PHYSICAL ANALYSIS TECHNIQUES FOR IDENTIFICATION OF CULTURAL HERITAGE IN THE BUILT ENVIRONMENT

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ABSTRACT

The identification process is significant stage to prevent the destruction and demolition of the cultural heritage. A major question occurs at this point: "what is to be protected?". Identification process answers this question and different analysis techniques are useful tools to be used in the identification process to determine the cultural heritage to be protected. In this paper, physical analysis techniques used for identification of cultural heritage in the built environment has been discussed. The first part, gives brief information about the significance of the identification and saving the cultural heritage in the built environment. Second part discussed the physical analysis techniques used in the identification process in detail: the definition, what are they used for and the method of each analysis technique to convey the identification process is put forward.

1.INTRODUCTION

Cultural and historic heritage includes historic buildings and townsites, important archaeological sites, and works of monumental sculpture or painting. A building or a site resembles to a human being: it burns, it grows up, it lives and it dies. At this point saving the cultural and historic heritage will led them not to die but to keep its unique character.

Saving the cultural heritage involves maintaining the presence of the past in the present as well as in the future which means the old, historic buildings and sites which deserve to be preserved being the best examples of our past, culture and customs; the buildings and sites of historic interest as a part of historic data.

The saving; initiates with the identification process that includes several issues. The character of the cultural heritage sites can be identified through natural, physical and social analysis. In this study, the physical analysis techniques to identify the characteristics of the built environment through direct survey will be the main aim of the research. Direct survey clarifies what is to be saved or protected through different analysis techniques.

In this study, the physical analysis techniques to identify the cultural heritage to be protected will be mentioned. The analysis techniques include documentary research, morphological analysis, figure-ground analysis, linkage analysis, Lynch analysis, lost space analysis, SWOT analysis and inventory survey.

Research has been initiated with brief information about the significance of the identification and saving the cultural heritage in the built environment. Then, it will continue with the discussion of the physical analysis techniques used in the identification process in detail: the definition, what are they used for and the method of each analysis technique to convey the identification process will be put forward.

2.PHYSICAL ANALYSIS TECHNIQUES

Documentary Research is associated with historical research and history sits uneasily alongside social science disciplines. Documentary research method seeks dominance of positivism and empiricism so that statistics and quantification are popular forms of data collection and analysis. It is also regarded as being not clear-cut, not having a method and nothing on how a researcher uses it.

Morphological Analysis is simply an ordered way of looking at things." (Fritz Zwicky: *"Morphological Astronomy"*, The Observatory. Vol. 68, No. 845, Aug. 1948). The term morphology comes from classical Greek (*morphe*) and means the study of shape or form. It is concerned with structure and arrangement of parts of a whole. General Morphological analysis was developed by Fritz Zwicky - the Swiss-American astrophysicist and aerospace scientist based at the California Institute of Technology (CalTech) - as a method for structuring and investigating the total set of relationships contained in multi-dimensional, non-quantifiable, problem complexes (Zwicky 1966, 1969).

Figure-Ground Analysis is related with relative land coverage of buildings as solid mass (figure) to the open voids (ground). Each urban environment has figure-ground relationship. The figure-ground approach to a special design is an attempt to manipulate the relationship by adding to, subtracting from, or changing the physical geometry of the pattern. (Trancik, 1986).

Linkage Analysis is derived from lines connecting one element to another. Streets, pedestrian ways, linear open spaces, or other linking elements that physically connect the parts of a city form these lines. The linkage analysis involves the organization of lines that connect the part of a city (Trancik, 1986). Moreover, linkage analysis tries to organize a system of connections, or a network, that establishes a structure for ordering spaces.

Lynch Analysis considers the analysis of 5 key elements of city which are paths, edges, nodes, districts and landmarks. This helps to provoke the imageability of the surrounding and to make its visual identification easier (Amin, 2004). Lynch provides these set of elements which are fundamental to structure the urban environment and thus was expected to be manifested in people's mental as environmental image (Lynch, 1960). Lynch defines a method of analyzing legibility based on 5 elements: paths which are channels along which the observer customarily, occasionally or potentially moves. They may be streets, walkways, transit lines, canals, railroads…etc. These are the major and minor routes of circulation that people used to move out. The identification of paths give morphological features of cultural heritage sites such as characteristics of the fabric, distribution of paths, continuity and length of paths and orientation and angles of paths.

Edges are the linear elements not used or considered as paths by the observer. They are boundaries between 2 faces, linear breaks in continuity: shores, railroad cuts, edges of development, walls, rivers and canals.

Districts are medium-to-large sections of the city, conceived of as having 2 dimensional extents, which the observer mentally enters "inside of", and which are recognizable as having some common identifiable character.
Landmarks are another type of point reference but in this case observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store or mountain.
Nodes are points, the strategic spots in a city into which an observer can enter and which are intensive foci to and from which he is traveling. They may be traveling junction, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character, as a street corner hangout or an enclosed square.
Trancik defines lost spaces as undesirable, ill-defined urban areas that make negative contributions to surroundings or users. Lost spaces failed to connect elements in a coherent way. Lost spaces can be surface parking lots, areas along the freeways, leftover spaces at the base of high-rise apartment blocks and many other underutilized areas. *Lost Space Analysis* is the determination of the mentioned spaces.
SWOT generates lists, or inventories, of strengths, weaknesses, opportunities, and threats. It is used to generate strategies that fit a particular anticipated situation (Doratli et al.,2004; Bourgeois, 1996; David,1997; Pears and Robinson,1997). The SWOT Analysis approach (Mintzberg, 1994) seeks to address the question of strategy formation from a to-fold perspective: from an external appraisal (of threats and opportunities in an environment) and from an internal appraisal (of strength and weakness in an organization). This model originally steams from the business management literature, where such an analysis has a clearly identifiable, strategic goal, as it is intended to shed light on outside opportunities and threats that can affect the feature of a business.
An *Inventory* or *Survey* is designed to inform people, community leaders and other citizens of a community of the history and current status of the place. One of the major purposes of evaluating the current physical conditions of a place is to identify and document the challenges and opportunities impacting it.

3. SIGNIFICANCE OF PHYSICAL ANALYSIS TECHNIQUES IN THE IDENTIFICATION PROCESS OF CULTURAL HERITAGE IN THE BUILT ENVIRONMENT

Physical Analysis conveyed in order to determine the existing characteristics of the built environment. In the identification process in the built environment, physical analysis techniques are significant tools to determine the physical qualities of the cultural heritage and the first step to preserve the cultural heritage.
Documentary research is significant for obtaining the background information related to a cultural heritage whether it is a building or a site.
" …within the final and true world image everything is related to everything, and nothing can be discarded a priori as being unimportant." (Fritz Zwicky: *Discovery, Invention, Research through the Morphological Approach*, 1969.). In this course, morphological analysis is needed to identify 2D and 3D transformations of urban form of cultural heritage-buildings and sites. These can be the characteristics of the fabric (organic/regular).
Figure Ground Analysis is a powerful tool for identifying the texture and patterns of the urban fabric as well as problems. Figure Ground studies reveal to collective urban form as a combination of patterns of solids and voids in the cultural heritage sites (Trancik, 1986). For example, the urban form can be determined as angular, grid, curvilinear, radial, axial or organic.
Linkage analysis places emphasis on the circulation diagram (Trancik, 1986). As a result of this, street pattern, urban spaces in terms of their quality, enclosure, character and activities can be determined (Doratlı et al., 2004).
Lynch analysis used to determine legibility of the cultural heritage in the built environment. Legibility is one of the key qualities of urban design, which affects how people interpret a place or how they read the physical form and whether they take advantage or are unaware of the choices that exists within a city (Bentley et al., 1985).
Lost space analysis is conducted to determine the three-dimensional relationships between buildings and spaces.
SWOT Analysis is carried to investigate the potential of cultural heritage in terms of strengths, weaknesses, opportunities and threats.
An inventory survey establishes an understanding of the present condition of cultural heritage sites and provides a basis for future objective policy formulation and decision-making. The variety of items to be catalogued is enormous since every feature contributing to the specific character of a monument or the specific image of a historic site has to be detailed. Thus, inventory should be conveyed in different forms for individual buildings, for individual street (s) pattern and for historic sites.
After identifying the significance of analysis techniques for the identification process, the following section will introduce the methods and tools of how these analysis techniques will be conducted in the cultural heritage sites.

4.CONDUCTING PHYSICAL ANALYSIS TECHNIQUES IN THE IDENTIFICATION PROCESS OF CULTURAL HERITAGE IN THE BUILT ENVIRONMENT

Documentary research conducted through the analysis of sources like historical documents such as, laws, declarations, statutes and people's accounts of event and periods. Also reports based on official statistics, as well as governmental records, mass media, novels, drawings, maps and personal documents such as diaries and biographies.
Morphological Analysis conducted through the analysis of maps of different periods in order to find out the transformation of urban pattern throughout the history and 3D drawings and photographs.
Figure-Ground Analysis is carried out with maps and the solid-void relationships are obtained through darkening the building blocks (solids) with black color and leaving the rest (voids) as white.
Linkage Analysis carried out with the similar method of Figure-Ground Analysis. In this analysis technique the paths are darkening with black colour and buildings left as white to obtain the circulation diagram.
Maps and photographs are used to conduct Lynch Analysis. Paths, nodes, landmarks, districts and edges determined though a site visit and through an observation obtained data marked on the maps. In addition, photographs and sketches of the 5 key elements are useful tools for the Lynch Analysis.
Lost Space Analysis starts with the site visit. On the site, the above mentioned lost space types are determined and marked on the maps and pictures are taken, sketches are drawn to support the investigated lost spaces.

There are several techniques used for SWOT Analysis. SWOT Analysis of cultural heritage in the built environment can be obtained based on the collected data as a result of the other mentioned analysis techniques. Analyzing the existing physical characteristics of the cultural heritage site by studying everything from its morphological evolution and environment gives its strengths, weaknesses, opportunities and threats.
Inventory Survey includes the information gathering related to individual buildings, individual streets (pattern) and historic sites. In order to conduct an inventory survey, a special form is designated for each building, street or site. On this form, for individual buildings, information about walls, material/technology, structural condition, inner-spaces, facades-openings, decoration-ornamentation, furniture, outside the immediate surroundings that is gardens, parks, squares and type and level of intervention must be considered. For individual street (pattern), walls, material-technology, structural condition, elevations, facades-openings, details that constitute street pattern, decoration/ornamentation on buildings and silhouettes must be considered. And for historic sites, the chief monumental buildings, private buildings of monumental character and the more modest building forming the connecting fabric, the features of streets, squares/like ancient paving, silhouettes, street elevations-with their own characteristics and works such as bridges, queys, connected natural features on site such as rivers, channels, lakes, ports, trees etc., urban outdoor furnishing, fountains, street lamps, signs, other street furniture etc. must be considered. Additionally, the inventory forms should be supported by visual documents such as photographs, measures and/or sketch drawings (Doratli&Onal, 2000).

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	TYPE	WHAT	WHY	HOW
PHYSICAL ANALYSIS TECNIQUES	*Documentary Research*	is associated with historical research and a type of data collection from sources.	To get background information	Analysis of sources like historical documents such as, laws, declarations, statutes and people's accounts of event and periods, reports based on official statistics, governmental records, mass media, novels, drawings, maps and personal documents-diaries and biographies.
	Morphological Analysis	is simply an ordered way of looking at things. The study of **shape** or **form**. It is concerned with structure and arrangement of parts of a whole.	To find out 2D-3D transformation of urban forms	Analysis of maps of different periods, 3D drawings and photographs.
	Figure-Ground Analysis	is related with relative land coverage of buildings as solid mass (figure) to the open voids (ground).	For identifying the texture and patterns of the urban fabric as well as problems	With maps and the solid-void relationships is obtained through darkening the building blocks (solids) with black color and leaving the rest (voids) as white.
	Linkage Analysis	involves the organization of lines that connect the part of a city	Places emphasis on the circulation diagram	The paths are darkening with black colour and buildings left as white to obtain the circulation diagram.
	Lynch Analysis	the analysis of 5 key elements of city which are paths, edges, nodes, districts and landmarks.	to determine legibility	Maps and photographs. Paths, nodes, landmarks, districts and edges determined though a site visit and through an observation obtained data marked on the maps. Photographs and sketches of the 5 key elements are useful tools for the Lynch Analysis.
	Lost Space Analysis	Determination of lost spaces-undesirable, ill-defined urban areas that make negative contributions to surroundings or users.	to determine the three-dimensional relationships between buildings and spaces	lost space types are determined and marked on the maps and pictures are taken, sketches are drawn
	SWOT Analysis	SWOT generates lists, or inventories, of strengths, weaknesses, opportunities, and threats.	to investigate the potential of cultural heritage in terms of strengths, weaknesses, opportunities and threats.	obtained based on the collected data as a result of the other mentioned analysis techniques. Analyzing the existing physical characteristics of the cultural heritage site by studying everything from its morphological evolution and environment gives its strengths, weaknesses, opportunities and threats.
	Inventory Survey	is designed to inform people, community leaders and other citizens of a community of the history and current status of the place.	establishes an understanding of the present condition of cultural heritage sites and provides a basis for future objective policy formulation and decision-making.	the information gathering by specially designated inventory forms.

Table 1: Summary of the Physical Analysis Techniques for Identification Process of Cultural Heritage in the Built Environment