

# Measuring urban identity. Comparative analysis of previous studies

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**Abstract.** Urban identity is a composite idea that dates back to the 1960s and combines the concept of identity with urban features. It consists of both objective elements, such as a city's characteristics, as well as subjective elements, such as perception, feeling and connection to a place. Urban identity has been mainly studied in relation to sense of place and place attachment, but it has also been studied, to a smaller extent, in relation to urban planning, public space and tourism. This study summarizes previously conducted research on urban identity, with a focus on studies that address the objective aspect of urban identity and especially those whose point of interest is on urban planning and public space. With a particular emphasis on quantitative research, the objective is to present the fields in which urban identity has been studied and the parameters that form it. The research reveals that urban identity requires further investigation in terms of urban planning and each of its components. This means that building codes, densities and land uses have a significant effect on urban identity and may even define it to some degree.

## 1 Introduction to urban identity

In a broader sense, urban identity is a spatial specialization of identity. The concept of identity, in particular, has its origins in ancient times and, according to Aristotle, is linked to the timeless reflection of the soul-body relationship from its philosophical side [1]. In psychological science, identity is presented as a relationship between the self and otherness, and it is studied on the basis of how people's perception, feeling and behaviors are affected by the existence of other people [2]. Psychologists pay particular emphasis on personal identity and characteristics of the self. Particularly, personal identity in psychology refers to the state or fact that a person remains the same throughout the course of their existence, i.e. the continuity of their personality [3]. Similar to how it occurs in psychology, identity in sociology is expressed as a relationship. However, the focus of sociology's inquiry is on how social interactions and daily experiences affect the way people perceive themselves through their subjective feelings [4]. The interaction between an individual and their society is influenced by social categories, which supports identity. When identity is linked to the urban environment, this issue becomes highly significant [5].

Based on prior research, this study attempts to identify the sectors in which urban identity has been investigated as well as the parameters that form it. A particular focus is placed on the search for studies (mainly quantitative) relating to urban planning and public space.

Urban identity could be viewed as “place identity”, “place character”, “place image”, “sense of place” and “spirituality of place”, with “place” referring explicitly to the concept of “locality”. Additionally, the components of

the environment and the actions or events that occur there have a large role in defining identity in urban settings [6]. Historic districts are one example of this; they are crucial in preserving a place's identity, memory, and sense of belonging, and they also tend to enhance the urban identity of the entire city. The investigation of urban identity is closely related to the interventions that are made in the urban fabric, whether they are one-off interventions in urban planning at points of interest (such as the renovation of urban public spaces) or the implementation of integrated urban planning tools and policies.

Urban identity is a socially constructed link between a human and his environment, between space and its elements, and between elements. In other words, we discuss a collection of mutually reinforcing links between the context and the content, which are spatially bounded at several levels. Different spatial levels of the built environment produce diverse manifestations of urban identity, which can be recognized in various ways [7].

Urban identity can be distinguished between the identity concerning the place itself (objective perspective) and the identity which is referred to, through the experiences of individuals (subjective perspective) [8].

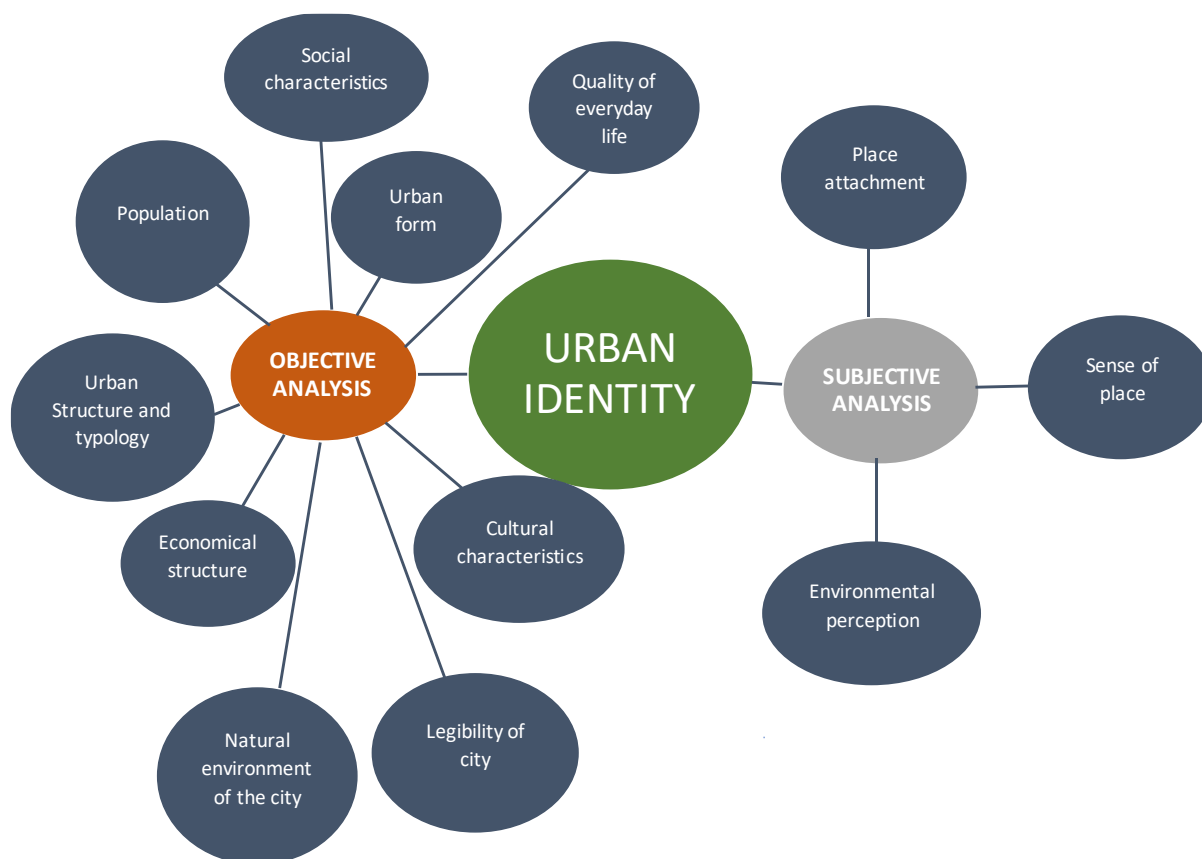
The subjective perception of place identity is distinguished by its experienced dimension, i.e. by people's experiences as they have lived in a particular location and their attachment to place. On the other hand, the objective elements of the city are geographical, natural and human-made. Thus, the mix of objective elements of the city and subjective perceptions of individuals eventually shapes urban identity [8,9].

In addition, urban identity is a concept which relates to the physical, cultural, socioeconomic, and historical

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features of the city. As a result, the foundation of urban identification is the functions and behaviors associated with the city [10]. Urban features, historical and cultural values, architecture, social structure, geography, culture, local traditions, way of life, topography, vegetation,

climate, geopolitical location, transport connections, and economic structure are just a few of the many factors that can affect an urban identity [11,12,13]. According to the preceding analysis, factors that form urban identity are shown in Fig. 1.



**Fig. 1.** Estimated criteria of urban identity (authors' elaboration).

## 2 Methodology

### 2.1 Search and eligibility criteria

The literature for comparative analysis was retrieved and reviewed between November 2020 and November 2021. The two main databases used for the research were SCOPUS and GOOGLE SCHOLAR, while key words were "Urban identity", "Identity in the urban fabric", "Urban spaces and identity", "measuring urban identity", "place identity" and "urban environment". Therefore, the search was limited to records written in English.

Regarding the inclusion/exclusion criteria of selected literature, only literature related to urban identity or place identity in association with urban environment or city or urban spaces was considered to be eligible for this study. Other forms of identity, such as place attachment, sense of place, image of a place from a psychological or philosophical perspective were not considered to be eligible and were excluded. Furthermore, the studies that were included were based on quantitative research (case studies), while literature that was based on qualitative analysis was excluded.

As presented in figure 2, 156 records were retrieved from the online databases, while 56 were identified from other sources (manually). In total, 212 records were screened, whereas 93 of them were excluded due to duplication. 65 full-text articles were excluded since they did not fit the inclusion criteria for identity and urban environment. Overall, 54 full-text articles were assessed for eligibility. 26 of them were quantitative, and 28 of them contained qualitative analysis.

### 2.2 Classification criteria of selected studies

The 26 published articles that were selected give case studies on urban identity by combining quantitative surveys with innovative methods / tools of analysis. To enable comparative analysis, these surveys were categorized in accordance with their study objectives, considering the following factors: i) the quality of public space and its relationship to urban identity; ii) design elements in the urban environment which reflect urban identity; iii) the socio-environmental dimensions of urban environment and urban identity; iv) the investigation of the impact of change on urban identity caused by decisions and policies that have changed urban spaces

over time; v) the identification of the positive and negative characteristics of an urban area's identity.

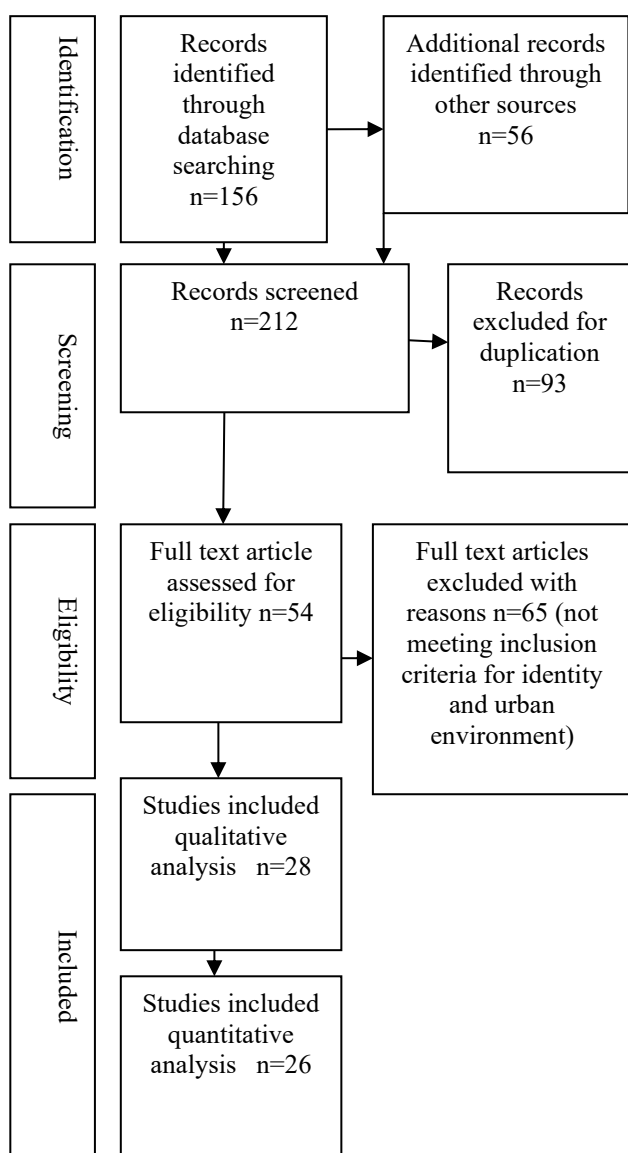


Fig. 2. PRISMA flow diagram of included studies after [14].

### 3 Results and discussion

Seven survey categories were created using the aforementioned methodology (see Table 1). They each examine a different identity research object. The scope of this research is to combine and compare urban planning and public spaces with urban identity's criteria as presented in the theoretical framework. Thus, Categories 1 and 3 are the focus of the analysis that follows.

The methods used in the selected studies are based on tools such as Space syntax, Fractal analysis, Mass GIS, GIS and HRV analysis. In addition, the use of questionnaires, spatial metrics, cartography and urban measurements were also identified.

Table 1. Categorization of selected studies on urban identity (authors' elaboration).

Investigation Object / Scope of research	Surveys
1 Public space and urban identity	[15]; [16]; [17]; [6]; [18]; [13]
2 Define image and identity in urban environment	[19]; [20]; [21]
3 Urban planning and urban identity	[22]; [23]; [24]
4 Tourism and identity (conflicts)	[25]
5 Urban identity's characteristics	[26]; [27]; [28]; [29]; [30]; [31]
6 Notion's clarification: place attachment, place identity, sense of place, perception in the urban environment	[32]; [33]; [34]; [35]; [36]
7 Place and identity processes	[37]; [38]

In terms of Category 1 studies, there seems to be a two-way relationship between urban identity and a city's public spaces that is also interdependent. Chang et al's research [18] is about place identity and public space, focused on the quality of urban space. The quality of urban space and the quality of urban life are inextricably linked. Furthermore, the examination of public spaces' elements is critical for determining spatial identity. The above mentioned research attempted a rebuild on Kevin Lynch's work and Space Syntax theory and connected it with POI (Points of Interest) in order to quantify the quality of public space. This research proposes a methodology of using Principal Component Analysis (PCA) and K-means clustering approach to investigate the important features of urban identity of public space. A case study in Zürich city is used to test these redefinitions and features of urban identity. Methodology tools that were used in the research are OSM (Open Street Map), Geometry Information and Space Syntax Analysis Data – CityGraph.

The research results were very interesting, showing that the PCA and K-means clustering algorithms may identify urban identity and explore essential features that might assist urban planners in identifying the qualities of urban identity for public space. It can also improve planning and design processes, as well as the development of new urban patterns with more relevant features and qualities.

Laskari et al's [15] research sought to determine whether and to what extent quantifiable spatial attributes, as expressed in plan representations, can capture elements related to the experience of spatial identity, and whether spatial identity is perceived through cohesion and differentiation within and between urban neighborhoods.

The study focuses on and investigates the cities of Athens and London in particular. The city of Athens, Greece, was chosen as the main study case, and four central neighborhoods (Museum, Kolonaki, Plaka, and Metaksourgeio) were examined. In order to test the scope of the research, the dataset was supplemented with a

neighborhood in London (Bloomsbury-Fitzrovia). Its methodology was based on a set of methods used in various fields of spatial studies and implemented to determine which are best suited to classify neighborhoods.

Each method generates measurements that capture different attributes of spatial configurations. Depending on the focus of each process, the quantities measured for the analysis of the blocks could be classified as scalar, geometrical and topological.

The urban planning measurements concern land area coefficients and number of buildings and spaces per building block. In addition, fractal dimension was used as an index of complexity and self-similarity from the contours of open and built spaces. A method for calculating fractal dimension of plans also measures box-counting dimension. Because this method allowed for the measurement of composite objects rather than single fractal curves, the fractal dimension of each plan as a whole could be calculated.

The other measuring method used was syntactical-topological meters that concern spatial connectivity, such as spectral analysis of axial graphs and convexity measurements of shape perimeters, which focus on syntactic properties of the plans, and more specifically:

- The convexity measure by distributing the connectivity along the perimeter of the building blocks.
- The measurement of quantifiable spatial characteristics which can lead to the detection of the extent of variation between neighborhoods in terms of local specificities.

The urban block is viewed as a configuration of built and open spaces whose geometrical shape and topological interrelations determine to a great extent the visual perception of urban environments, influencing spatial experience and defining local particularities related to spatial identity.

In conclusion, resulting values at different levels of observation led to the gradual formation of a system of forces reflecting spatial and transpatial relations according to degrees of identification and differentiation across neighborhoods. Therefore, although spatial identity cannot be explicitly described through quantifiable spatial attributes as represented in plans, its continuity, indivisibility and heterogeneity can be abstractly perceived through the field of forces constantly rearranging the elements from which it emerges. Spatial identity could thus be maintained through space and time by the reproduction of established configurations and architectural styles.

The research of Cheshmehzangi and Heat [6] focuses on socio-environmental dimensions and urban identity of urban environments by evaluating human behaviors and space-to-human relations. It also investigates the installation of temporary activities in the public realm and the impact that this might have on perception, identity and activity within public spaces.

A case study of temporary markets, taking place in Nottingham's Old Market Square in the UK is undertaken by analyzing selected case-studies with qualitative

research methods. The main data collection is conducted using the "unobtrusive observational method", which tracks human behaviors in space through "disguised field analysis".

Particularly, the research is planned to feature a wide-spread typology of the chosen case studies. These features would include the temporary physical interventions, socio-environmental values, behavioral evaluations, social and environmental characteristics of the place, spatial interrelations and related identities.

The idea of identity construction can therefore be achieved through understanding the socio-environmental values of any society, as well as the relationship between humans and environment. The identity could then create a sense of place or a sense of belonging, not just through certain physical qualities, but through engineered subjective mechanisms. The research findings of this study support the view that what occurs in an urban place, both being behavioral and physical, could have an impact on the spatial inter-relationships within that space. This could also be inferred to the concept of transforming a space to an identifiable place, where a network of experiences, memories and perceptions are constructed.

The research of Sıramkaya [13], investigates the impact of change on urban identity due to the decisions and policies that have changed urban squares over time, and the political and cultural identity that the city presents. The case study is the Turkish city of Ikonio. Its methodology was based on previous studies. Additionally, visual data were obtained from satellite images and records of the Municipality of Ikonio, while spatial measurements have been made regarding the changes observed in the visual data, and their results were evaluated through interviews.

The general conclusion that emerged from this research is that the effects of change on urban identity have both positive and negative consequences. Particularly:

According to the spatial reading and citizen interviews, it is reasonable to say that Zafer Square has become a popular living space at all hours of the day, with features such as:

- The access is easy and every transportation network roaming the city intersect at this area
- There are numerous commercial activities
- The space fulfills the relaxation needs of citizens with its green area arrangements and positive urban furniture
- The square meets the recreational requests of people with its spatial usages like cafe, restaurant and musical entertainment

According to the obtained data, it is clear that the transformation in Zafer Square positively affected the urban identity of Konya.

According to the spatial readings and citizens' opinions, Mevlana Türbe Ö nü Square contains the following features:

- The green area and urban furniture that provided the citizens to breathe, find peace and rest is completely vanished
- The square is covered with stone and became an area used just for pedestrian circulation

- Stone, as a ground covering material, is dangerous to walkers due to its slick surface and ability to absorb and reflect heat. These material characteristics have a negative impact on the square's use in both summer and winter. As a result, the critical change in the square usage had a negative impact on urban identity.

Stiperski, et al [17] study urban identity through city toponyms. The central idea and research hypothesis is that names of the streets, squares, and parks, provide information for interpreting a community, about its past, which are defined in relation to persons, institutions and events. The survey included the following cities: Graz, Kraków, Maribor, Mostar, Olomouc, Prague, Zadar, Zagreb and has taken place into their historical cores, while the names of 602 streets, squares, parks, and avenues were examined. Furthermore, the analysis was based on three distinct years that were all quite significant at the time. These are the years 2009, 1985, and 1935. At the same time, the city's toponyms were divided into various categories and groupings. Such categories are people, geography, historical facts, institutions, commerce. The research revealed that toponyms in Prague and Olomouc represent the stability of the city's traditional historical character. Zagreb's identity was formed in large part by toponyms, which, like in Mostar, have been preserved since the communist era and serve as elements of the city's character.

Another research about public spaces and urban identity was conducted by Omer and Jiang [16]. The purpose of this survey was to propose an application of a multi-perspective approach based on graph theory and Q-analysis, exploring the relationship between an urban road network and the image of the city. Because graph theory (particularly, centrality measures) and Q-analysis are both complementary, combining the two can provide a powerful approach to structural analysis in the city of Tel Aviv.

The survey used geographic database of the road as data sources, as well as subjective data gathered by Tel Aviv residents through the creation of sketch maps. The empirical research showed how the multiple approach, provides new insight into urban road topology and city image. The multidimensional connectivity chain embedded in Q analysis and supplemented with graph theory centrality measures, has the potential to improve the understanding of the structural linkages between a city's road network and its image.

In the context of Category 3 surveys, emphasis is placed on urban planning and its relationship with urban identity. Shawket's research [23] investigates the existence of "identity" in urban areas from various residential complexes. The examination, according to the research questions, is also about whether the design components utilized by designers reflect identity. If all of the above is correct, what are the key design elements (to be used as criteria) and their priorities? To investigate these factors, the areas of New Cairo and "6th of October city, Giza" were studied using surveys and interviews with various stakeholders (residents and engineers).

The questionnaire that was shared is divided into two parts. The first part assesses the potential existence of identity, while the second assesses the image/meaning,

activity and physical setting. Both are entered in ascending order, with numbers assigned by each.

To design the questionnaire, numerous procedures and forms were employed. Initially, the residential complexes were investigated with the goal of categorizing them as follows:

- Settlement age scale
- Type of ownerships
- Character design

As a conclusion, the average percentage of identity existence in the Egyptian residential compounds is 66%. Also, identity does not exist in the housing estates in a way that reflects its true value. At the same time, "physical elements" are more visible to stakeholders with the "landmarks" being of primary importance. As a result, such physical settings, images and activities are seen as targets for shaping the sense of place and creating "urban identity".

The purpose of Beyhan and Gürkan 's research [22] is to reveal the weak identity in Turkey as a result of urban transformations. In particular, this survey is taking place in Isparta (Turkey). The methodology is based, first of all, on the division of the area into three time periods (before '60, between '60 and '80, and the period after '80), secondly, on five analyzing categories by chronological period (morphological analysis, visual analysis, functional analysis, spatial analysis, relevance analysis), and at last, on the use of maps supporting the literature. The case study consists of the government building, the old Municipality building, the Municipal Park, the Firdevs Bey Bedesten, Ranging shops and Shoe-Kebab Shops Arasta (Ottoman Bazaar).

The following conclusions were drawn from the research data analysis: While Isparta once had an identity, it is now losing its authentic identity as a result of urban transformations that have undermined the city's social, economic, cultural, and architectural values. This impact is most noticeable in the city center, which has been globalized and no longer has a distinctive identity.

Lastly, the study of Nia and Suleiman [24] explores the physical and social factors that cause the loss of identity in the city of Famagusta (Northern Cyprus), as well as the reasons why urban expansion cannot maintain the city's identity. The identity of the city's historical and recently created parts is studied in the research methodology. Both quantitative and qualitative methods have been utilized in this research.

Techniques that were used are personal observation, sketches and comparison of the newly developed part of the city with the traditional part. The elements of the city that have being studied, are:

- The physical structure of the city
- The roads in the urban environment
- The squares
- The sociospatial templates
- The socioeconomic structure of the city
- Socio-cultural factors

Finally, the new residential housing environment adheres to the globalization plan while disregarding the historical city's framework. The impact of this on the people is the inability to create a place with its own identity and attractiveness.

Table 2 shows the methodology tools used in the selected studies in correlation with the research results. These results show either the usefulness of the tools used as a means of measuring / assessing identity, or elements regarding the relationship between urban identity and the environmental elements, as well as the role of urban planning in shaping urban identity.

Selectively, studies by [18] and those by [15,16] use theoretical spatial models, such as graph theory and space syntax theory, as well as spatial measuring techniques, such as the fractal dimension of space. It is shown that such tools can improve or help the clarification of urban identity in conjunction with urban environment. Other types of public space study, such as those of [6,17,13], use qualitative methods for both primary and secondary data collection, as well as quantitative methods such as questionnaires and various spatial measurements. Moreover, a comparable approach of analysis is used in the works of [22,24], and there are also common purposes. In both cases, there is a cities' analysis which concerns both morphology and functionality, as well as exploration of identity in the cities of Isparta and Famagusta. The first study uses a distinct approach of analysis, involving questionnaires and interviews. The survey of [15] uses syntactical-topological meters that concern spatial connectivity, such as spectral analysis. This study shows that spatial identity can be maintained from some elements such as design and architecture styles. Accordingly, in the survey of [23] the investigation of identity in urban areas, is about whether design components utilized by designers reflect identity. The result of the research shows that physical setting (Scale, Intensity, Landmarks, vertical grain) is of most importance in shaping urban identity.

**Table 2.** Methodology tools in correlation with research results of the selected surveys (authors' elaboration).

Research	Methodology tools	Research results
[18]	K-means clustering and PCA	These tools can identify urban identity and explore essential features that might assist urban planner to identify the qualities of urban identity for public space
[15]	Spectral analysis	Spatial identity can be maintained from some elements such as design and architecture styles

Based on the preceding comparative analysis, in Table 3 an attempt is made to correlate between the aforementioned surveys (and their case studies) and the urban identity's estimated criteria. Public spaces

[6]	Unobtrusive observational method	Everything that occurs in an urban place has an impact on the spatial inter-relationships within that space (experiences, memories and perceptions included)
[13]	Visual data, Spatial measurements	The city's squares exhibiting the identity components are the spaces that can positively affect the urban identity when its characteristics are appropriately evaluated and conserved
[17]	Division of the city's toponyms into categories and three distinct years	A city's identity can be formed in large part by toponyms
[16]	Graph theory and Q-analysis (structural analysis of the city)	These tools can improve the understanding of the structural linkages between a city's road network and its image
[23]	Surveys and interviews with various stakeholders	'Physical elements' are always the most noticeable and affective elements to stakeholders. Physical settings, images, and activities are considered to be objectives in forming the sense of the place and creating its identity
[22]	Morphological analysis, visual analysis, functional analysis, spatial analysis, relevance analysis in three time periods	Urban transformations that have undermined the city's social, economic, cultural, and architectural values led to loss of identity
[24]	Personal observation, sketches and comparison of the newly developed part of the city with the traditional part	Globalization is a crucial factor of threatening a city's identity. Urban design needs to take into account the urban context, value the characteristics of the place and respect the local pattern of physical objects, landscape, public space and topography

constitute an important issue in the field of urban identity, followed by urban structure and typology. Elements of the natural environment are also a frequent issue examined in research.

**Table 3.** Correlation of urban identity’s estimated criteria with case studies (authors’ elaboration).

Re-search	Case studies	Urban identity estimated criteria									
		Econo-mical characte-ristics	Cultural chara-cteristics	Urban structu-re and typolo-gy	Pu-blic spa-ces	Natural environ-ment of the city	Urban form	Social charact-eristics	Qua-lity of every-day life	Environ-mental percep-tion	Place attach-ment and sense of place
[15]	Athens London			√	√						
[16]	Tel Aviv			√							
[17]	Graz Kraków Maribor Mostar Olomouc Prague Zadar Zagreb		√		√						
[6]	UK (Notting-ham’s Old Market Square)				√	√		√		√	
[18]	Zurich				√						
[13]	Konya (Turkey)				√				√		√
[22]	Isparta (Turkey)		√	√	√	√	√				
[23]	New Cairo and “6th of October city, Giza”			√		√				√	√
[24]	Famma-gusta, Northern Cyprus	√	√	√	√	√		√			

## 4 Conclusions

The selected studies examine either the usefulness of certain tools / method in measuring / assessing identity, or the factors shaping urban identity and links to urban planning. As for the latter, the systematization of earlier studies that preceded shows that a debate has evolved in the last decade or so over the relationship between urban planning and urban identity, with a more specific focus on the effect of urban interventions on a city’s identity. The research about urban identity in relation to urban planning and public spaces that has been conducted so far, mainly copes with elements such as urban squares, parks, streets and a variety of other spatial features depending on each case study. Urban morphology, the quality of everyday life and economic characteristics of cities have been studied to a lesser extent. The study to date has not been sufficient to draw clear conclusions on how and to what extent urban identity is affected by the way urban planning is practiced, leaving room for future research.

Planning tools, urban elements such as land uses, density, building codes and urban morphology in general, can be examined further in connection to urban identity.

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