional needs and the use of indigenous materials. It embodies the traditional practices of a specific region. Over time, vernacular architecture has evolved in response to the environmental, cultural, technological, and historical fabric of the area. It differs from formal architecture, which incorporates stylistic design elements in a non-random manner primarily for aesthetic purposes, often exceeding the basic functional requirements of a building.

Historically, vernacular architecture was not prominently addressed until the mid-twentieth century,

but it has since gained significant attention. Before this century, architectural historians predominantly focused on formal, scientific, and monumental architecture (Naqavi and Kiaei 2018). The revival of interest in vernacular architecture during the 18th and 19th centuries coincided with major changes in labor and the economy, which are particularly notable. As social and economic revolutions occurred, they brought about substantial cultural changes, leading to transformations in indigenous traditions (Gholamalizadeh and Hassanzadeh 2016).

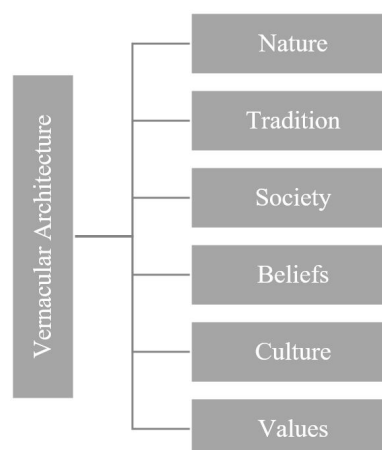


Fig. 3. Factors Affecting Vernacular Architecture from the Theorists' Perspective

Infill buildings are new constructions developed within historical fabrics and are generally considered a relatively emerging phenomenon. Given the differences between modern and ancient eras, infill buildings raise new issues that need to be addressed.

The design of these types of buildings must carefully take into account the historical fabric in which they are located. The overall form, volume, proportions, and interior layout of a building constitute its form. New designs within historical fabrics should not only be

compatible with the neighboring buildings in terms of dominant form but also avoid mere imitation. Instead, they should establish an appropriate connection to the existing architectural landscape. The building's skyline should harmonize with and enhance the skyline of the surrounding context, respecting the existing features of the urban landscape rather than imitating or competing with them (Mohammadpour et al. 2012). Here, it does not matter whether this is done by imitating or by using new architectural innovations. The focus should be on creating a "family resemblance" that adds a harmonious, cohesive phenomenon to the environment. It is essential to go beyond the stylistic trends of the present and consider styles that are appropriate for different contexts. Attention to the spirit of the place, as an architectural idea, is more important than adherence to the spirit of the time (Berolin 1980). To establish a strong connection between a new building and its neighboring structures, it is crucial to align with the main theme of the design context. This connection can be achieved through approaches such as closely copying an existing design, using similar forms with a new interpretation in contemporary times, creating new forms that evoke the visual impact of older styles, or abstracting original forms. Urban endogenous development was first proposed at the Habitat II conference in 1976 and was formally defined two years later by the American Real Estate Association. This type of development emphasizes utilizing vacant urban plots and land left over from the demolition of old buildings. It aims to prevent the city from expanding into surrounding open and agricultural lands. The concept of infill architecture was highlighted as a solution to the problems caused by scattered and excessive urban growth. Although the definition of urban endogenous development was reinforced in the late twentieth century, it primarily focused on increasing density and renovating the urban fabric, emphasizing conservation and restoration of historic urban areas. However, the emphasis should be on presenting new structures that align with the principles of 21st-century architecture while accommodating contemporary activities and technologies. Therefore, new constructions must also be consistent with modern architecture regarding style, form, structural mass, construction methods, land use, spatial relationships, materials, details, scale, and proportions (Alamdari et al. 2020). Spatial flexibility refers to the ability of a system to change while maintaining its original characteristics and form (Wallburg and Wielland 2012). Bentley

discusses the potential for selectivity in a space's function, emphasizing that spatial flexibility allows a space to accommodate multiple functions. He argues that places used for diverse purposes offer users more choice compared to those intended for specific and limited uses. According to Bentley, environments that exhibit such selectivity possess a quality called flexibility (Rahimi et al. 2021). Flexibility involves making changes that affect both the areas of activity and the architectural form to meet user needs, allowing individuals to fulfill their requirements anywhere and at any time through modifications in spatial and activity systems (Kiani et al. 2019). Our senses play a crucial role in how we engage with our environment, providing essential information to interpret the events around us. This sensory system includes the organs associated with seeing, hearing, smelling, and touching (Jeodicke 1985). More than eighty percent of our sensory information is received through vision, which is why discussions about perception often center on visual perception. The visual sense is more observable and controllable than other senses, in addition to being influenced by cultural factors (Douglas Porteous 2003). Hedman argues that in urban design projects, it is important to recognize that people observe their surroundings more closely than is often assumed. Individuals enjoy re-experiencing locations with visually appealing features or those that exhibit new spatial relationships and effects (Modiri and Nourollahi 2015). Consequently, it is vital to consider aesthetics and people's visual preferences when examining the surrounding environment, as this can enhance overall perception. Such attention can improve the quality of a space and strengthen the two-sided relationship between humans and their environment. This interaction can foster a sense of belonging to urban spaces and encourage individuals to take responsibility for maintaining and enhancing these spaces (Masnavi and Fathi 2011).

Based on theoretical foundations and research background, the primary goal of contextualism is to create a cohesive whole when adding a building to the context of existing buildings. Achieving this coherence in a historical fabric requires understanding the underlying grammar of that context and extracting the patterns it contains. Given the necessity to revise designs within the context and the presence of visual disturbances, this research focuses on "visual coherence" as a key criterion for realizing contextualism. This aspect is examined within the second-degree boundary of Dezfoul's historical fabric based on the language of the context pattern.

Mohtashamifar, A. et al.

Table 2. Coding of Indicators using MAXQDA Software

Components	Dimensions	Mean
Contextualism	Natural Conditions	0.871
	Regional Architecture	0.910
	Traditionalism	0.763
	Historical Fabric	0.612
	Environment	0.933
	Body	0.879
	Social Values	0.920
	Lifestyle	0.653
	Past Architecture	0.890
	Legibility	0.766
	Local Authenticity	0.884
	Identity	0.903
Vernacular Architecture	Values	0.715
	Environment	0.912
	Nature	0.976
	Faiths	0.851
	Regional Culture	0.992
	Climate	0.901
	Traditions	0.762
	Beliefs	0.620
	Economy	0.715
Infill Buildings	Urban Development	0.890
	Creative Reconstruction	0.826
	Developed Areas	0.832
	New Structure	0.939
	Services and Facilities Expansion	0.713
	Low Consumption	0.607
	Dilapidated Buildings	0.793
	Reconstruction	0.995
	Spatial Distribution	0.805
	Density and Form	0.765
Spatial Flexibility	Various Land-Uses	0.739
	Various Activities	0.980
	Function of Buildings	0.966
	Function of Public Spaces	0.996
	Various Economic Functions	0.834
	Various Social Functions	0.871
	Various Functions of the Region	0.998

4. METHOD

The present study was mixed-method research. Initially, components of contextualism that influence visual coherence and spatial flexibility were identified through a literature review focused on vernacular

architecture and spatial affordances. Following this, open-ended interviews were conducted with experts in architecture, urban planning, and restoration to refine these components and enhance the reliability of the aforementioned concepts. The research

population included 25 experts 25 experts from the above-mentioned fields. Next, a contextual approach was applied to openly code the extracted components using MAXQDA software. The components were presented again to the experts for confirmation. Based on the priorities identified, a new questionnaire was developed and distributed to 15 urban experts due to data collection limitations. Additionally, the components of vernacular architecture in the historical fabric of Dezful City were identified in the form of photographs through field observations. To assess the reliability and validity of the questionnaire, it was revised to incorporate the results of these observations and was provided again to the expert group. Data collected from the questionnaire were analyzed using SPSS 26 software. Friedman's test was employed to assess the normality of the data. Furthermore, structural equation modeling was conducted using LISREL software, and graphs depicting the coefficients of the research variables were created using Gephi software, which is specifically designed

for data visualization and graphing.

4.1. Case Study

Dezful City, with a history spanning several thousand years, is located on the eastern bank of the Dez River and to the southwest of the Zagros Mountains in Khuzestan Province. It is one of the oldest cities in Khuzestan Province. The study area focused on Dr. Shariati Street, adjacent to the new Dezful Bridge. This bridge, also known as Shariati Bridge or Shahid Soleimani Bridge, is a concrete structure built in 1972 by a foreign contractor. It is the busiest bridge crossing the Dez River, positioned along Dr. Shariati Street, connecting the old city with the west bank of the river and Andimeshk Road. The continuous presence of people and the ongoing vitality of this area made it an ideal case study location. This dynamic has resulted in changes to the historical fabric of the city, making it crucial to examine this area for studying the contextualization of infill buildings.

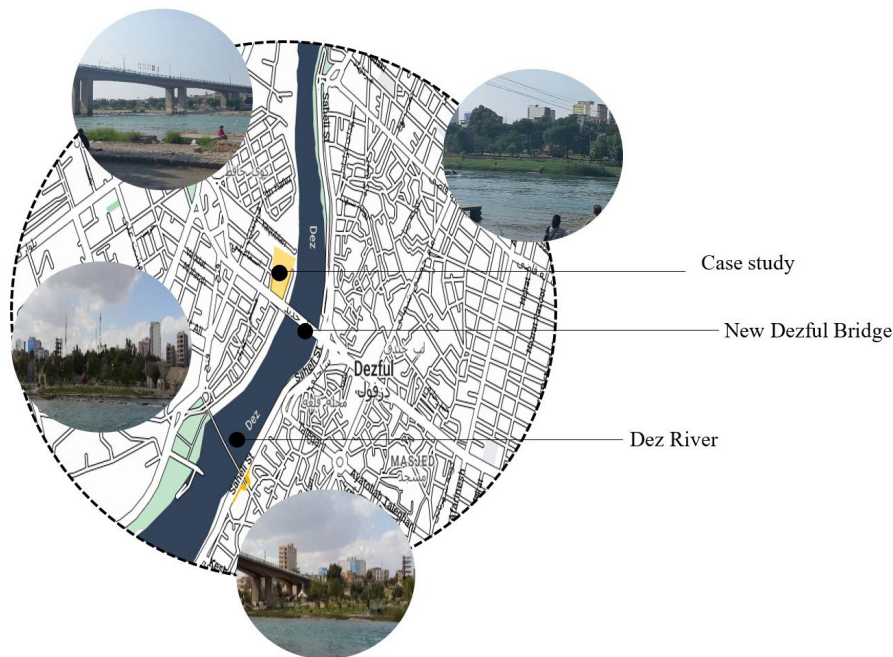


Fig. 4. Case Study

4.2. Quantitative Data Analysis

This section statistically analyzes data collected from questionnaires distributed to identify the components affecting infill buildings, as well as visual coherence and spatial flexibility in the historical fabric of Dezful

City. Internal consistency was assessed to validate the reliability of the research tools, using Cronbach's alpha, which was found to be above 0.7, indicating high reliability for subsequent analyses.

Table 3. Reliability of Questionnaire Items

Reliability of Statistical Analyses	
Number of Items	Cronbach's Alpha
51	0.930

Unlike Cronbach's alpha, which measures reliability based on variables, the Guttman reliability test evaluates the consistency of responses. In this approach, responses are categorized into six groups,

and a Lambda coefficient is calculated for each category. Table 4 confirms the reliability of the research findings through Guttman's lambda test.

Table 4. Guttman Reliability Test

Lambda	1	0.976
	2	0.965
	3	0.952
	4	0.835
	5	0.925
	6	0
Number of Responses		51

The Friedman test was employed in this study to gauge participants' opinions and rank the significance of various components affecting infill buildings, as well as visual coherence and spatial flexibility in the historical fabric of Dezful City. The results from the

Friedman test's "test-statistic" table were utilized to determine whether the differences in average ranks of components, based on individuals' opinions, were statistically significant.

Table 5. Friedman Test

N	100
Chi-Square	436.215
Df	23
Asymp.sig	0.000

Apart from assessing whether differences existed among average ranks, the Friedman test also

prioritized the criteria. The results in the "Ranks" column of Table 6 were examined for this purpose.

Table 6. Prioritization of the Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City, based on the Friedman Test

Components	Average Mean	Indicators	Average Mean
Vernacular Architecture	4.36	Sunken Courtyard	12.13
		Elongated Porch	11.23
		High Thermal Mass Materials	13.84
		Elongated Strip Openings	12.15
		Solar Radiation	12.20
		Windward	13.93
		Shavadan (or Şavaadun)	13.98
		Courtyard Geometry	12.52
		Central Courtyard	11.34
Contextualism	4.01	Roof Form	13.36
		Building Form	14.71
		Introversion	12.96

Components	Average Mean	Indicators	Average Mean
Naturalism	3.59	Mosquito-Repellent Trees	13.34
		Playing with Water	11.10
		Flowing Water	8.23
		Vernacular Plants	14.30
Flexibility	4.75	Multi-Functional Space	14.76
		Aggregation and Segregation	13.49
		Daily and Seasonal Displacement	13.74
		Lightweight Structure	14.93
		Prefabricated Structures	10.54
		Spatial Diversity	15.32

The findings indicate significant differences among the components affecting infill buildings, as well as visual coherence and spatial flexibility in Dezful City's historical fabric. From the participants' perspective, vernacular architecture emerged as the

most critical criterion for infill buildings, followed by flexibility, contextualism, and naturalism, respectively. The analysis of average rankings of the components affecting infill buildings in the city is illustrated in Figure 5.

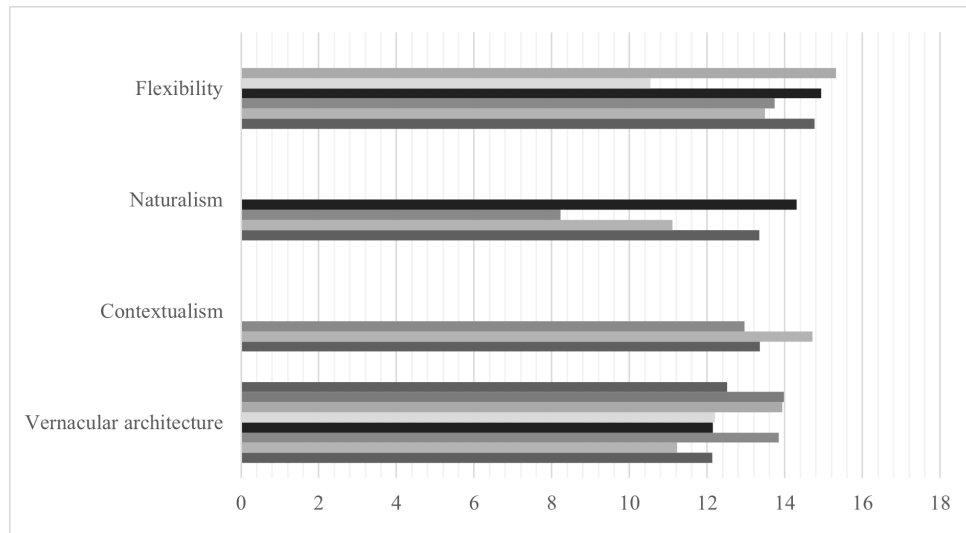


Fig. 5. Prioritization of Components based on the Friedman Test

The findings indicate that the most significant indicators promoting visual coherence and spatial flexibility are spatial diversity and multi-functional spaces. According to structural equation modeling (as shown in Fig. 6), flexibility is the most pivotal factor directly influencing spatial diversity. This means that buildings designed with greater spatial diversity and variety exhibit more flexibility compared to

others. The next influential factor is multi-functional spaces; while its direct relationship is weak, it accounts for 0.27 of the variation in the dependent variable through indirect relationships. The total impact of each factor—considering both direct and indirect effects—indicates that spatial diversity and multifunctional spaces are the two most significant indicators affecting spatial flexibility.

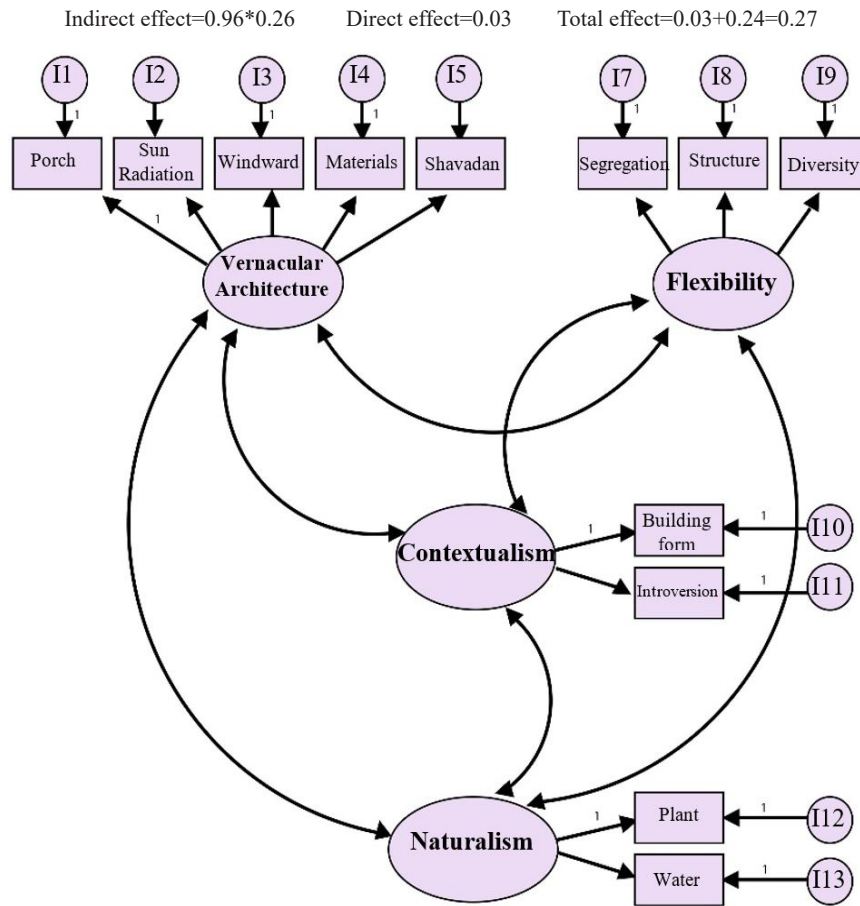


Fig. 6. Structural Equation Model

4.3. Examining the Relationship between the Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City

the components affecting infill buildings, as well as visual coherence and spatial flexibility in the historical fabric of Dezful city, utilizing the Pearson correlation coefficient.

This section examines the relationship between

Table 7. Pearson Correlation Coefficient for Examining the Relationship between the Main Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City

The Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City	Vernacular Architecture	Contextualism	Naturalism	Flexibility
Vernacular Architecture	1			
Contextualism	**0.986	1		
Naturalism	**0.721	**0.757	1	
Flexibility	**0.953	**0.961	**0.767	1

*p<0.05 and **p<0.01

Table 7 illustrates a two-sided relationship among the general components affecting infill buildings, as well as visual coherence and spatial flexibility. Specifically, vernacular architecture, contextualism,

and naturalism serve as the foundation for improving spatial flexibility. Figure 7 depicts these two-sided relationships among the components affecting infill buildings in Dezful's historical fabric.

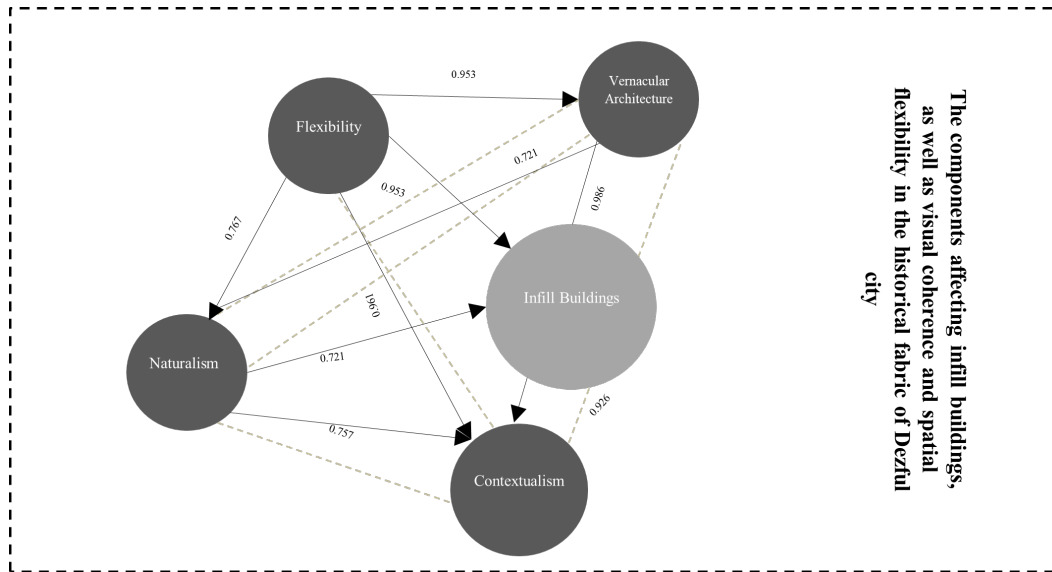


Fig. 7. The Correlations between the Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City

In this section, considering the correlations between the components mentioned above, the components

are coded to generate the corresponding graphs using the Gephi software.

Table 8. The Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City

	Title		Title
Contextualism	High Thermal Mass Materials	Vernacular Architecture	Building Form
	Elongated Strip Openings		Spatial Diversity
	Solar Radiation		Introversion
	Courtyard Geometry		Lightweight Structure
	Central Courtyard		Prefabricated Structures
	Elongated Porch		Multi-Functional Space
Naturalism	Mosquito-Repellent Trees	Flexibility	Aggregation and Segregation
	Playing with Water		Daily and Seasonal Displacement
	Flowing Water		Invitation

Table 8 lists the criteria for spatial flexibility compiled from interviews and questionnaires. These criteria were coded and labeled in Table 9 for use in Gephi software. By comparing the data in Table 9 with those

in Table 8, one can identify possible relationships between these two groups. In graph theory, 20 proposed principles, along with their connectivity, play a role in the two-layer graph environment.

Table 9. The Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Traditional Context of Dezful City

Code	Label	Code	Label
0	Openings	10	Insects
1	Courtyard	11	Variety of Uses
2	Order	12	Sunlight
3	Sunken Courtyard	13	Open Spaces
4	Environment	14	Form
5	Structure	15	Access

Code	Label	Code	Label
6	Material	16	Movement
7	Invitation	17	Spatial Diversity
8	Transparency	18	Composition
9	Function	19	Introversion

Figures 8 and 9 present graphs created with Gephi software. Figure 8 displays the relationships between the components affecting infill buildings in Dezful's historical fabric, while Figure 9 is based on the existing criteria. Both figures focus on data that promote spatial flexibility. Figure 8 demonstrates the ideal conditions and the relationships between the criteria obtained from Table 5, showcasing a

clear dispersion and relationship among concepts. In this analysis, the larger the nodes, the greater their weight. Therefore, in the first round of analysis, we can examine the detailed relationships between the components affecting infill buildings in the historical fabric of Dezful city without heavily relying on graph theory properties.

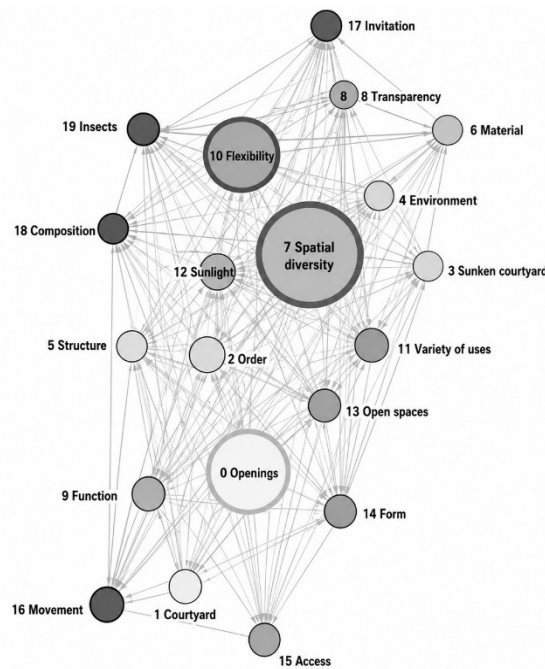


Fig. 8. Graph generated in Gephi Software based on the Factors Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City

In Figure 9, under the existing criteria, a noticeably different set of relationships is observed compared to those in Figure 8. The number of defined relationships is greater, and the graph's complexity has increased, highlighting an evident imbalance between the nodes and edges. This indicates a more discrete dispersion or gap in the relationships. Comparing the two Gephi

graphs in Figures 8 and 9 allows us to clearly identify factors influencing spatial flexibility that may be lacking in the infill buildings of Dezful's historical fabric. Additionally, this comparison provides insight into possible actions needed to achieve the ideal design.

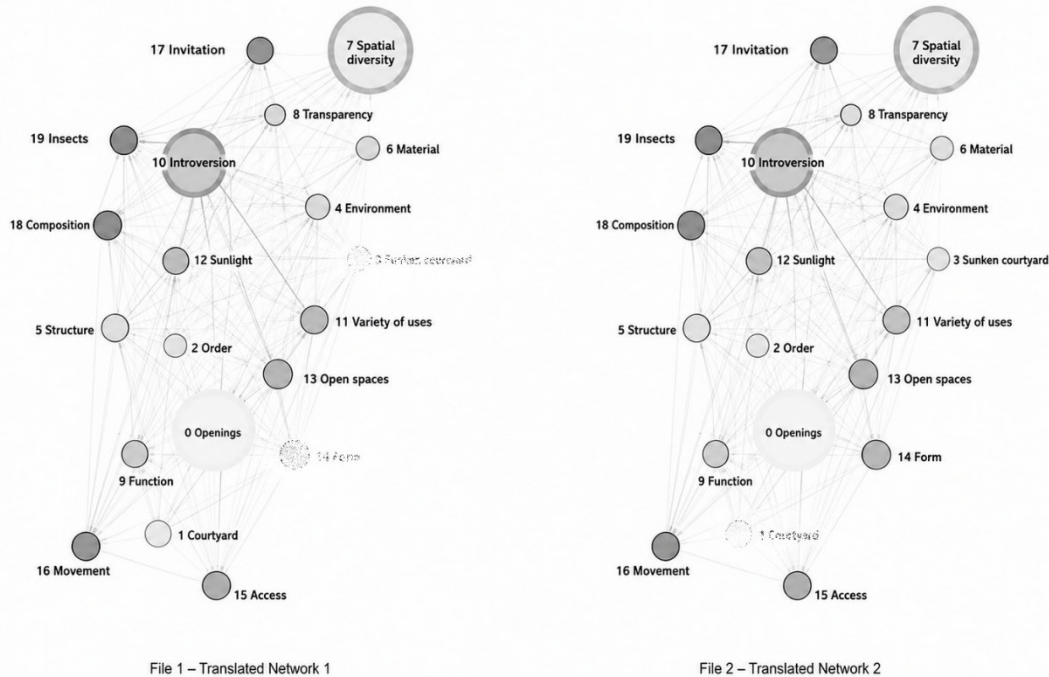


Fig. 9. Graph generated in Gephi Software based on the Components Affecting Infill Buildings, as well as Visual Coherence and Spatial Flexibility in the Historical Fabric of Dezful City

The graphs, focusing on contextualism, naturalism, vernacular architecture, and flexibility, validate the diagram depicting the correlations between the components affecting infill buildings. As shown in Figure 9, factors such as invitation, spatial diversity, and introversion play crucial roles in promoting flexibility and visual coherence in infill buildings.

5. CONCLUSION

In conclusion, to address the primary research question- namely, to what extent do the influential components of contextualism affect visual coherence and flexibility in the historical fabric of Dezful?- we can state that factors such as the modeling of vernacular architecture, spatial diversity, and the invitation of space significantly enhance visual coherence and spatial flexibility. This study utilized a mixed-method approach to investigate and evaluate the factors influencing infill buildings, as well as visual coherence and spatial flexibility within the historical fabric of Dezful city. Theoretical methods were employed alongside interviews, questionnaires, and field observations to assess the subjective and perceptual characteristics of the environment. The main research goal was to explore the impact of contextualization of infill buildings on visual coherence and spatial flexibility. The results from analyzing interviews, questionnaires, and field observations indicate that attention to vernacular architectural patterns has the most substantial effect on visual coherence and flexibility in infill buildings. The findings highlight that the most important indicators promoting visual coherence

and spatial flexibility, as perceived by respondents, include lightweight structures (14.93), spatial diversity (15.32), multifunctional spaces (14.76), and building form (14.71), respectively. Moreover, this study suggests that promoting the adoption of vernacular architecture in infill buildings—along with principles of contextualism and naturalism—provides a foundation for enhancing spatial flexibility. Additionally, previous research conducted in the historical fabric of Tabriz demonstrated that the intensity, weaknesses, and significance of various sections, as well as the approach to infill projects, vary based on the historical fabric, demands, needs, priorities, and policies. Analyses based on an interdisciplinary model of infill architecture can effectively evaluate the factors involved in designing new or under-construction infills. This provides a suitable foundation for future proposals and directions for these projects. By examining relevant research and selecting the historical fabric of Dezful city, it can be concluded that this research confirms the results of prior investigations. This study aims to take a meaningful step in this field by introducing new components. Based on the analyses conducted, achieving a successful infill design requires thorough investigation of the design context. The design context—specifically, the historical fabric—can be contentious; however, with a proper understanding of the conditions, appropriate solutions can be identified for creating architectural works. The principles and insights presented in this study should be regarded as fundamental guidelines for designing infill buildings within the historical fabric of cities.

ACKNOWLEDGMENTS

This article wasn't supported by any financial or spiritual sponsors.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

MORAL APPROVAL

The authors commit to observe all the ethical principles of the publication of the scientific work based on the ethical principles of COPE. In case of any violation of the ethical principles, even after the publication of the article, they give the journal the right to delete the article and follow up on the matter.

PARTICIPATION PERCENTAGE

The authors state that they have directly participated in the stages of conducting research and writing the article.

REFERENCES

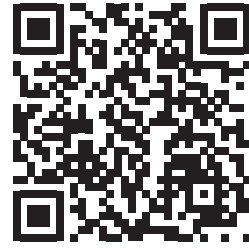
- Atarian, Kourosh, and Behnaz Safarali Najjar. 2019. "Native and Historical Urban Underground Facilities and Urban Sustainability: Case Study of Dezful City Infrastructure." *Journal of Cultural Heritage Management and Sustainable Development* 9(1): 2-23. [in Persian]
- Bahmani, Elmira, Mohammad-Mahdi Goudarzi Soroush, and Mohammad Ebrahim Zarei. 2016. "Study of Contextual Factors in the Physical Structure of Houses and the Old Fabric of Sanandaj." *Journal of Iranian-Islamic City Studies*. [in Persian]
- Bidarbakht, Zahra. 2013. "Vernacular Architecture as Contextual Architecture: A Look at the Vernacular Architecture of Shushtar." In *International Conference on Civil Engineering, Architecture and Sustainable Urban Development*. Tabriz: Islamic Azad University, Tabriz Branch. [in Persian]
- Didehban, Mohammad, Behnaz Safarali Najjar, Kourosh Momeni, and Kourosh Atarian. 2020. "Evaluation of Specialists' and Non-Specialists' Visual Perception of Native Urban Spaces in Dezful Based on Gestalt Theory." *Armanshahr Architecture and Urban Development* 13(33): 107-119. [in Persian]
- Einifar, Alireza. 2003. "A Model for Analyzing Flexibility in Traditional Iranian Housing." *Honar-Ha-Ye-Ziba* (13): 64-77. [in Persian]
- Hakimi Kalkhoran, Maryam, Mohammad-Karim Khodapanahi, and Mahmoud Heydari. 2011. "The Relationship between Handedness and Visual-Spatial Abilities and Cognitive Flexibility." *Journal of Behavioral Sciences* 5(1): 83-89. [in Persian]
- Hashempour, Parisa, Ahad Nejad-Ebrahimi, and Sana Yazdani. 2018. "Application of the Contextualism Approach in the Regeneration of Historical Fabrics: Case Study of Saheb-ol-Amr Square, Tabriz." *Sustainable Architecture and Urban Design* 6(1): 105-126. [in Persian]
- Hataminejad, Hossein, Bahar Habibi, and Maryam Amirshakari. 2016. "Prioritizing Strategies for the Development of Religious Tourism in Dezful City." *Urban Tourism* 3(1): 59-76. [in Persian]
- Karamy, Jalal, Amineh Mohammadi, and Mohammad Sharifi Kia. 2016. "Spatial Analysis of Urban Flexibility after Earthquake Using the OWA Method in District 12 of Tehran." *Spatial Analysis of Environmental Hazards* 3(2): 23-34. [in Persian]
- Khodadadi, Elham, Mohammad-Reza Rahimzadeh, and Mehdi Mahmoudi Kamelabad. 2022. "Rereading the Mutual Relationship between Vernacular Architecture and the Beginning of Architecture." *Soffeh* 32(99): 5-17. [in Persian]
- Kiaei, Mahdokht, Hossein Soltanzadeh, and Ali Akbar Heidari. 2019. "Measuring the Flexibility of the Spatial System Using Space Syntax Technique: Case Study of Houses in Qazvin." *Bagh-e Nazar*. [in Persian]
- Maleki Ashlaghi, Mitra, and Maryam Ghalambor Dezfali. 2023. "Explaining a Proposed Model for Qualitative Assessment of Soundscape with a Contextualism Approach in Urban Fabric Using Fourfold Matrices." *Manzar* 15(64): 42-53. [in Persian]
- Mirpanah, Reza, and Masoud Yousefi Tazakor. 2017. "Study of the Constituent Dimensions of Contextual Architecture and the Relationship between Vernacular Architecture and Its Effect on Spatial Composition in the Design of Educational Buildings Compatible with the Climate of Gilan Province." In *Sixth International Conference on Research in Engineering, Science and Technology*. London. [in Persian]
- Naghi, Pouyan, and Mostafa Kiani. 2019. "Explaining the Relationship between Vernacular Architecture and Contextualism." *Iranian Scientific Journal of Restoration and Architecture* 9(18): 71-90. [in Persian]
- Nari Qomi, Masoud, and Sajjad Damyar. 2015. "Approaches to Vernacular Architecture in Modern Architectural Theorizing." *Architecture in Hot and Dry Climate*. [in Persian]
- Qarehbeglou, Minoo, Ahad Nejad-Ebrahimi, and Ilqar Ardebilchi. 2019. "Infill Architecture: An Interdisciplinary Approach to Design in Historical Context; Case Study: Mashruteh Commercial Complex in the Historical Bazaar of Tabriz." *Bagh-e Nazar* 16(76): 57-68. [in Persian]
- Rapaport, Amos. 2013. *Anthropology of Housing*. Translated by Khosrow Afzalian. 2nd ed. Tehran: Ketabkadeh Kasra. [in Persian]
- Rahimi, Leila, Leila Aliloo, and Hadith Bardbar. 2021. "Analysis of the Effect of Contextualism on Place Attachment in Historical Neighborhoods: Case Study of Sorkhab and Dochi Neighborhoods of Tabriz." *Geography and Urban-Regional Planning* 11(40): 1-22. [in Persian]
- Sotoudeh, Hossein, and Wan Mohd Zakri Wan Abdullah. 2012. "Affected Variables on Successful Infill Design in Urban Historic Context." *Arts and Design Studies* 3: 7-12.
- Torshabi, Karim Bakhsh, Gholamreza Akrami, and Alireza Einifar. 2021. "Flexibility in Vernacular Rural Housing of Baluchestan, Iran." *Architecture in Hot and Dry Climate* 9(13): 103-117. [in Persian]
- Wieland, Andreas, and Carl Marcus Wallenburg. 2012. "Dealing with Supply Chain Risks." *International Journal of Physical Distribution & Logistics Management* 42(10): 887-900.

HOW TO CITE THIS ARTICLE

Mohtashamifar, Amin, Saeed Azemati, and Azam Esmaceli. 2026. Analyzing How the Contextualization of Infill Buildings Affects Spatial Flexibility in the Historical Fabric of Dezful City. *Armanshahr Architecture & Urban Development Journal* 18(53): 83-98.

DOI: 10.22034/AAUD.2024.462586.2890

URL: https://www.armanshahrjournal.com/article_247529.html

**COPYRIGHTS**

Copyright for this article is retained by the author(s), with publication rights granted to the Armanshahr Architecture & Urban Development Journal. This is an open- access article distributed under the terms and conditions of the Creative Commons Attribution License.

<http://creativecommons.org/licenses/by/4.0/>

