Definition of New Model of Urban Design Qualities for Underground Urban Spaces

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Abstract

Today, cities need public spaces for social interactions. Shortage of land on the ground level in metropolitan areas is a big challenge for creating public spaces. Using underground spaces for creating public space in urban areas could be an efficient answer to solve mentioned problem. Using underground area as an urban space is a wise decision for creation of more public spaces in big cities. Creating well organized underground urban spaces for various activities instead of normal unplanned underground spaces need theoretical foundation. It seems existing underground spaces in cities such as Toronto, Montreal, Osaka, Paris and Stockholm and future underground spaces need unique urban design qualities to act as rich public spaces. This research is a kind of scientific study on urban design qualities of underground urban spaces. The main aim and objective of this research is to derive appropriate urban design qualities for high quality of underground urban spaces. Basically, quality of urban spaces was defined through observing and describing existing underground urban spaces and their documents such as reports, maps and photographs; beside analysing various available urban design theories.

Importance of accessibility, legibility and their impressive impact on an urban space are significant points that learned from urban design researcher who focus on the mentioned qualities. Special academic information in scientific papers available in national scientific databases of Iran like http://sid.ir and “http://www.magiran.com” shows urban design researchers highlight some of the qualities such as social interaction, security, visual quality and identity. Some of the leading researcher in the field of urban design has focused on accessibility and other qualities like scale of space shape and form, identity in England and America. Underground urban space should answer various urban complexities affecting urban design quality, which differentiate the determination of quality of this kind of space from those on the ground level. Underground urban space requires unique qualities to perform in a different level from other areas of the city such as those on the ground level.

In this regard, according to the characteristics of underground urban spaces, it is necessary to provide a set of urban design quality for these types of urban spaces. Underground urban spaces should be studied with respect to technical (mechanical & electrical), architectural and urban design aspects to provide truly useful results. Therefore in relation with urban design quality, it is important to consider the technical aspects. The technical aspect of locating infrastructure at same level of underground urban space is one of the significant aspects which affect the quality of these spaces.

According to Sariyildiz & Durmisevic [29] and Pourjafar[18], Key aspects that could have influence on underground space design include: accessibility and enclosure; sense of orientation; spatial proportions; communication with the outside world; natural and artificial lighting; materials and colors; noise level; and air quality. Research carried out by the Dutch Railway in 1996 included both above and underground train stations (as underground urban space) and showed that the most negatively experienced places in the stations are the platforms and places where tunnel were located. The reasons for the negative experience are mainly: unwanted behavior of other people, abandonment, darkness and poor visibility. Architecture integrates both function and form. Through form and function the psychological aspects are interwoven by having an influence on the experience of space in a given context. Only when both are together, they give to each other a meaning and a quality. Considering the psychological aspects which can be strongly influenced by the form and functional aspects is very important. In this way the relationship between spatial characteristics, being form and function, and psychological aspects becomes more transparent [29]. The clear meaning of the concept of quality in the field of urban design will help to understand relationship between underground urban space and its set up of quality. Important qualities in three groups such as function, form and psychological aspects could be explained as follow:

Function: communicational patterns, accessibility, space integration, Acoustic, soundscape, lightning, air quality and temperature [29].
Psychological aspects: Impact of wide and visible view of space for consumers to feel secure and crime prevention (C.P.T.E.D), Escape possibility in crisis, natural lighting, social control, sense of orientation, comfort, maintenance, attraction, various services and infrastructures [18].

Shape & Form: tonality and materials harmony in paving, ceiling and wall, structure and partition walls, dimension, natural and artificial furniture, location and design of stairs and escalators.

Overall, it can be found that the most important qualities that response to people’s needs in an underground urban space are security, comfort, legibility and orientation.

The result of this research indicates that: based on discussion on underground space features and people’s essential needs in city scale, underground space qualities derived from international and national urban design researcher’s views and reports of urban design projects in USA & England and various case studies in Tehran. Successful underground space project experiences such as Toronto, Montreal, Osaka, Paris and Stockholm; show appropriate qualities for this kind of space like: Social interaction & liveliness, safety, stability, identity, legibility(sense of orientation), diversity, accordance, homology, sense of belonging, comfort, accessibility, flexibility, moderation and space scale. Therefore underground urban space qualities have to be classified with respect to main underground urban space features and their location under the surface of the ground.

In this paper a new model is proposed to create effective various responsive underground urban spaces. This new practical model can be called model of overall quality of underground urban space. Overall qualities of underground urban space were classified into three groups, called: «Outer space» qualities, «In-between space» qualities and «Inner space» qualities (Fig. 1). (Source: Authors)

A) “Outer space” qualities such as safety, stability, homology, legibility(sense of orientation) and space scale are dealing with peripheral spaces and spaces on the surface of the ground

B) “In-between space” qualities such as accessibility, escape and moderation are related to communication spaces between underground urban space and other spaces on the surface of the ground.

C) “Inner space” qualities such as legibility (with landmarks), liveliness, identity, safety, stability, accordance, sense of belonging, flexibility and comfort are dealing with defined limited area of underground urban space.

Finally it is concluded that underground urban spaces must be designed with respect to climatic constraint (Design of Toronto and Montreal in Canada), lack of space in city (such as Osaka in Japan and Stockholm in Swedish), underground subway network development (such as Osaka in Japan), avoiding altering the historical urban fabric (like what has happen in Paris in France). Obviously a kind of urban space with classified qualities can create appropriate environment in an urban setup. Underground urban space qualities can cover a wider scope than a limited urban area; then they must be presented by overall urban design quality model. This study indicates that new underground urban space quality classification as an overall model could be a suitable proposed model for dealing with all characteristics of this kind of urban space.

**Keywords:** Underground Responsible Urban Space, Urban Design Quality, Qualities Classification.