

Presenting a Proposed Model of Sustainable Performance in Traditional Residential Houses Using Critical Regionalism

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ABSTRACT

Critical regionalism has its roots in the depth of culture and nature. The new trends in critical regionalism are moving towards the concept of sustainable development. Kenneth Frampton, one of the greatest critics of critical regionalism, refers to this approach as a resistance against global standards and cultural homogeneity and the decline of modernism; there are two most important internal factors: culture and identity. This research aims to address the question of the basic conceptual model and criteria of critical regionalist architecture in order to improve the sustainable physical-social structure of residential houses in the city of Mashhad and the emergence of the greatest background of changes in culture, identity and indigenism from the perspective of critical regionalism. The aim of this research is to achieve the principles of critical regionalism, to present an effective conceptual model along with the preservation of authenticity and environmental principles. The present study uses grounded theory qualitative analysis to analyze the physical-functional typology, cultures and lifestyles of people in residential houses in Mashhad during the Pahlavi period, and to prove the research hypotheses based on the samples. This research concludes that the components of critical regionalism, considering the qualitative analysis, have the greatest impact on the form of the building, which, due to population growth, rising land values, and the result of dense and more compressed technology and sustainability, has shifted towards high-rise, complexing, etc., which is more compatible with the indigenous architecture of the region.

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Introduction

Regionalism is an analytical and critical perspective that prioritizes the preservation of the specific characteristics and features of a place, over the general global characteristics. The theory of regionalism has shifted from indigenist approaches and emphasis on physical perceptions and social, cultural, ecological, and human communication issues, towards the moderation of past prejudiced and limiting ideas and the strengthening of an interactive approach and the use of global benefits (Bayzidi et al., 2014: 22). Globalization had very deep and profound impacts on the culture of countries, especially developing countries. Architecture also turned to industrial construction, standardization, and mass production under the influence of the industrial revolution. The phenomenon of globalization in architecture led to pragmatism, resulting in the creation of similar buildings in different parts of the world without regard to cultural, climatic, and environmental characteristics. Therefore, with the advent of modernity in architecture, relying on pure rationality and rationalism, the emotional, spiritual, and mental needs of humans were neglected (Mahdavi-Nejad et al., 2013: 59). Critical regionalism has its roots in the depth of culture and nature. It includes a more direct clarity with nature compared to most abstract modern avant-garde movements (Zoghi et al., 2019: 4). One of the most important buildings that evoke the indigenous architecture were residential houses, which could have represented the culture, customs, and traditions of the people of that region, and also provided the necessary climatic comfort and security for the general public. Given that the architecture of houses in the Pahlavi period was influenced by the Isfahan style. This research is aimed at achieving the primary conceptual model and critical regionalism architectural components of their specific operational types in order to improve the architecture of the past and also to provide an effective conceptual model in order to be more effective in improving the physical-functional structure of a socially sustainable residence. It has been done while maintaining authenticity and environmental principles. Therefore, the research question is as follows: - What is the primary conceptual model and architectural components of critical regionalism in order to improve the physical and functional structure of residential houses in Mashhad city and what are the most changes in the field of culture, identity and localism in Has the physical-social stable structure of the residential houses of Mashhad city happened in the Pahlavi period? It seems that respecting the principles of Iranian and sustainable architecture, creating a balance between local and global aspects by creating a building that is homogeneous and harmonious with the surrounding context, dependence on nature and culture, such as: the central courtyard and the flexibility of spaces, etc., lead to sustainability. Therefore, to manifest the architecture of the past and improve the architecture of Mashhad. Also, global technology such as vehicles, cooling and heating, etc., along with maintaining the originality and environmental principles. He has applied the most changes in the architecture of the houses of Mashhad.

Research Background

In the field of critical regionalism, research has been conducted by thinkers such as Kenneth Frampton, Alexander Tzonis, and Liane Lefaivre. The book "Architecture and Identity" by Abel (2008), the last chapter of which is "Architecture as Identity". The book "Introductory to Architectural Design Methods" by Urmala (2001), the sixth chapter of which is related to situationalism and regionalism. The book "The Poetics of Space" by Ando (2010), the last chapter of which includes critical essays. The article "Critical Regionalism" by Kenneth Frampton (2004), which examines how and the factors that create critical regionalism and examines the works of great architects around the world. The paper "Reinterpreting Regionalist Approaches in Prominent Contemporary Buildings of Mashhad City" by Zoghi Hosseini (2010), essays on explaining the perspectives of regionalism and the evolution of these perspectives in contemporary and globalized architecture, and "Globalization and Regionalism in Contemporary Architecture: Interaction or Confrontation", taken from the doctoral dissertation of Gader Bayzidi, entitled "Globalization and Regionalism in Iran".

Research Method

The grounded theory analysis method is used for theorizing in areas where quantitative positivist approaches are difficult. The aim of this type of analysis is to highlight the inductive approach in research; because it seeks to theorize through the collected data. Grounded theory is formulated in the field of research and utilizes the data obtained from observation and interviews. The inductive nature of this theory, in particular, leads to the researcher's creativity and freedom of action, and makes the research process highly flexible. The found articles were analyzed with the help of MAXQDA software (Grounded Data). The extraction of critical regionalism architectural indicators with the Grounded data approach is as follows:

- a) Finding conceptual categories (open coding: creating concepts and their characteristics)
- b) Finding the connection between categories (axial coding: communicating between concepts)
- c) Conceptualization and reporting of these communications (selective coding: integration and improvement of concepts)

Theoretical Foundations: Regionalism in Architecture

Regionalism is an approach in design that prioritizes the specific identity of a region over the characteristics and features of a place (Table 1). In other words, while people possess a regional culture, they are also the inheritors and creators of a global culture, and they must gain an understanding of the interaction between the two (Figure 1 & 2) (Kami Shiraz et al., 2010: 55).

Table 1. Types of Regionalism (Source: Authors)

Title	Definition	Attributes
Lightness Regionalism	The main axis of all architectural activities (Bayzidi et al., 2013: 12)	Attention to climatic conditions (Kami Shirazi et al., 2019: 70)
Modern Regionalism	Using an old world and transforming traditional methods and goals by using new innovative technologies. (Bayzidi et al., 2020: 13)	The use of technology in a metaphorical way (ibid) - the use of new technologies - abstract regionalism responding to the climate - the sign and model of culture. (Abel, 2017)
New regionalism	It requires something beyond the need for "context" (Kami Shirazi et al., 2019: 72)	Creative Protection (ibid.)
Critical regionalism (non-modern)	It is a resistance against global standards and uniformity of culture and degradation of modernism. (Abel, 2008: 135)	Introduction of past and contemporary architecture - attention to sustainability - more complete and economical - rational approach to regionalism
Interactive regionalism	A two-way thinking in which differences are not considered absolute and imagines the relationship between oneself and the other as two-way and resists two types of views (Ghanbari et al., 2009: 1367)	It resists two types of views: 1- the unification of oneself and the other in which the differences disappear. 2- Staying separate and making the differences harder and stronger (Ghanbari et al., 2009: 1368)
Bio-regionalism	Influenced by sustainable and ecological development movements (Ghanbari et al., 2009: 1368)	Attention to location-based features (Ibid)
Reflective regionalism	To recognize the concept of the region, which in the opinion of the critical regionalists consists of a set of self-referential issues, in the cultural context of Chideh (Kami Shirazi et al., 2019: 78)	The connection between the product of the regionalism process and the desired sample should be established and in the analysis of the works, the understanding of how to relate to the region from the point of view of activities and functions should be replaced by examining the relationships between forms (Ibid)
Non-modern	based on re-recognition of the two concepts of place and technology (ibid)	Regenerative (Abel, 2017)
Executive regionalism	Emphasis on human interactions (Kami Shirazi et al., 2019: 78)	Paying attention to the concepts of culture, region and identity (Ibid)

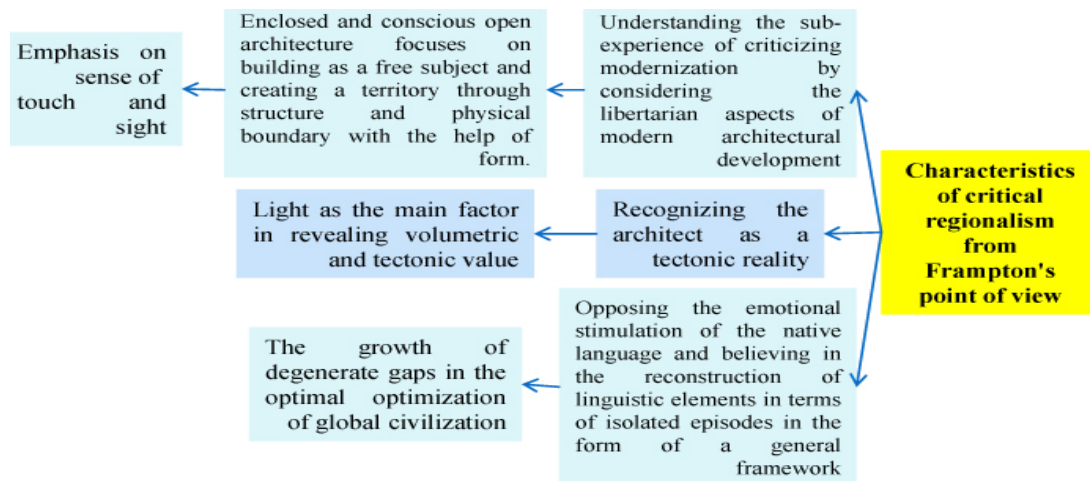


Figure 1. Characteristics of Critical Regionalism from the Perspective of Frampton (Source: Authors)

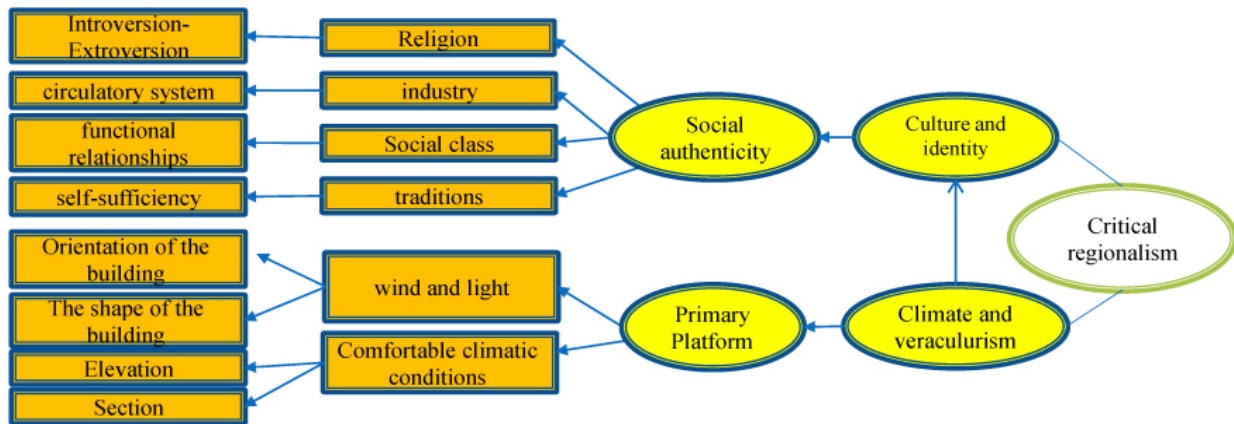


Figure 2. Critical regionalism based on the studies and opinions of experts and Kent Frampton's perspective (Frampton, 1983) Source: Authors

Physical-Social Sustainability Architecture

The concept of sustainable architecture, whether as the creation of human space and the regulation of the relationship between man and the physical environment, or as the product of this process, is always mixed with the sustainable environment and in a general framework, it can be interpreted as "the creation of a sustainable manmade environment" (Farhoudi, 2007). This architecture has an activity in the direction of restoration, reconstruction and renewal of natural systems and the earth, as well as cautious use of life cycle resources in nature (Soleimani, 2008). Sustainable architecture, architecture compatible with the economic, social and natural environment, is the process of creating a space during which natural resources are minimally damaged during construction and operation. There are three basic principles for sustainability in architecture: resource conservation, which deals with the reduction, reuse and recycling of natural resources used in the building, life cycle design, which is a method for analyzing the building

process and it brings up its effects on the environment, and finally human design, which focuses on the interaction between humans and the natural world (Tavakoli Kazeruni et al; 2023: 73).

Sustainable development, development that can meet the needs of the present generation without compromising the ability of future generations to meet their own need. that sustainable development possesses three dimensions: environmental economic, and social so that tries to reduce environmental pollution, adjust unstable economic situations, and establish social balance in society. the social dimension of sustainable development is the most important factor in this field, because it means strengthening the vitality of society and increasing social and cultural values (Izadyari Aghmiuni et al., 2023: 75).

Physical Sustainability, also referred to as climatic sustainability, focuses on the sustainable design of the building structure and the optimization of material and energy consumption. Non-physical or social sustainability, on the other hand, deals with the qualitative enhancement and sustainability of the events taking place within the architectural structure. Socially sustainable design involves designing spaces that serve as a suitable container for human culture, behaviors, and lifestyles, and where the flow of life formed by these elements can be present for a longer period.

To increase the temporal span of social sustainability, one can employ flexible space-enabling strategies. In this way, it can be expected that the mentioned space will be able to respond to future changes in behavioral patterns (Raeisi, 2016: 282).

Research Findings

Extracting Enduring Indicators of Critical Regionalist Architecture using Grounded Theory

Finding Conceptual Categories (Open Coding: Generating Concepts and their Characteristics): After reaching the key points in the definitions of experts, a code was first assigned to each. Then, considering the similar cases, they were divided into concepts (codes) and eventually led to the formation of the concepts (codes) (Table 2).

Table 2. Extracting Critical Regionalist Notes and Data from the Perspective of Experts (Source: Authors)

Characteristics	Effective factors in regionalism and critical regionalism	ID	Theorist
Indigenous forms and elements	A1-Creation of urban form-Form forming land-Environment Substrate-Relationship of indigenous and social materials-Sustainability factors beyond limited horizons-Specific features of place-Absorption of indigenous		Frampton 1983-2006

Modern and indigenous culture	A2 - The interface between postmodernism (neo-traditionalists) and avant-gardes - culture and identity - reconciling the effects of global civilization and the characteristics and characteristics of the place - focused on local characteristics in the direction of resistance to the assimilation of modernism capitalism - resistance and local characteristics and architecture technology against abstract and global architecture - architectural strategies - optimization of technology - institutionalization of technology sensitivity in	A	
Diversity of the region	A3- Regional diversity		
Professional	A4- Requires a high level of self-awareness - a place-specific manner		
Sustainable design factors	A5- In addition to the visual characteristics of the place, the impact on qualitative aspects such as the intensity and quality of light, texture and		
Exclusive	A6- The unique identity of a culture		
Indigenous organic architecture	A7- Relationship with nature- direct dialectical relationship with nature	B	Alexandre TZounis 2017
Traditional architecture	B1-Criticism of the use of global architecture		
Local architecture	B2 - sustainable design - priority with the specific identity of the region - rethinking architecture through the region - ecosystem balance and environmental issues - special characteristics of the project location		
Diversity and neo-nativism	B3 - Maintaining diversity and difference - creating diversity while benefiting from global benefits		
Identity and architecture	B4- The significance of architecture		
Human design	B5-An expression of common human aspects-complex human connections		
Sustainable design factors and neonativism	B6-Visual characteristics of the place and qualitative aspects, including the intensity and quality of light, texture and material type	C	Lian Lefour 2013 2021
Indigenous culture	C1- Criticism of the use of global architecture		
Indigenous and local	C2- internal characteristics		
Human culture and	C3- An expression of common human aspects		
Sustainable design factors and neo-nativism	C4 - The visual characteristics of the place and qualitative aspects, including the intensity and quality of light, texture and materials		
Modern, indigenous and specialized culture	C5 - Balancing local needs and capabilities with advanced modernization course	D	Schultz 2012
Indigenous architecture and sense of place	D1 - Strengthening the sense of place - the special characteristic of a certain place or having an identity - harmony between humans, man-made works and nature - a specific mood		
Human design and sense of place	D2- sense of belonging and safety - unity with the spirit of the place	E	Colcohan 2018-2012
Culture, modern culture and indigenous	E1 - Culture - manifestation of culture - interaction with culture and cultural background		
Indigenous and traditional architecture	E2- Geography - cultural and indigenous traditions including: using and changing the shape of local forms and natural materials - idealizing indigenous and folk traditions		
Factors of sustainable architecture	E3- climate- materials		

Characteristics	Effective factors in regionalism and critical regionalism	Id	Theorist
Traditional culture	F1- Historicism	F	Canizzaro 2015
Modern and traditional culture	F2- Nationalist romanticism		
Identity and introduction of past and contemporary architecture	F3 - The concept of originality - the heterogeneity of structures		
Indigenous and local architecture	F4 - reduction of indigenous differences		
Sustainable Development	F5 - Revive life		
Indigenous abstract architecture and sustainable development	F6 - beyond the design based on adaptation or mere reference of sources	G	Agner 2012
Indigenous and regional culture	G1- Development of culture and geography		
Modern and Indigenous culture, unique	G2- The balance of global civilization and the unique features of the place	H	Ozkan 2012
-Creative neo-nativism	H1- The use of new technologies- a contemporary interpretation of local architecture		
Indigenous architecture and rational and sustainable approach	H2 - Emphasis on preserving the specific features and characteristics of the place - opposition to the trend towards international style (globalization)	I	Newcom
Human and indigenous design	I1- Interaction between design generators and place		
Economic and conservative	J1- tolerance based	J	Berry
Indigenous and modern culture	K1- Emphasis on the existence of characteristics and differences and global culture	K	Harris 2012
Flexibility and sustainable development	K2- variety of freedom and expansion		
Modern culture, indigenous and neo-nativism	L1 - Linking regional characteristics with global components such as: technology and critical thinking	L	Lois Mumford 2012 2016
Extracorporeal and sustainable development	L2 - beyond the body - meaning beyond the body		
Ritual, traditional and innovative art	L3 - Understanding the art of the ancestors and creating the creative spirit		
Humane and sustainable design	L4- Balance between nature and man		
Sustainable Architecture	L5 - Stability		
Neo-nativism	L6- Current technology		
neo-nativism and localism	L7 - Contrast with assimilation		
Traditional, past and modern culture	L8 - Identity - background and history - a challenge to nationalists and the domination of national governments	M	Vitruvius 2013
Unique and local	M1- an indicator for a specific group identity		
Indigenous architecture and human design	M2 - architectural diversity is the result of physical, mental and behavioral characteristics of people - the establishment of buildings	N	Chris Abel 2008
Introduction of past and contemporary architecture	N1- creation and continuity of the present with the past - a connection of indigenous traditions with other foreign forms of cultural exchange		
Human and indigenous design	N2 - Spreading good social and cultural meaning		
Regional diversity	N3 - regional diversity		
neo-nativism	N4- Indigenous wisdom		
Nativist	N5- An effective response to the climate		

Creativity	N6- a creative process with the interweaving of cultural belief with the regionalization of foreign models		
Indigenous architecture and rational and sustainable approach	N7- Appropriate and original technology to establish a balance between man and nature		
Symbolic and abstract	N8-Infiltration of the obvious features of the regional style into some deeper mythological structures rooted in the past with		
- Combination of modern and traditional architecture	O1 - modern and traditional combination - paying attention to place and technology	O	William Curtis 2012-2016
-Sustainable neo-nativism	O2- Establishing harmony between people, their handiwork and nature- Continuation of indigenous traditions		
-Traditional, neo-nativism and modern culture	P1 - The relationship between technology and culture - integration of global architectural and technological developments with regional sensitivities caused by spatial, cultural and historical contexts.	P	Ken Ying 20121

Characteristics	Effective factors in regionalism and critical regionalism	Id	Theorist
Creativity	- Creativity Q1	Q	Gideon 2012 2015
Extracorporeal	Beyond compatibility with specific locale Q2		
Human design	Overcoming the gap between thought and feeling Q3		
creativity and innovation	Creative protection - Creative approach Q4		
Authenticity	- Return to the objects themselves Q5		
culture and civilization	Context and date- Q6		
Balance between contemporary and past culture	R1- Proportion between function-body-culture- indigenous and local	R	Ghadom 2012
Identification of indigenous culture and architecture	S1- Introduction of community characteristics and the combination of community characteristics (geography, climate, form and community)	S	Sirajuddin 2012
Sense of Place	S2- Sense of place		
Exclusive	S3- special feature		
Combination of traditional and modern culture	4 -New combination of community culture with specific regional culture		
Physical and indigenous	T1- characteristic topography of the region	T	Peterson
Sublime originality	U1- Using the sublime concepts of past architecture	U	Manfredi Nicoletti 2016
Compatible with nature	V1- Technology along with preserving the originality and principles of the environment by establishing a balance and a combination of technology between man, society and nature	V	Schumacher 2016
-Diverse local forms	W1 - production of more types of forms, better understanding and perception	W	Lamponiani 2016
Indigenous and traditional architecture	W2- A stronger return to tradition		
Human design	-X1 Architecture of a place for people	X	Balkrishna doshi 2018

Indigenous and sustainable architecture	Y1 - The main factors of space arrangement: dominant resources, energy and weather - climatic considerations - cultural background - local materials	Y	Charles Korah 2018-2016
Exclusive to the indigenous person	-Y2 unique site planning		
Authenticity and stability	-Z1 Use of natural materials on the building: culture and civilization	Z	Jeffrey Bowa 2018
Emotional factors	-Z1 Use of natural materials on the building: culture and civilization	α	Raj Roval
Indigenous-abstract architecture	B1 - a selection of past and present values	β	Alvaro Siza 2018
Modern neo-nativism	Γ 1- Attention to place, people and technology	γ	Aini Fur 2012
Modern neo-nativism	1 - δ Attention to place, people and technology	δ	Diba 2012
Indigenous architecture and creativity	1 - ϵ Specific characteristics of the place - creative approach (creative protection)	ϵ	Judet 2012
-local architecture	1 - ζ A function of regional or national characteristics	ζ	Tolai 2016

Finding the Relationship Between Categories (Axial Coding: Establishing Relationships Between Concepts):

In this section, the concepts (codes) related to a common category were grouped and connected within a theoretical framework.

Table 3. Relationship Between Critical Regionalist Concepts (Source: Authors)

Dimensions	Category	Concepts	Characteristics	ID (codes)
Contextual	The architectural genre of critical regionalism (The importance of indigenous)	Indigenous organic - architecture Traditional and - indigenous architecture Indigenous -local - architecture Indigenous architecture and rational and sustainable approach	Indigenous forms and elements - Indigenous - organic architecture - Traditional architecture - Indigenous architecture - Indigenous and local architecture - Indigenous architecture and sense of place - Indigenous and traditional architecture - Indigenous local architecture - Indigenous architecture and rational and sustainable approach - Indigenous architecture and human design - Indigenous architecture and human design - Indigenous architecture and rational and sustainable approach - physical and indigenous - diverse	A1+A7+B1+B2+C2+D1+E2+F4+M2+N2+N5+N7+T1+W1+W2+Y1+ ζ 1
Contextual	The architectural genre of critical regionalism (cultural)	Identity and - architecture Modern and - indigenous -traditional culture Unique and - specialized Introduction of past - and contemporary architecture culture and - civilization Identification of local -	Modern and indigenous culture - Traditional culture - Identity and architecture - Indigenous culture - Culture and human design - Modern, indigenous and specialized culture - Culture, modern and indigenous culture - Traditional culture - Modern and traditional culture - Indigenous and regional culture - Modern culture and indigenous , unique - modern and indigenous culture - modern culture, indigenous and neo-nativism - traditional, past and modern culture - introduction of past and contemporary architecture - traditional, neo-nativism and modern culture - authenticity - culture and civilization - balance between contemporary culture and past - identification of	A2+B1+B4+C1+C3+C5+E1+F1+F2+G1+G2+K1+L1+L8+N1+P1+Q5+Q6+R1+S1+S4+U1+Z1

Causal-conceptual	The architectural genre of Critical regionalism	Unique and - specialized Factors of sustainable - design and neo-nativism Principles of Iranian - architecture Sustainable - Development	Specialist - factors of sustainable design - unique - - human design - factors of sustainable design and neo-nativism - factors of sustainable design and neo-nativism - human design and sense of place - factors of sustainable architecture - sustainable development - human and sustainable design - sustainable architecture - unique to individual and neo-indigenous - sense of place - unique - compatible with nature - unique - indigenous	A4+A5+A6 +B5+ B6+C4+D2 +E3+ S2+S3+V1+ Y2+ F5+L4+L5+ M1
	Critical regionalism architectural chapter	Introduction of past - and contemporary architecture Local and sustainable - creative neo-nativism	Past and contemporary identity and architecture - - Creative neo-nativism - neo-nativism - Indigenous and local - Combination of modern and traditional architecture - Sustainable neo-nativism - Modern neo-nativism - Indigenous architecture and creativity	F3+H1+L6+ L7+N4+O1 +O2+γ1+δ1 +ε1
Causal-behavioral	The architectural genre of critical regionalism	Human and - indigenous design	Human and indigenous design - Human design - - Human design - Emotional factors	I1+Q3+X1+ α1
		Complete and economical	Economic and conservative-	J1
		Principles of Iranian - and sustainable architecture	Flexibility and sustainable development	K2
		extracorporeal and - sustainable development	extracorporeal and sustainable development- - extracorporeal	L2+Q2
	Critical regionalism architectural chapter	Religious art form-	Traditional ritual art and innovation	L3
		The diversity of the - region and neo-nationalism	Diversity of the region-diversity and neo-nationalism- - diversity of the region	N3+A3+B3
Symbolic	The architectural genre of critical regionalism	Creative-	Creativity-creativity and innovation-	Q1+Q4
		Symbol and - abstraction of indigenous architecture	Abstract and indigenous architecture -abstract - indigenous architecture and sustainable development- symbolic and abstract	F6+N8+β1

Given that the goal in this section is to categorize the concepts of critical regionalist architecture, structure; It is a general concept that expresses part of the truth of the object and its contents. nature; It is an inherent generality that distinguishes a type from other types within a genus.

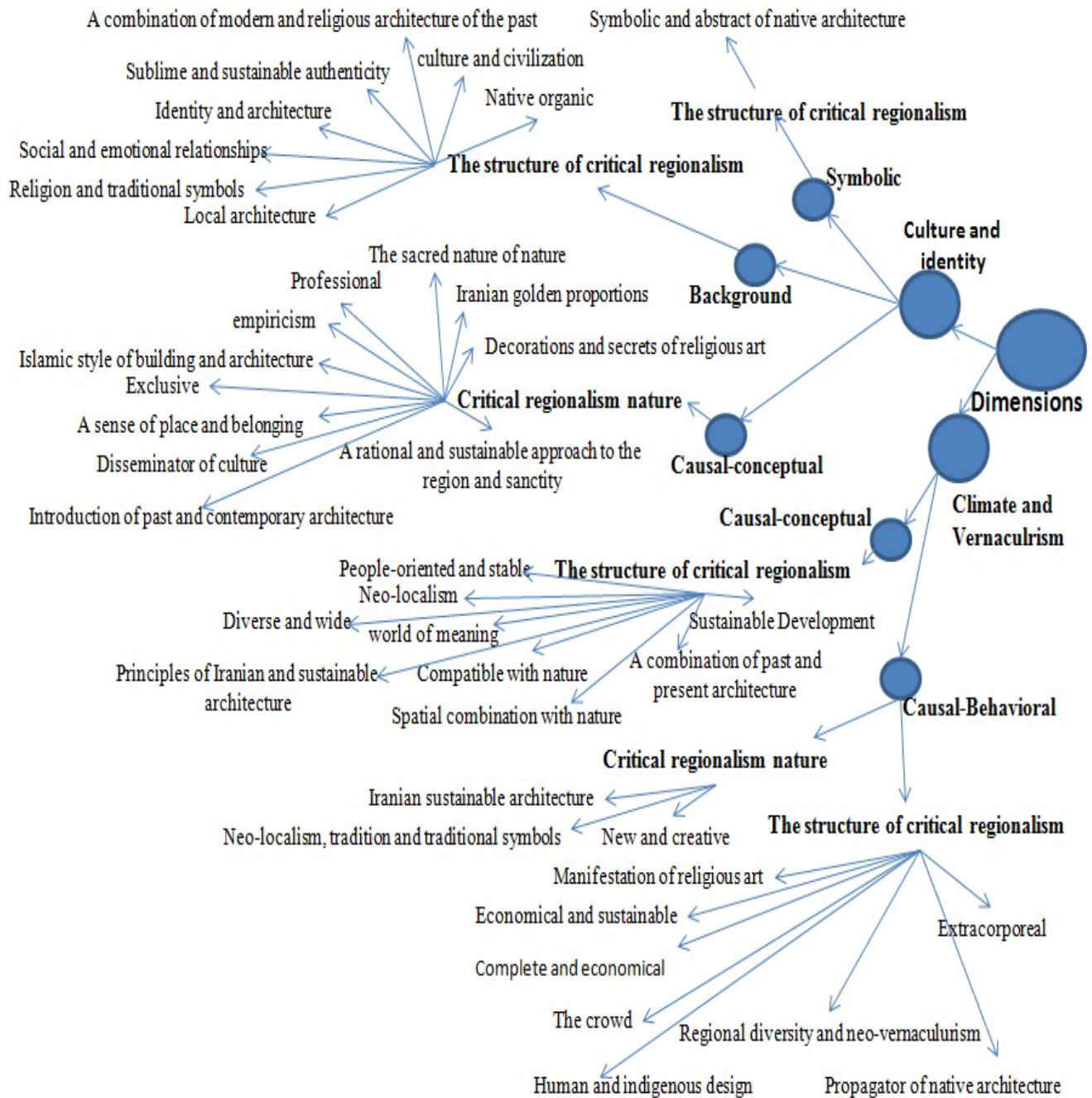


Figure 3. Preliminary Model for Extracting Concepts and Components of Critical Regionalist Architecture to Achieve Contemporary Housing (Source: Authors)

Conceptualization and Reporting of these Relationships (Selective Coding: Integrating and Improving Concepts):

After the axial coding is completed, the next step is selective coding, which arises from the fusion and combination of the main categories and is used for the initial formation of the model framework.

This work was also shaped by the overall mentality of the model and an approach based on the extraction of the enduring patterns of Iranian indigenous architecture. In this section, the related concepts (codes) in indigenous architecture were categorized under a related category in critical regionalist architecture, for the purpose of integrating and improving the categories. Then, to form the model, the categories were interconnected within a theoretical framework under the title of the components of conceptual patterns in housing.

Table 4. Categorization of Housing-Related Concepts in Relation to Indigenous and Critical Regionalist Architectural Concepts of Mashhad Homes in the Pahlavi Period

Index type	Indicators and concepts in critical regionalism housing	Trans-time-space human needs****	Values***	Concepts related to Iranian housing from the point of view of experts**	Concepts in critical regionalism architecture	Concepts in indigenous architecture*	Effects of concepts	Dimensions
Functional-conceptual	- Introvers ion - Privacy - The crowd	Feeling of character - Calm down -Identity - Security	- Cooperation and social unity - Honoring the guest of Arham Patch Neighborhood relations - importance to; Family, kinship, abstract categories such as common religion, ethnicity and political views	-Maintaining and promoting attention to family and family relationships	-Attention to culture, civilization and community identity - Introduction of past and contemporary architecture - A combination of modern and past culture - The symbolic nature of the local	Paying attention to the culture of the environment and the traditionalist society	physical-social	Backg round
		- A sense of belonging		- Maintaining and strengthening neighborhood relations				
		-Identity	compatibility - Honor	- Attention to the culture of society				
		-Security -Solitude and territory -Identity - A sense	- Contentment (avoid extravagance) - Moderation (balance and balance) - Confrontation with fashion and consumerism - Coordination	- Adherence to justice and attention to social justice (balance, harmony, harmony, balance, etc.)				

		of belonging	Beauty, simplicity and order -Emphasis on national identity and social unity - The unity and centrality of God -Avoid showing off and individualism and homogeneity with strangers	-unity in diversity	sample			
Functional-behavioral	- Light and purity - Transparency - Avoiding futility Indigenous decorations	safety and security - Calm down - Solitude and sense of territory	- Covering and hijab Importance and attention to inner-life -Respect for personal life - Peace and comfort - Compatibility with the surrounding environment.	respecting the hierarchy; - Introversion - Security			psycho-physical	
Functional-conceptual	- Light and purity - Transparency - Avoiding futility - Indigenous decorations	- Flexibility - Calm down - A sense of belonging	- Back-casting - Compatibility - Contentment (avoiding extravagance; respecting justice and balance) - Observing and feeling the landscape, landscape and beautiful shapes -Avoid hypocrisy and deception	- Avoiding futility - Self-sufficiency	- The reliability of the building - Sublime and stable authenticity - Indigenous organic architecture - A sense of belonging and continuity	- Regional and local - Dependence on the environment	environmental	
	- A sense of belonging - Self-sufficiency	-Identity - Feeling of character	- Hope, effort, perseverance, Respect, adaptability	- Self-sufficiency -Perfectionism	- Unique and specialized - Social authenticity	- Depends on the conditions of the insider	Social	

Functional-behavioral	-Playing with light - Transparency	- Communication with	- Coexistence with water - Nurturing light - The importance of climate and yard	- Communication and coexistence with nature - Perfectionism	- neo-nativism - Indigenous organic architecture Compatible with nature and future	-Harmony and connection with nature	Environmental-social	Contextual
Functional-conceptual	- Use of traditional symbols - Light and purity - Transparency - Thank you very much - Degree of enclosure	- flexibility - Calm down - Feeling Changeable flexibility	- Multi-base architecture - Symmetry - Honesty and health Diversity and harmony - Similarity of whole and part - Refinement and elegance	- Comprehensiveness and unityism - Balance Unity and plurality	- Unity in the same multiplicity - A sense of unity - Pimon-conceptual needs -Physical flexibility	- Comprehensive and harmony (respecting the basic and aesthetic principles of architecture) - Performance	- Conceptual body	Causal-conceptual
	- Abstract forms -Playing with light	Adaptable flexibility	- Maintaining vitality -identifiable	- Diversity and uniformity	-Abstract from past architecture			
	Multifunctional	- Diversifiable flexibility	- Increasing durability and quality of life - Interaction between space and society	- Multifunctionality of spaces and elements	-Different degrees of confinement - Quiet			
Behavioral-conceptual	- Social interaction - Emotional relationships	- Feeling of character	Respect for yourself and others	- Crowd	- Social authenticity	-Slang - People	Social	
functional-conceptual	- Abstract forms	-Identity	Easy and restrained - Satisfaction and savings -Avoid hypocrisy and deception	- Avoiding futility	- Symbolic and abstract forms - Meaning and sanctity	- Clear and simple	- Conceptual	
	- Transparency	- Communication	- A sense of respect for nature				- Environment	

	- Naturalist	with nature						
	- Traditional symbols	- flexibility - Identity	- Compatibility - Continuity and differentiation of material and spiritual life of man		- Physical flexibility	Timeless and placeless	conceptual	
Physical-conceptual	- Multifunctional	flexibility - Identity - Communication with nature - Calm down	- Compatibility - Bewitching of material things by spirituality	- Perfectionism	- Rhythm - Continuity - Evolution - belonging - Local symmetries	- Continuity - Evolution	conceptual	Causal-conceptual
	- Minor symmetries - Foresight		- The need to create a new space - Continuity (increasing the life of the building) - Visual communication				physical	
	- Human design - Human Scale - Pimon	- A sense of belonging - Solitude	- Discipline		- Life - A sense of belonging	- Attention to the value of space and its	conceptual-physical	
Behavioral-conceptual	- Private arena	- Calm down	- Dignity and moderation - Avoid showing off - Avoid arrogance	- Humility	- A sense of belonging - Balancing housing	- Humble	psychological	causal-behavioral
	- Characterizing the space	- Identity		- Reminder - Preferring spirituality over materiality	- Sense of Place - Balancing visual and tactile sense	- Innate insight and intuition - Unconscious		
Physical-conceptual	- Using abstract and symbolic forms - Abstract decoration	- Identity	Trust and obedience	- Ambiguity and doubt	- Traditional symbols - Abstract forms - Symbolic aesthetic elements	- Semantic - Symbolic	Psychological	symbolic

(*and**and***and ****taken from the article by Najranjad et al.)

Residential Houses in Mashhad During the Pahlavi Period

Studying Residential Buildings in the First Pahlavi Period

The continuous and harmonious architecture of the street edges gradually turned into the construction of buildings in a fragmented manner and within the open spaces of the street edges, with volumes that were more protuberant. Gradually, the ornaments of the buildings decreased, modern building materials replaced the brick and tile facades, the French cap replaced the skylights, and the domed and adobe roofs were replaced by gable roofs (Bahman Bijari, 2009). In general, in this period, the facades had fewer decorations compared to the Qajar era. In this period, more use was made of brick headers and brick battlements on the roof edges, as well as plasterwork for facade decorations, and sometimes tile decorations were also used. The doors and windows were wooden and had little value and decoration, and the facade bodies were simple and mostly symmetrical. The facades lacked or had inappropriate plinths. The decorations were mostly on the main entrance, creating symmetry in the facade, and the building roofs were flat or gable. The plan shapes were mostly semi-extroverted and semi-open, with simplicity on the outside and dynamism on the inside, being flexible, providing diverse lighting quality in the spaces, and providing cultural identity and a sense of belonging to the place.

Studying Residential Buildings in the Second Pahlavi Period

The height of the buildings around the streets located in the historical and old fabric of the city was constantly increasing, but the vast majority of the new urban fabric, except around the main streets - the main buildings - consisted of one-story to two-story buildings, mostly on very small plots (Naqi Zadeh, 35: 2002). The height of most of the city's buildings is one and two stories, and buildings up to 5 stories are rarely seen. The influential factor in the selection of the architectural style of the buildings was the natural characteristics of the environment, as the severe cold, snowy winters, and high humidity of the ground have determined the architectural characteristics of the city. As a result, the floors of the buildings were raised above the ground level, which was called "cat-faced". The walls were always thick, the windows were narrow, the ceilings were mostly high and as flat as possible. Later, when the gable roof became common, the majority of the buildings were covered with gable sheet roofs. The old fabric, apart from the removal of the arches from the old alleys, remained intact, and in general, the houses of Mashhad are made of mud, brick, and wood with wooden roofs and mud roofs (Bahman Bijari, 2009).

In this period, the facade decorations were simple and mostly symmetrical, and less than the previous two periods. Tile decorations were rarely used, and more brick decorations and sometimes plasterwork were used on the entrances, and geometric and abstract patterns of plants and living beings were used on the window guards. Towards the end of this period, stone or

cement facades with metal gable roofs were also used. In general, the facades in this period have little architectural value (Figure 4 & 5).

In this period, the plans have evolved from semi-introverted to extroverted; and have had partial symmetry and vitality. Simplification of form and building and flexibility, open plan, and use of traditional geometry, as well as the use of basements, were common. Towards the end of this period, high-rise (tower) and complex construction became prevalent.

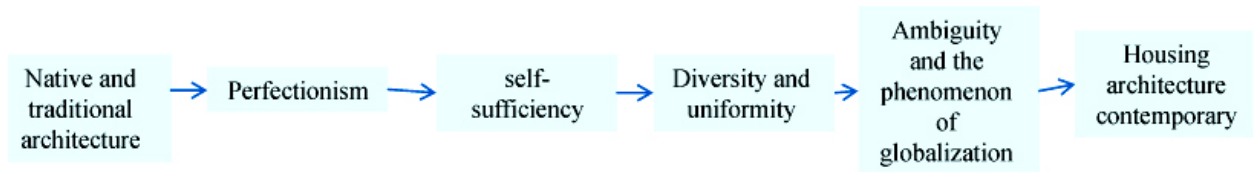


Figure 4. Contemporary housing changes in Iran

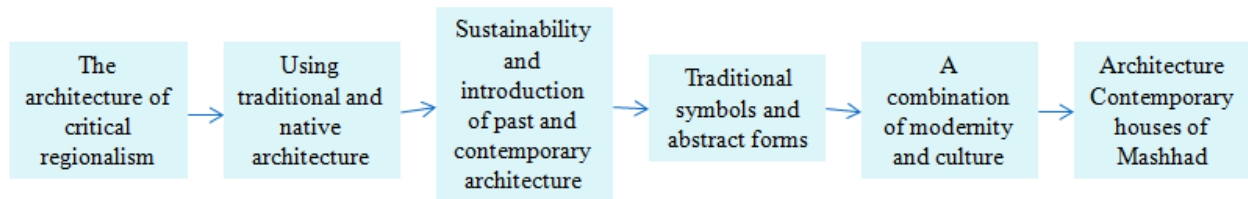

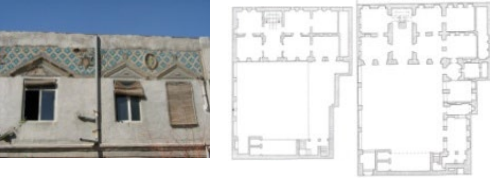




Figure 5. Process of changes in residential houses in Mashhad

Table 5. The effects of traditional, western, indigenous and critical regionalist architecture on the houses of the first Pahlavi period (Source: Authors)

Effects of globalization	* The effects of critical regionalist architecture	Effects of indigenous architecture	Western architectural influences	Effects of traditional architecture
<p>1- The influence of foreign culture (Mahtabi, Hozcheh, and Dodari)</p> <p>2- Not paying attention to the climate of the region (wide windows).</p> <p>3- Creating broad perspectives.</p> <p>4- Creating classes.</p> 	<p>1- Creating a central courtyard for stillness and visual peace in the heart of the space and play with light. (Mohammadi house: three-way introvert)</p>  <p>2- Aligning the buildings with the surrounding buildings with aesthetic proportions, light geometry, etc.</p> <p>3- Use of local site materials and brick textures compatible with culture and economy.</p> <p>(Dr. Salari's house: semi-introverted with two perpendicular sides)</p>  <p>4- Creating the proper shape, form and orientation of the building in the direction of sustainable development.</p> <p>5- Having a form based on the traditions on the site.</p> <p>(Judgment House: Borongrai Villai)</p>  <p>6- Increasing the sense of belonging to the place by using local patterns and symbols.</p>	<p>1- Using the basement for geothermal heating.</p> <p>2- Using dense and compact form.</p> <p>3- Using local materials with good heat capacity.</p> <p>4- Minimizing the amount of indoor and outdoor air conditioning.</p> <p>5- Choosing a flat roof and keeping snow for thermal insulation.</p>	<p>1- Space circulation system from corridor to room or foyer.</p> <p>2- The centrality of the staircase and entrance hall in the organization of spatial communication.</p> <p>3- Guards and metal decorative elements in windows.</p> <p>4- Pond in the yard.</p> <p>5- Creating a wide view in the windows.</p> <p>6- Using moonlight instead of porch.</p> <p>7- Three doors have been changed to two doors.</p> <p>8- Slope of the roofs.</p>	<p>1 - Vertical communication is less important.</p> <p>2- Smooth line. The sky</p> <p>3- Janaghi Ilkhani arches.</p> <p>4- Precedence of inside and outside decorations.</p> <p>5- Insisting on creating symmetry in decorative motifs.</p> <p>6- Rectangular doors and windows.</p> <p>7- Roof covered with straw.</p> <p>8- Iranian wall heater.</p> <p>9- Use of brick and wood in the structure.</p>

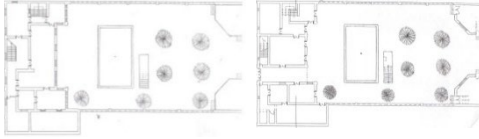







	<p>7-The approach of stability and reliability of the building.</p> <p>8- Human design and flexibility of spaces.</p> <p>9-Using the principles of Iranian architecture (introversion, etc.).</p> <p>10-Identity and affiliation and connection with the past.</p> <p>11- The combination of space and nature and the balance of man and nature.</p> <p>12- The world of meaning and creating security and peace with the appropriate hierarchy and creating privacy)</p>  <p>13- Paying attention to the special features of each place in addition to the design requirements.</p> <p>14- Architecture in search of identity.</p> <p>15- Struggle to preserve the traditions and cultural characteristics of the residents of the region.</p> <p>16- Maintaining and creating continuity between present and past construction forms.</p> <p>17- Maintaining and creating continuity between present and past construction forms.</p>			
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Table 6. The effects of traditional, western, indigenous and critical regionalist architecture on the houses of the second Pahlavi period (Source: Authors)

Effects of globalization	**Effects of critical regionalist architecture	Effects of indigenous architecture	Western architectural influences	Effects of traditional architecture
1- The influence of foreign culture	1- Aligning the buildings with the surrounding buildings with aesthetic	1- Using the basement for	1- Space circulation	1- Unimportant vertical

<p>(Mahtabi, Hozchah, and Dodari)</p> <p>2- Not paying attention to the climate of the region (wide windows).</p> <p>3- Creating broad perspectives.</p> <p>4- Creating classes.</p> <p>5- High-rise building.</p> <p>(High-rise construction: high-rise apartments)</p> <p>6-mass construction.</p> <p>(Residential complex of 600 units)</p>   <p>7-Using a metal frame</p>	<p>proportions, light geometry, etc.</p> <p>2- Use of local site materials and brick textures compatible with culture and economy.</p> <p>(Pourhosseini house: semi-introvert with two perpendicular sides)</p>   <p>3- Creating the proper shape, form and orientation of the building in the direction of sustainable development.</p> <p>4- Having the roots of the building form in the traditions on the site (Agronomist's house: Borongray Villai)</p>   <p>5- Increasing the sense of belonging to the place by using local patterns and symbols.</p> <p>6- The approach of stability and reliability of the building.</p> <p>7- Human design and flexibility of spaces.</p> <p>8-Using the principles of Iranian architecture (introversion, etc.).</p> <p>9- Identity and affiliation and connection with the past.</p>	<p>geothermal heating.</p> <p>2-Using dense and compact form.</p> <p>3- Using local materials with good heat capacity.</p> <p>4- Minimizing the amount of indoor and outdoor air conditioning.</p> <p>5- Choosing a flat roof and keeping snow for thermal insulation.</p>	<p>system from corridor to room or foyer.</p> <p>2- The centrality of the staircase and entrance hall in the organization of spatial communication.</p> <p>3- Guards and metal decorative elements in windows.</p> <p>4- Pond in the yard.</p> <p>5- Creating a wide view in the windows.</p> <p>6-Using moonlight instead of porch.</p> <p>7- Three doors have been changed to two doors.</p> <p>8- Slope of the roofs.</p>	<p>communication.</p> <p>2-Smooth line. The sky</p> <p>3- Janaghi Ilkhani arches.</p> <p>4- Precedence of inside and outside decorations.</p> <p>5- Insisting on creating symmetry in decorative motifs.</p> <p>6- Rectangular doors and windows.</p> <p>7- Roof covered with straw.</p> <p>8- Iranian wall heater.</p> <p>9- Use of brick and wood in the structure.</p>
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	<p>10- The combination of space and nature and the balance of man and nature.</p> <p>11- The world of meaning and creating security and peace with proper hierarchy and privacy. (Dr. Kahraman's house: outgoing)</p>  <p>12- Paying attention to the special features of each place in addition to design requirements.</p> <p>13- Architecture in search of identity.</p> <p>14- Struggle to preserve the traditions and cultural characteristics of the residents of the region</p> <p>15- Mediation between global and indigenous and local civilization.</p> <p>16- Maintaining and creating continuity between present and past construction forms.</p>			
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*And** All the plans and photos in this column, as well as the photos in Table 11, are field surveys conducted by the author.

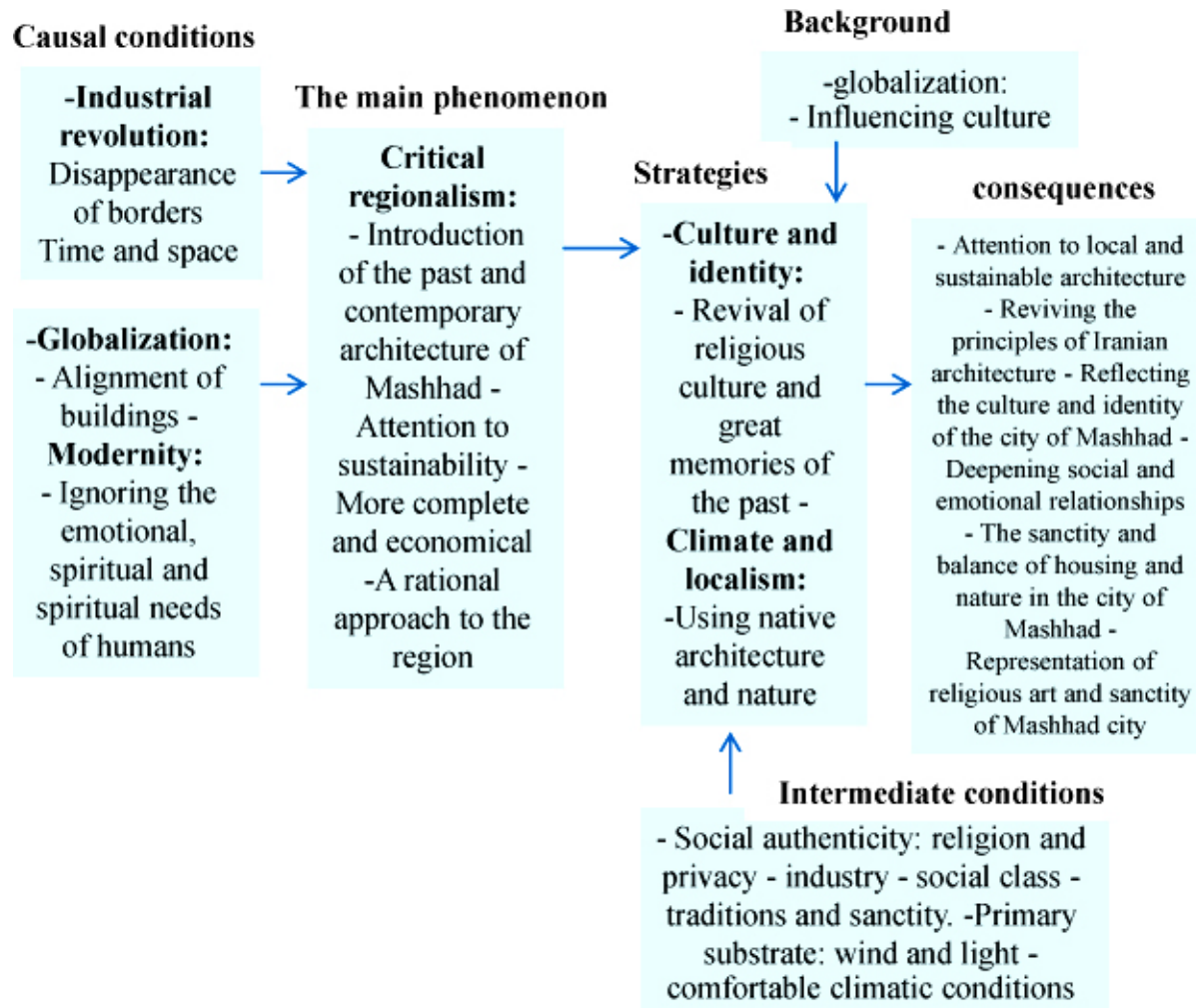


Figure 6. Grounded Theory in Mashhad Homes (Source: Authors)

Considering the (Tables 5 & 6, Figure 6), the presentation of an efficient plan model in the city of Mashhad is as follows in (Figure 7):

The use of a dense and compact form considering the indigenous architecture of the region and the principles of sustainable architecture, the use of a columned porch and three-door elements that were common in Iranian architecture. The use of greenery and nature, and their sanctity in the centrality of the plan and the privacy in the space, which is consistent with Iranian culture. Creating a public section on the ground floor and a private section on the first floor to reflect the Iranian-Islamic culture and the manifestation of religious art, which is a reflection of the architecture of the city of Mashhad. Creating deep social and emotional relationships with sustainable design, the sanctity of the family foundation, and creating a sense of belonging and a suitable place, which are the requirements of Iranian-Islamic house design. Identity, attachment, and continuity with the past in plan design, and creating security and tranquility with appropriate

hierarchies, attention to the specific characteristics of the place, and the factors of physical-social sustainable design in the form and shape of the building are evident.

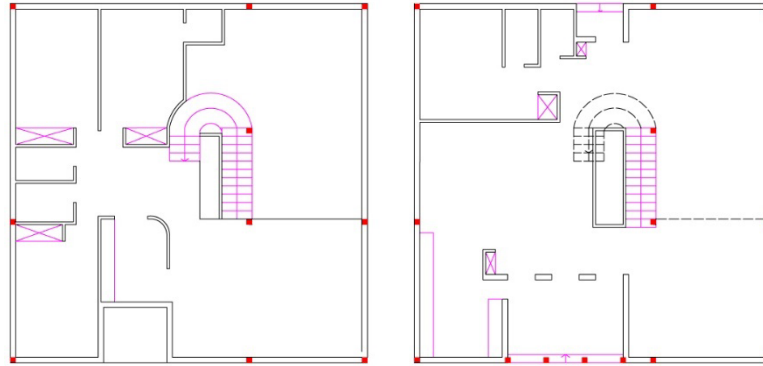


Figure 7. Efficient Proposed Model (Source: Author)

Conclusion

Critical regionalism should be understood as a kind of subsidiary experience through which, while criticizing modernization, the liberating and progressing aspects of the legacy of modern architecture are by no means overlooked. The critical regionalist architecture of the Pahlavi period in Iran has been the introduction of past and contemporary architecture, attention to physical-social and economic sustainability with a rational approach to the region. Creating a unique urban form in a way that, in addition to light, purity and transparency, is compatible with indigenous materials and brick textures compatible with the culture and economy of the region. Towards the end of this period, globalization and modern architecture have pushed the Isfahani style of the houses towards extroversion, high-rise and complex construction, etc. The architecture of the first Pahlavi period in the city of Mashhad, with the harmonization of the buildings, has had a trans-physical impact on the region, which has taken steps towards sustainable development. The plans in the first Pahlavi period were mostly in the Isfahani style; they had adaptable, changeable and diverse flexibility, semi-introverted, semi-open, inner dynamism, outer simplicity and cultural-social identity. Creating a central courtyard in the first Pahlavi period for visual stillness and calm in the heart of the space, balancing man and nature by playing with light and using traditional patterns, has brought a sense of belonging and a suitable sense of place. The depth of social and emotional relationships, the sanctity and balance of housing and nature in the design of the plans of this period are evident; which has been a manifestation of religious art and the sanctity of the family foundation in the city of Mashhad.

According to the analysis of tables 11 and 12 and consultation with experts, the comparative analysis of the buildings of the first and second Pahlavi periods is the most important in the form of the building, which has a combination of modern and local culture in an extroverted way.

In the second Pahlavi period, the greatest importance was in the form of the building, which was a combination of modern and indigenous culture in an extroverted way. The form of the building in this period, considering the population growth, the increase in land value and also the growth of technology, has manifested in a dense and compact form, which is more compatible with regional architecture. Therefore, the growth of global technologies such as vehicles, air conditioning and heating, etc., along with the preservation of authenticity and environmental principles, have made the greatest changes in the architecture of the houses. Therefore, respect for the principles of Iranian and sustainable architecture, creating a balance between indigenous and global aspects by creating a harmonious and harmonious building with the surrounding context, dependence on nature and culture, such as the central courtyard and the flexibility of spaces, etc. causes the sustainability of the building, the manifestation of the architecture of the ancestors and the promotion of the architecture of the city of Mashhad. Therefore, in the proposed efficient model, considering the past interpretations, the use of a dense and compact form and greenery in the centrality of the plan, the creation of a public section on the ground floor and a private section on the first floor to create deep social and emotional relationships, identity, attachment and continuity with the past in plan design and physical-social sustainable factors in model design have been taken into account.

Author Contributions

All authors contributed equally to the conceptualization of the article and writing of the original and subsequent drafts.

Data Availability Statement

Not applicable.

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Ethical considerations

The study was approved by the Ethics Committee of the Islamic Azad University, Birjand Branch. The authors avoided data fabrication, falsification, plagiarism, and misconduct.

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Conflict of interest

The authors declare no conflict of interest.

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