

# Application of Physical and Nonphysical Elements in the Conservation of Historic Core of City

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## Abstract

*The main aim of this paper is to demonstrate the mapping outputs of the historic core of Gonabad city based on both physical and nonphysical elements. Despite the fact that the architectural elements have been the main sources of data for the conservation of the historic part of cities, seemingly, the cognitive map based on the perceptions of the inhabitants could enhance the level of the reliability of the outputs. The methods of the research were designed based on the survey and interview to collect both physical and nonphysical data. The physical was included the current historical elements such as mosque, school, and water storage, and the nonphysical was included the destroyed elements such as the wall, gates, towers that have been part of the memories of the inhabitants. ArcGIS was applied for overlaying the data. The findings of the research identified that despite the architectural elements located in a specific location, perception of the people referred to the broader areas in terms of the historic area. As a conclusion, both historical areas of the city include a different pattern of the development. The physical and nonphysical elements played a significant role to highlight the historic core of the city. However, the cognitive map based on the perception of users is not fitted exactly with the geo-reference data, and it is more flexible in terms of conceptual forms. The result of the study represented the map of the historic cores of the city for conservation activity.*

**Keywords:** *Physical and Nonphysical Elements, Historic Core, Mapping, Cognitive map, Inhabitants perception*

## 1. Introduction

Documentation of a historic area in a city has been a multidisciplinary, multidimensional, and interdisciplinary project with many complicated tasks, particularly in developing countries. In this situation, the researcher encounters inevitably with both challenges and opportunities in the documentation process of the historic areas of the city. On one hand, cultural supporters from heritage departments stand in the position to enforce the project with an up to down approach, on another hand, developers, local governments, and landowners prefer to modernize and reconstruct the urban fabric through redevelopment (Tafahomi & Nadi, 2020; Pulawska & Starowicz, 2014). In this dialectic, the new generation of buildings, urban fabric, and urban forms take the position in the city

areas to demonstrate the significant relationship between public-private, budget and value, and tradition and modernity.

Gonabad city is located in the north-eastern part of Iran. The history of the city dated to the around 90 B.C; however, intensive earthquakes damaged or destroyed historic fabrics three times in 1237, 1710, and 1968 respectively (Tabandeh-Gonabadi, 2000; Pajohesh and Memari, 1995; Pajohesh and Memari, 1999). In fact, despite some traces from the archaeological projects from different times in the area, a major part of the architectural elements belongs to 1100 A.D and after, which repaired, reconstructed, and refurbished such as the mosques, schools, and water storages (Ghirshman, 1954; Tafahomi, 2010; Tabandeh-Gonabadi, 2000).

ICHHTO (Iran Cultural Heritage, Handicrafts and Tourism Organization) Khorasan Razavi province requested the documentation of the historic core of the city based on the architectural elements as a research project due to the policies of the country. Therefore, the research took the position in the city based on the documentation of the historic elements in the city, which located in the northeast of IRAN, as shown in Figure 1.



Figure 1: The location of Gonabad city in the country

Studies revealed that the historic information about Gonabad city is limited to some reports and books (Tabandeh, 1969; Zamani, 1994; Pajohesh and Memari, 1995; Pajohesh and Memari, 1999) with a macro scale of the study based on the literature, stories, mythology, and bibliography. So, in those references just could observe some general statistical data about the population, political circumstances, and geographical aspect in the regional scale. Therefore, on the architectural scale, the resources are so limited. Despite some master thesis on the architectural design in the area, the content of those resources refer to a specific project to design (Tafahomi, 2010).

There are two development plans for the area including the development plan for the district and the master plan for the city, which the same consulting company provided the plans in 1990-1999 under supervision of the Ministry of Housing and Urban Development (Pajohesh and Memari, 1995; Pajohesh and Memari, 1999). However, both plans are less rich in the historic buildings, areas, and architectural elements due to deficiencies in the archaeology and documentation research in the area. Nonetheless, the master plan of the city highlighted the city centres as a potential for the next phase

of the historic study and analysis. The results of the master plan emphasized the city in two parts including Joyمند and Gasabe based on the different urban form than the historic specification.

According to the heritage laws and regulation of Iran Cultural Heritage, Handicrafts, and Tourism Organization classified the city in terms of the historic urban fabrics (ICHHTO, 1990). For this reason, this study took into consideration to obtain the objectives important to identify the historic area of the city, the architectural elements, and provide a list of priority for the preservation of the elements in the city.

## **2. Argument about the Physical and Nonphysical Elements in Heritage Area**

The form of the city includes both manmade and natural components. The architectural elements introduce the urban contextual background such as the religious, political, administrative, and defensive buildings. In fact, the buildings as manmade elements represented the process of urban evolution (Morris, 1994; Hedman & Jaszewski, 1984). Despite the buildings were constructed with durable materials normally included in longer times to be part of the urban landmarks (Krier, 1991), other buildings also were memorized by users. Therefore, cities include a process of the reconstruction that challenges the old buildings and architectural elements. Many of old buildings represent the historic aspect of civilisation and culture of specific location and time, which calls in terms of heritage.

In addition, both physical and nonphysical architectural elements have been effective factors to recognize a heritage and characteristic aspects of a historic city. Despite the fact that the physical elements refer to the architectural elements, the nonphysical elements imply the events, memories, and meaning of place as the image of users about the city (Montgomery, 1998; Raymond, et al., 2010). For this reason, many urban design, urban planning, and landscape design documents emphasized keeping those characteristic elements (Llewelyn-Davies, 2000; APA, 2006; PPS, 2010) as part of the identity of the place (Relph, 2007; Bently, et al., 2003).

Studies applied two approaches as the main sources for dealing with the historic site including the physical and nonphysical elements. In detail, the studies in the country highlighted some architectural elements specifically mosque, bazaar, school, palace, castle, surrounding wall of the city as main elements in a conservation project (Soltanzadeh, 1991; Raymond, 1984; Tafahomi, 2007).

On the other hand, scholars emphasized the meaning of the place based on the memories in terms of nonphysical elements such as the square, hangout, and behavioural sitting, and sense of places (Tavasoli, 1997; Altman & Chemers, 1984; Relph, 1976). In fact, the influences of the replacement of architectural elements have affected the memories of people with a new image of the city, and so, the adaptation with the new forms has been a difficult task for users. However, the recognition of the changes requires more times for the inhabitants than a short time (Llopis, et al., 2015). Studies argued that the process reconstruction of the replaced architectural elements unbalances the historic and modern parts of cities (Radoslav, et al., 2013; Arandjelovic, 2015). Studies highlighted the nonphysical perceptions in terms of the sense of place (Relph, 1976; Relph, 2007), the cognitive map

(Montgomery, 1998) and the perceptual dimension of the city (Knox, 2007). In fact, the studies on the mapping of the perception of users in the urban areas have developed through observation, interview, and questionnaire (Lynch, 1960; Laseau, 2000; Carmona, et al., 2003; Gehl & Rogers, 2013).

In other words, the physical elements as the architectural productions were renovated in any cases of natural disasters or human interventions such as mosque, schools, bazaar, and houses (Tabandeh-Gonabadi, 2000; Soltanzadeh, 1991). However, the perceptual dimension of the city transformed gradually through changing the cognitive map in the mind of the users in term of the sense of place without documentation. Importantly, this changing process of the urban landscape changed the holistic perception of the users about the city (Airas, et al., 2015).

To recognize nonphysical architectural elements, some precedents suggested applying the participatory design for more effective results (Manzini & Rizzo, 2011; Hussain, et al., 2012; Iversen & Dindler, 2014). This process has trended to collaboration between designers, users, and stakeholders (Hussain, et al., 2012), in the whole process of study, research, and design. Indeed, in this process, researchers have recommended shifting from the final product to the social production approaches (Manzini & Rizzo, 2011; Iversen & Dindler, 2014). In addition, some the researches have reformulated the participatory design into co-design and co-creativity phrases (Sanders & Stappers, 2008). However, application of this approach has been faced with difficulties in particular countries (Raymond, 1984), and sometimes participation of people resulted in chaos (Hillier, 2002). Nevertheless, the process has facilitated decision-making (Dyson, 2004) but has not been any guarantee to make the right decision.

### **3. Methods and Techniques**

The ArcGIS version 10 utilized to overlay the data, to illustrate quality and quantity of the historic elements, and to highlight the impartment aspects of the data. The ability of the software was discussed in precedents projects such as the multiple decision making by stakeholder (Malczewski, 2006) or multi-criteria evaluation system for analysis (Boteva, et al., 2004), the built environment elements as a cultural value (Llopis, et al., 2015), and ecological conservation (Veltheim, et al., 2019).

In addition, the outputs of the research highlighted that the ArcGIS software applied for the analysing, monitoring and archiving of the information in the historic areas (Campiania, et al., 2019). Also, in this group of researcher, they emphasized a multiple criteria decision making for the conservation actions as the sustainable model of development (Krois & Schulte, 2014; Phua & Minowa, 2005) to select priorities areas for the conservation (Woodhouse, et al., 2000; Geneletti, 2004). The researchers recommended the participatory survey and public participation in the data collection (Brown & Weber, 2013) in a conservation project through face-to-face engagement. However, studies highlighted an uncertain state in the mapping process in a community such as the way of participation and interaction in the survey (Martin, 2000) and variety of user perception approaches (Gallo & Goodchild, 2012). Furthermore, the integration of the ArcGIS with other

renderings, drawing, and modelling tools discussed widely for the conservation projects (Lezzerini, et al., 2016; Tezel, et al., 2019).

In fact, to collect the relevant information for the mapping process to design different layers, the research applied qualitative methods described in (Miller, et al., 2004; Groat & Wang, 2002; Marshall & Rossman, 2006; Silverman, 2010). In detail, survey technique (Groat & Wang, 2002) applied for structure of the roads, observation (Neuman, 2006) and photography (Tafahomi & Nadi, 2016; 2020) to collect the physical elements, and graphical analysis techniques (Laseau, 2000; Lang, 2005) for overlaying data. In addition, interview technique applied with the snowball technique (Marshall & Rossman, 2006; Frankfort-Nachmias, et al., 2014) to engage the inhabitants of the city, particularly the elderly people for nonphysical data.

In detail, the available aerial photos were applied to recognize the oldest boundary of the city through geo-referencing to discover the historic layer of the city. In fact, the map demonstrated that the development process in Gasabe and Joyمند were different in both internal and the general form of development of the city. In detail, the Gasabe was limited to the surrounded gardens and architectural elements such as old mosques, schools, and the districts based on a radial form to the central square. However, the Joyمند was developed among farms with a semi-orthogonal pattern with minimum limitation.

In addition, the nonphysical data was limited to the interview and storytelling of the interviewees in terms of the cognitive map of the inhabitants (Groat & Wang, 2002), which it was described in terms of the participation of the community in research. For example, in the interview process, some nonphysical data in the areas recognized as a landmark in the cognitive map of the users, which through of the sketching and mapping techniques converted on the map based on the users' information such as washing pools, gardens, and underground water entrances. Figure 2 attempts to illustrate the process.

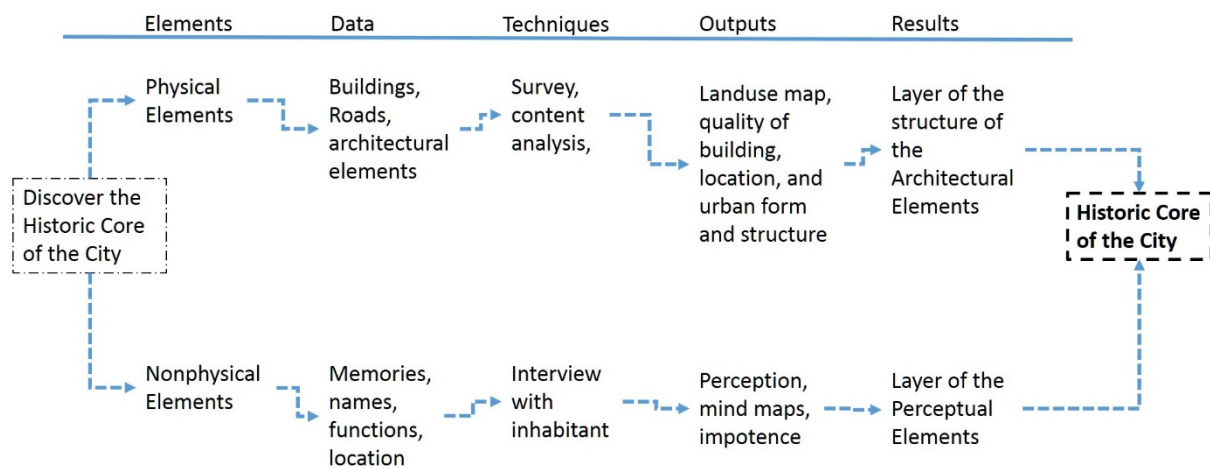


Figure 2: Research Process

#### **4. Results**

The overlaying process demonstrated some development boundaries in the city based on the central core in both Gasabe and Joymend. Gasabe was more congested than Joymend area. It meant this form of development formed a central core in Gasabe, however, in the Joymend could observe a linear form of development based on the main orthogonal streets (row 1 of table 1).

Despite the fact that the main road of the city redeveloped through of the central part of the city around 1940 to connect Gasabe and Joymend with one main street, differentiation between the road network structures remained in Gasabe and Joymend. In detail, the road network of Joymend designed based on a linear form of streets with some junctions to create orthogonal and semi-orthogonal patterns. This pattern constructed the structure of the secondary and tertiary roads to integrate in the whole network pattern. However, the historic core in Gasabe area was divided into two parts due to the main road. This contradictive function of the central road resulted in disconnection of the secondary and tertiary roads to the neighbours and just roads circulate in the inner part of the areas (row 2 of table 1).

The architectural elements revealed differentiation between the structures of the two areas. In detail, the Gasabe followed the central core and the public buildings arranged in the surrounding areas such as mosque, school, and public water storage. However, in the Joymend the public buildings took the position in the linear street. Therefore, in the Gasabe could observe a central core based on the radial form of the streets and the super-scale projects in the surrounding of the historic core. In the opposite form of the structure, the historic area of the Joymend integrated from super-scale projects in the alignment of the roads with the semi-orthogonal form. Important architectural elements were included mosques, schools, water storage, old administrative houses, and traditional houses, which included heritage, architectural, or cultural values in both areas. The traditional bazaar, palace, castle, old wall of the city, and gates have been destroyed and reconstructed by new buildings or other public functions. Just one of the old defensive tower of the old wall conserved by private family as their property (row 3 of table 1).

The layer of people' perception was drawn through interviews with the inhabitants. In detail, the mental image of inhabitant about the city resulted in to highlight a cognitive map of those locations, which interviewees referred to. The inhabitants referred to general areas based on their perception about the location and accessibility to both physical and nonphysical elements in the area. Although just the elder people were familiar to the location of the historical elements in the city, generally they referred to an area than a specific location. Those general areas not only included some architectural elements but also a mental landmark based on the destroyed elements such as palace, castle, the old wall of the city, the gates, old districts and neighbours' names and locations, old buildings, and the laundry location as a specific feminine function in the old city (rows 4 and 5 of Table 1).



Table 1: Analysis of Data

| No | Name  | Gasabe | Joyمند |
|----|---|--------|--------|
| 1  | The map of the both historic areas in Gonabad city  |        |        |
| 2  | Primary, secondary, and tertiary roads  |        |        |
| 3  | Valuable architectural elements in the areas  |        |        |
| 4  | Cognitive map of the people perception about both physical and nonphysical elements in the areas        |        |        |
| 5  | General perception of the inhabitants about the historic core and the location of the historic elements |        |        |
| 6  | Comparison between the general perception of the inhabitants and the location of the historic elements  |        |        |

The interpretation of the people perception revealed that the structure of the people' perception about the heritage and the historic areas in the city adapted with both the physical and nonphysical elements. In fact, the perception of the inhabitant adapted with the physical elements in a general form than an accurate location in both areas. However, the perception diagram referred to some destroyed elements that were included significant value in the mind of the users. Those nonphysical elements require further archaeology investigation to discover the location and the form based on the traces.

The historic core of the city encompassed from those two separated historic districts. In detail, the historic core of the Joyمند district was included majority part of the historic elements those took the position on the two intersected streets. Therefore, the form of the historic areas demonstrated a centralized pattern of architectural elements. However, the physical elements in Gasabe district tool the position on one of roads in terms of radial form with distance with the city centre including mosque, school, and water storages (row 6 in Table 1).

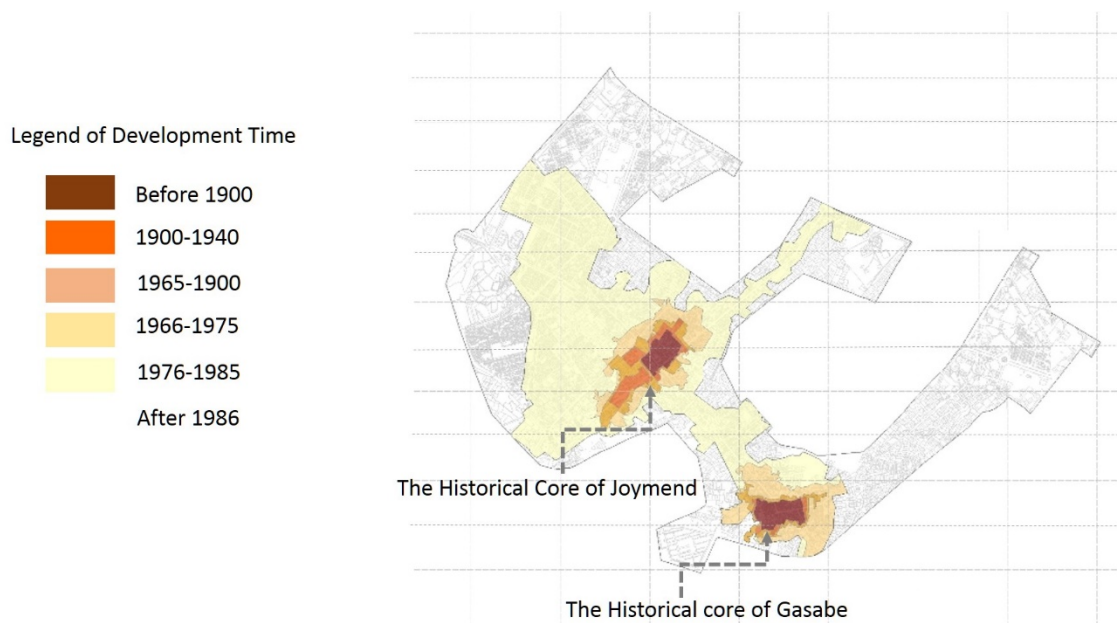


Figure 3: The Historic Core of Gonabad city

## 5. Discussion

The physical and nonphysical elements were engaged to form the cognitive map of people about the historic core of the city. In detail, not only people referred to the physical and architectural elements in the areas such as mosques, schools, and neighbours names but also they revealed some destroyed elements in other periods, which no longer exist based on the redevelopment policies. Those elements were part of the character and identity of the city, which was emphasized in the findings of other studies such as (Relph, 2007; Llewelyn-Davies, 2000; APA, 2006).

Participation of people in the research was so effective on the results similar to other researches (Manzini & Rizzo, 2011; Hussain, et al., 2012; Iversen & Dindler, 2014). In detail, people addressed to architectural elements to specify their consideration about the urban heritage. Those addresses



facilitated the research process to discover both physical and nonphysical elements in the historic core. However, the research did not achieve to the co-design or co-creativity in the research process based on the objectives in the opposite of the suggestion of Sanders and Stappers (2008). In other words, the people had different priorities and preferences that should come into a unique form of planning for the city. However, the level of participation of people was depended on the social, cultural, and political openness of society in the participatory activities. Therefore, inhabitants participated in the research those recommended as participatory and public participation in the survey (Martin, 2000; Brown & Weber, 2013) although the level of participation limited to the addressing, explanation of information, and correction of some data with consideration of finding of Gallo & Goodchild (2012).

The method of the research was sufficient to collect, overlay, and represent the data. In detail, layers of information and table attributes with the ability of the interchange of data and correction constructed an effective platform for the analysis. This ability provided a wide range of the presentation and representation of the data for clients and stakeholders in the same alignment with the previous research (Phua & Minowa, 2005; Krois & Schulte, 2014; Campiania, et al., 2019). In addition, the perceptual map of the users in the city also was a challenging activity to convert into the graphical symbols to be readable by the graphical features.

## **6. Conclusion**

The city faces rapid development with a new function. The data reveals that before 1900 the city followed an inner model of development with a congested and limited form of the development based on the agricultural activities. The speed of the development increased with the periods particularly after 1985 due to increasing the administrative service centres in the city. The redevelopment patterns have functioned to reconstruct the old buildings in the historical part of the city, which just mosques and some of the public buildings remain. Although many historic elements were destroyed, some of them still are part of the mental map of the inhabitant.

The historic core of the city is composed of two separated part including Joymend and Gasabe. This separation is not only the location but also on the structure of the development. In detail, the Joymend has developed based on the semi-orthogonal structure due to the flat areas for the development, which the architectural elements took the position in the corner of the main streets for more associability. In the opposite form, the structure of Gasabe has developed based on the central area with the surrounding rings of development, which the roads network creates a radial form of development. In this structure, the historical elements took the position on the radial roads and other rings of development.

Both physical and nonphysical elements integrate to form the historical core of the city. In fact, the historical physical elements take the place in the location with the visual expression as a physical landmark to represent the form of the city. They are specific, legible, registered, and reference point for people. The nonphysical elements are part of the cultural aspects in the historic area of the city,

which referenced to a mind map of the inhabitants in the city. Although the exact location of the nonphysical elements varies in the mind of the users, they believe in those elements as part of the location. They are imaginable, symbolic, and included a narrative story.

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