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Recognition the Sociological and Architectural Components based on Geographical Segmentation Technique by Value-normative Paradigm

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ABSTRACT: A house, as a primary dwelling is designed according to life style and current values in the life and mind of Residents. House is a cultural element, containing cultural meanings situated in the spirit of a house, distinguish the form of other houses. Special life style and conduct of residents becomes value through time. This value organizes the meaning in the mind and determines meaning of life and appropriate physical space. In this paper, we have tried to study theories of a philosopher concerning meaning issue and meaning ontology, and meaning of life, and then, present components to evaluation the meaning in historical houses of Mazandaran. Indexes and questionnaire were used through the components. Six historical houses were selected to evaluate, filled by ten specialists for each house. This paper describes the theoretical framework by qualitative research approach and analysis method. It assesses qualitative components to quantitative components, based on the evidences and documents. Then, it provides reliable criteria. Research achievement presents the solution to design temporary houses based on linkage of meaning and form.

Keywords: *Index Terms— meaning and form, Historical house, Houses of Mazandaran, Quality evaluation.*

INTRODUCTION

Social components have a profound influence on architecture. This components includes culture, life style, family structure, social capital, social identity, Characters of community members and other components have an irrefrangible linkage with Space organization and Physical Form. These factors are in connection with each other, like body organs. Investigation of contemporary architecture in influenced by vernacular architecture and required to recognise social conditions in the region.

In this paper, a geographical segmentation is used to achieve desired conclusion to recognise the social and architectural layers. Among different paradigms of this technique, Value-normative paradigm is used.

This paper describes the theoretical framework by qualitative research approach and analysis method. It assesses qualitative components to quantitative components, based on the evidences and documents. Then, it provides reliable criteria.

Rapoport (2005) and Yazdanfar et al. (2013) studied the culture and its relevance to architecture and environment. Qelichkhani (2012), Ghasemi Sichani and Memarian (2010) investigated typology of houses and influence of formal-cultural pattern in some case studies. Karimi (2008), Naraghi (2006), Manouchehri (2008), Delavari (2008), Khalili (2008), Ebrahimbai Salami (2008) analyzed Iranian society and offered paradigms or frameworks or theories to categorize the characters of Iranians. Kaffashi (2014) , Kaffashi et al., (2010), Heidarabadi, & Salehabadi (2012), and Kalantari et al. (2012) investigated the some social components in selected societies for example social identity and social capital.

Lack of knowledge about the culture of urbanization, which in

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turn is resulted from rapid transition of a lifestyle from short to high-rise buildings, today has become one of the most important problems in the world. (Safdarian & Habib, 2014, 15)

These studies did not investigate the sociological and architectural studies in parallel and did not study on society and architecture of Mazandaran. Lack of study is obvious in this region especially by mentioned viewpoint.

Therefore, research achievement presents the twelve social and architectural accommodation model, obtained by overlapping the social segmentation includes eastern, central and western section and quadr-architecture includes coastal architecture, plain architecture, foothills architecture and mountain architecture.

Geographic segmentation is a common strategy, when society has different preferences based on where they are located. This approach is common for small sociality that serve a wide demographic sociality based on a local or regional territory. It is often used since companies selling products and services would like to know where their products are being sold in order to increase advertising and sales efforts there. Geographic area can be segmented to a market by area, such as cities, counties, regions, countries, and international regions. The social space can down into rural, suburban and urban areas by collecting and analyzing information according to the physical location or other data source. Kahle (1986) segmented nine nations of North America geographically. Barlow (1989) compared regional or geographical segmentation to develop London and southeast housing markets. Kano & Tsutsui (2003) segmented Japanese capital banks and Becker (2007) segmented US capital banks geographically for bank loan assigning. Pereira & Ferreira (2011) segmented geographical telecom infrastructures markets. None of these studies used mathematical based tools by considering the expert judgment for geographical segmentation.

In this paper, geographical segmentation of Mazandaran province is done by decision-making tools. Making decisions often involve the assessment and ranking of available alternatives or decision options based on multi-criteria (Pohekar & Ramachandran, 2004; Yoon & Hwang, 1995)

TOPSIS[1] model presented in Chen & Hwang (1992), with reference to Hwang & Yoon (1981). The basic principle is that the chosen alternative should have the shortest distance from the ideal solution and the farthest distance from the negative-ideal solution. The TOPSIS procedure consists of the following steps:

Step 1. Calculate the normalized decision matrix. The normalized value rij is calculated as:

$$r_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}} \ , (j = 1, \dots . , n)$$

Step 2. Calculate the weighted normalized decision matrix. The weighted normalized value V is calculated as:

$$V = N_D \times W_{n \times n}$$

Where wi is the weight of the i th attribute or criterion

Step 3. Determine the ideal and negative-ideal solution.

$$\mathrm{I-S} = \left\{ (max_i \ v_{ij} | \ j \in J1), (min_i \ v_{ij} | \ j \in J2) \right\}, i = 1,2, \dots \dots , n$$
$$\mathrm{N-I-S} = \left\{ (min_i \ v_{ij} | \ j \in J1), (max_i \ v_{ij} | \ j \in J2) \right\}, i = 1,2, \dots \dots , n$$

Where J1 is associated with benefit criteria, and J2 is associated with cost criteria.

$$A_i^+ = \{v_1^+, v_2^+, \dots, v_n^+\}$$
$$A_i^- = \{v_1^-, v_2^-, \dots, v_n^-\}$$

Where A_i^+ is associated with benefit criteria, and A_i^- is associated with cost criteria.

Step 4. Calculate the separation measures, using the Euclidean distance. The separation
of each alternative from the ideal solution and negative-ideal solution are given respectively as:

$$D_i^+ = \left\{ \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2} \right\}, i = 1,2, , \dots . , n$$

$$D_i^- = \left\{ \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2} \right\}, i = 1,2, , \dots . , n$$

Step 5. Calculate the relative closeness to the ideal solution. The relative closeness of the alternative is:

$$C_i = \frac{D_i^-}{(D_i^- + D_i^+)}$$

Step 6. Rank the preference order based on relative closeness to the ideal solution in Step 5.

A lot of studies used TOPSIS model for ranking alternatives by attention to criteria. Chen et al. (2001) used this model to determine priority areas for a bushfire hazard reduction burning Cheng et al. (2003) used this model to select landfill locations in the solid waste management problem. Zavadskas & Antucheviciene (2004) used this model to determine redevelopment priorities of buildings, Berger (2006) used this model to generate depictions of the agricultural landscape for use in alternative future scenario modeling Zavadskas & Antucheviciene (2006) used this model to rank sustainable revitalization. Using alternatives of derelict rural buildings in Lithuania, Onut & Soner (2008) used this model to solid waste transshipment site selection problem. Lin & Li (2008) used this model to Land-use design model for regional transit-oriented development planning. Lin & Tsai (2009) used this model to select an ideal city for medical service ventures using overall performance. Lin & Tsai (2010) used this model to select alternative locations for investing hospitals. Zhang et al. (2011) used this model to evaluate the tourism destination competitiveness of the Yangtze river delta. Huang & Peng (2011) used this model to analyze the tourism destination competitiveness of nine Asian countries. Ning & Wang (2011) used this model to Select an efficient location for a new factory to select an optimal construction site layout among generated

layout alternatives in the design stage. Özcan et al. (2011) used this model for warehouse location selection problem. Sadat et al. (2013) used this model to select an appropriate site for mineral processing plant. In this paper, TOPSIS model is used for geographical segmentation of Mazandaran province.

MATERIALS AND METHODS

This research considered twelve cities in Mazandaran province to study in the field of sociology and architecture, in parallel. Seven sociological components offered based on special studies in the selected region.

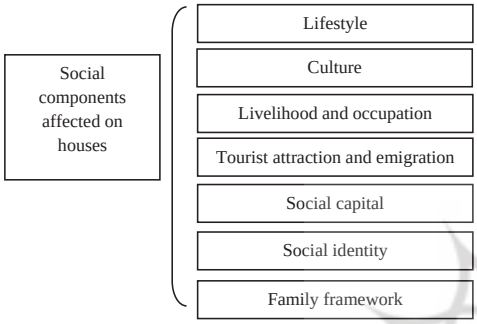

Fig . 1: Social components affected houses

Therefore these seven sociological components scored in twelve cities based on judgments of experts. TOPSIS model is used to prioritize the cities based on selected criteria.

In this paper, cultural criteria are based on Hofstede model of six dimensions of national cultures: Power Distance, Uncertainty Avoidance, Individualism/Collectivism, Masculinity/Femininity, Long/ Short Term Orientation, and Indulgence/Restraint (Hofstede, 2011). These dimensions were scored by experts interview. Viewpoint of Pierre Bourdieu is used in life style criteria. Family structure criteria, Livelihood and occupation, and tourist attraction and emigration is scored according to official statistics. Viewpoint of Coleman is used in social capital. Accordingly, components offered in two levels include intragroup and intergroup. In social identity, viewpoint of Henri Tajfel and its factors, religious identity, national identity, family identity, group identity, and individuality are used (Kaffashi 2014) . According to this , criteria are investigated with different weights. TOPSIS model is presented in Chen & Hwang (1992), with reference to Hwang & Yoon (1981). The basic principle is that the chosen alternative should have the shortest distance from the ideal solution and the farthest distance from the negative-ideal solution.

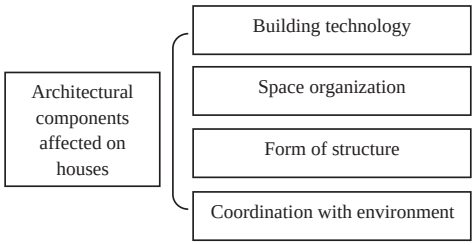

Fig . 2: Architectural components affected on houses

In addition, in architectural segmentation, every architectural component is investigated in selected region. Components of Fig. 2 are separated to indexes and indexes became items.

Based on above description of Mazandaran province, in this paper, seven criteria are considered for segmentation of twelve selected cities in this province. These criteria are: culture, life style, family structure, livelihood and occupation, tourist attraction and emigration, social capital, and social identity. For ranking the twelve selected cities and segmentation based on this ranking, TOPSIS model is used. The hierarchy of decision making of this problem is shown in Fig. 3.

In this section, seven criteria are considered for ranking of twelve selected cities in this province. These criteria are: culture, life style, family structure, livelihood and occupation, tourist attraction and emigration, social capital, social identity.

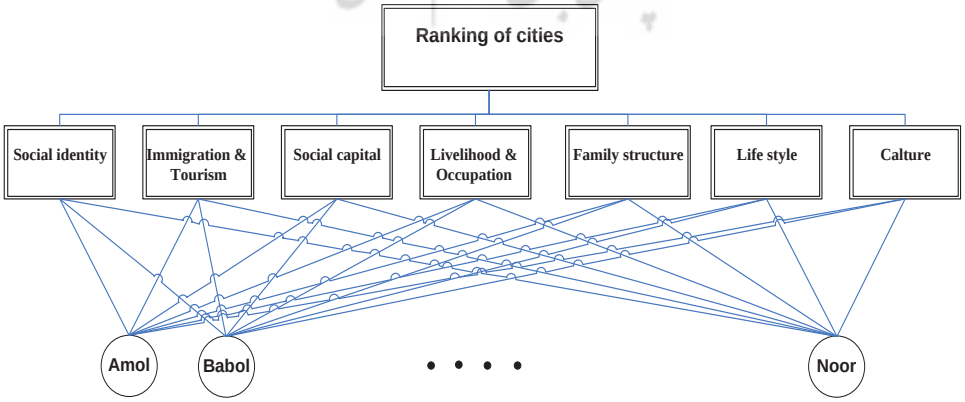

Fig 3: The hierarchy of decision-making problem

Table 1: Scoring based on seven criteria

Name of city	C1	C2	C3	C4	C5	C6	C7
Amol	20	35	4	5	3	15	47
Babol	23	36	3	5	3	17	50
Babolsar	20	34	5	4	3	17	46
Behshahr & Galogah	16	26	2	1	2	14	43
Tonekabon	16	33	4	4	5	17	42
Chalos & Noshahr	18	30	5	3	2	19	47
Ramsar	18	30	4	4	4	19	47
Sari	18	35	3	5	5	15	45
Feridonkenar & Miandorood	16	31	3	2	3	17	47
Ghaemshahr & Savadkooh	16	33	3	3	3	13	41
Neka	15	25	1	3	1	14	49
Noor & Mahmoodabad	16	35	1	2	2	17	47

Table 2: Weighted normalized matrix

Name of city	C1	C2	C3	C4	C5	C6	C7
Amol	0.05	0.04	0.05	0.06	0.04	0.04	0.04
Babol	0.06	0.05	0.04	0.06	0.04	0.04	0.04
Babolsar	0.05	0.04	0.06	0.04	0.04	0.04	0.04
Behshahr & Galogah	0.04	0.03	0.02	0.01	0.03	0.03	0.04
Tonekabon	0.04	0.04	0.05	0.04	0.06	0.04	0.04
Chalos & Noshahr	0.05	0.04	0.06	0.03	0.03	0.05	0.04
Ramsar	0.05	0.04	0.05	0.04	0.05	0.05	0.04
Sari	0.05	0.04	0.04	0.06	0.06	0.04	0.04
Feridonkenar & Miandorood	0.04	0.04	0.04	0.02	0.04	0.04	0.04
Ghaemshahr & Savadkooh	0.04	0.04	0.04	0.03	0.04	0.03	0.04
Neka	0.04	0.03	0.01	0.03	0.01	0.03	0.04
Noor & Mahmoodabad	0.04	0.04	0.01	0.02	0.03	0.04	0.04

Table 3: Positive and negative ideal solution for each criteria

	C1	C2	C3	C4	C5	C6	C7
Positive ideal solution	0.06	0.05	0.06	0.06	0.06	0.05	0.04
Negative ideal solution	0.04	0.03	0.01	0.01	0.01	0.03	0.04

For ranking the twelve selected cities of Mazandaran province and segmentation based on this ranking, TOPSIS model is used.
In the first step, scoring of twelve cities based on seven criteria by expert judgment are shown in Table 1.
In the second step, the data of expert judgment are normalized. By considering the equal weight of each criterion, the waited normalized matrix is shown in Table 2.
In the third step, positive and negative ideal solution for each criterion is calculated in Table 3.
And, the final calculation for TOPSIS model for ranking of twelve cities is shown in Table 4. Based on TOPSIS score, the twelve cities of Mazandaran are segmented into three groups.
Value-normative paradigm in Mazandaran society segmentation
By attention to ranking of TOPSIS model in Table 4, the

Table 4: The final calculation for TOPSIS model

Name of city	TOPSIS score	Grouping
Amol	0.87	B
Babol	0.89	B
Babolsar	0.74	A
Behshahr & Galogah	0.59	C
Tonelabon	0.71	A
Chalos & Noshahr	0.76	A
Ramsar	0.79	A
Sari	0.91	B
Feridonkenar & Miandrood	0.98	A
Ghaemshahr & Savadkooh	0.83	B
Neka	0.57	C
Noor & Mahmoodabad	0.69	A

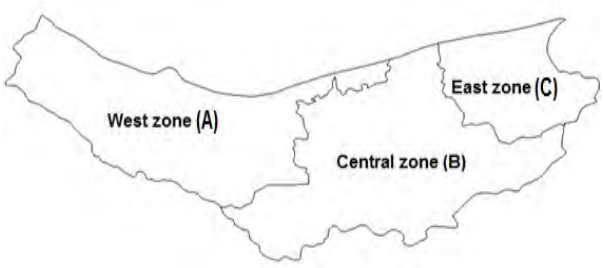

Fig. 4: Segmentation of Mazandaran society

Table 5: Building technology in Architecture of Mazandaran

Architecture type	Most materials
Coastal architecture	Wood, mortar and coating, adobe, brick, clay
Plain architecture	Wood, mortar and coating, adobe, brick, glass, metal
Foothills architecture	Wood, mortar and coating, adobe, brick, clay, stone, metal
Mountain architecture	Stone, mortar and coating

Mazandaran province is segmented into three groups. The cities that have scores more than 0.08 are segmented in same group named B. The cities that have scores between 0.06 and 0.08 are segmented in same group named A and the cities that have scores less than 0.06 are segmented in same group named C. Based on this segmentation, Mazandaran society are divided into three zone in Fig 4. The east zone named (C), the central zone named (B) and the west zone named (A). This geographical segmentation of Mazandaran province can be used in architectural study with sociology viewpoint in future. (Fig.4)

According to written references, field studies, analysis the vernacular architecture of Mazandaran, quadr- architecture is offered. Architectural components include space organization, form and coordination to environment. Regular and Simple geometry, human proportions and local materials are features of Mazandaran vernacular architecture. According to Table 5, Architecture of Mazandaran is considered as extroverted in housing typology. Exceptionally, mountain architecture in this province is introverted architecture.

First dimension of architectural components is space organization, includes plan pattern, functional relationship, separation of private and public arenas. The second is form includes shapes and geometry, proportion and architectural decoration. Third is coordination with environment includes view, harmony with background and texture, Compatible with the climate. (Table 6, 7 and 8)

Table 6. Space organization in quadre-architecture of Mazandaran

Architecture type	Space organization		
	Plan pattern	Functional relationship	Separation of private and public arenas
Coastal architecture	Simple linear plan	Nested spaces, spaces connection by porch	Private arena near to public arena by yard
Plain architecture	U-shaped plan and central courtyard	Nested spaces, spaces connection by porch and yard	Private arena separated to public arena by yard
Foothills architecture	Multi-layer linear plan	Nested spaces, spaces connection by porch and yard	Private arena separated to public arena by yard and functional connections
Mountain architecture	Compressed plan and indoor courtyard	Spaces connection by indoor courtyard	Private arena separated to public arena by functional connections

Table 7. Form organization in quadre-architecture of Mazandaran

Architecture type	Form		
	Shapes and geometry	Proportion	Architectural decoration
Coastal architecture	Plan geometry: rectangular Window geometry: rectangular and arch shape Sloping roof	According to the financial situation of the owner	Decoration in column, shelter, porch, window
Plain architecture	Plan geometry: rectangular window geometry: rectangular and arch shape sloping roof	According to the financial situation of the owner	Decoration in column, shelter, porch, window, colored glass
Foothills architecture	Plan geometry: rectangular window geometry: rectangular and arch shape sloping roof	According to the financial situation of the owner	Decoration in column, shelter, porch, window, colored glass
Mountain architecture	Plan geometry: rectangular flat roof	Functional proportion	Interior roof decoration

Table 8. Coordination with environment in quadre-architecture of Mazandaran

Architecture type	Coordination with environment		
	View	Harmony with background and texture	Compatible with the climate
Coastal architecture	Wide viewing to surrounding via opening and porch	Harmony in materials; wood and mortar	Wide Opening porch in main elevation distance between building and ground
Plain architecture	Wide viewing to surrounding via opening and porch	Harmony in materials; wood, brick and mortar	Wide Opening porch in main elevation distance between building and ground
Foothills architecture	Wide viewing to surrounding via opening and porch	Harmony in materials; wood, brick and mortar	Wide Opening porch in main elevation distance between building and ground
Mountain architecture	Normal viewing to surrounding via opening	Harmony in materials; wood, stone and mortar Influence of topography	Compressed plan and introverted

Overall, overhead architectural components and indexes direct the region to four segmentations.

RESULTS AND DISCUSSION

Value-normative paradigm is used in this segmentation. The combination of architecture and society recognition is done by statistical data, experts judgments and written references.

Thus, two layers of architecture and society overlap and twelve zones determine. Accordingly, twelve zones is named. The three social zones named based on geographical location: Western zone, central zone and eastern zone (W, C, E) quadr-architecture includes of coastal architecture, plain architecture, foothills architecture and mountain architecture in fig 4 named by numbers. Thus, each zone has special architectural and sociological properties, distinguished it from others. (Fig. 5 and Fig.6)

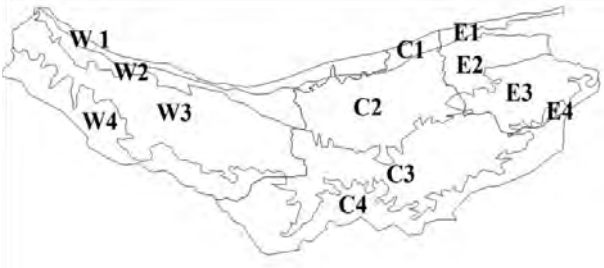

Fig . 5: Overlapping the sociological and architectural layers in Mazandaran.

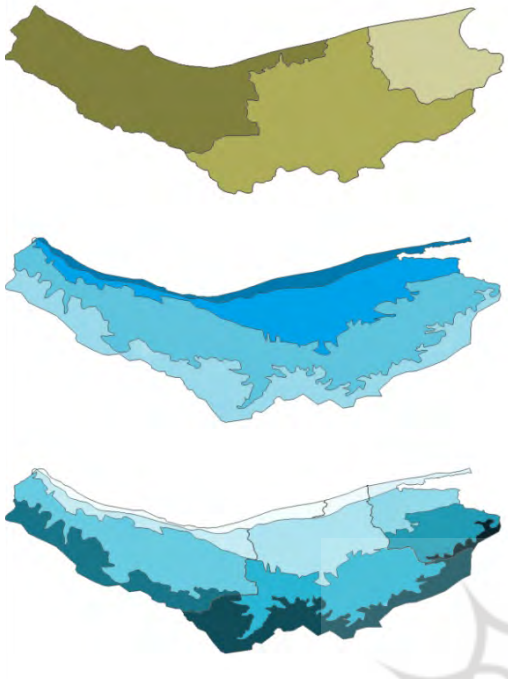

Fig. 6: Twelve named zone obtained by geographical segmentation

CONCLUSION

Social context of Mazandaran province is investigated to achieve the social components. Gained components include culture, life style, family structure, livelihood and occupation, tourist attraction and emigration, social capital, social identity. This research describes the theoretical framework by qualitative research approach and analysis method. It assesses qualitative components to quantitative components, based on the evidences and documents. Then, it provides reliable criteria. Research achievement presents the twelve social and architectural accommodation model, obtained by overlapping the social segmentation including eastern, central and western section. Quadr-architecture includes of coastal architecture, plain architecture, foothills architecture and mountain architecture.

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ENDNOTES

1. Technique for order performance by similarity to Ideal Solution.

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