

The study of urban form in Turkey

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Revised version received 4 November 2009

Abstract. *Urban form is studied in a variety of disciplines in Turkey, but it has recently become central to urban studies. Histories of individual towns have usually been preoccupied with political, socio-economic and cultural issues. Archaeological excavations have made an important contribution to the reconstruction and analysis of Hellenistic, Roman, Byzantine and Turkish historic cities located in Anatolia and Thrace. Urban form is often considered as a container of socio-economic processes and as a marker in the search for cultural identity in Turkey. Architectural studies have focused mainly on important buildings and housing areas. The increasingly strong morphological perspective in urban studies is part of a reaction to the loss of historical fabric associated with large-scale urban renewal schemes. Urban morphological research in Turkey is reviewed here mainly since the 1970s. A number of disciplines are covered, particularly architecture, urban planning, urban design, geography and urban history. The historical evolution of Anatolian civilizations and its impact on settlement forms is outlined. Attention is drawn in particular to the contribution of urban planning and urban history to urban morphological research.*

Key Words: urban morphology, urban landscape, urban history, space syntax, Turkey

As in many countries, research on urban form in Turkey has been studied within different disciplines, including archaeology, architecture, urban design, urban planning, geography and urban history. However, until recently it has rarely been the central concern of these studies. It is only now that urban morphology is claiming its place as an autonomous research field recognized within a wider academic community.

Urban morphological considerations have been evident in urban planning competitions, policies and guidelines in the years since 1930. This can be seen, for example, in the ‘Jansen Plan’ for the new capital Ankara between the

years 1932 and 1956, the ‘Henry Prost Plan’ for Istanbul in 1937 and 1951, and the competitions organized by the ‘İller Bankası’ (the Province Bank) which was founded in 1933 at the beginning of the accelerated urbanization process in Turkey. The bank produced development plans and made morphological and land-use surveys in several regions of Anatolia between 1947 and the 1980s. Additionally, architects and urban planners of that period – notably M. Topaloglu, M. A. Topaloglu and B. Berksan (Mimarlık, 1952, 1953) – made major contributions after the Second World War in their proposals for Eskişehir (1952), Malatya

(1954), Samsun (1956), Adapazarı (1957), Adana (1967) and Konya (1963). In addition to the Province Bank of Turkey, the Ministry of Development and Housing and several municipalities organized urban planning competitions and produced development plans for a number of settlements which influenced the plans for urban investment during that period. The morphological surveys they undertook also helped new methods of analysis to be considered for planning purposes.

Studies of the history of urban form in Anatolia

Archaeological studies of urban structure

Anatolia is rich in architecture and urban structure, reflecting its geographical location and the influence of several civilizations. The history of the dwellings and settlements of Anatolia has been the subject of an exhibition and book prepared for Habitat II conferences (Sey, 1996). The contributions in the book provide a source for historical morphological conspectuses of Anatolia.

Archaeologists such as Mellaart (1967) have made an important contribution towards understanding the form of the prehistoric city of Çatalhöyük, which originated in the central part of Anatolia between 7500 BC and 5700 BC. Mellaart, who introduced this Anatolian *tell* to the world, suggests that defence may have been the basic reason for the construction in Çatalhöyük of dwellings without doorways, the sole entry being through the roof. Dwellings represent the centre of human life, and thus the rectangular housing units, made of mud bricks and constructed wall to wall, are the dominant elements of Çatalhöyük. Hodder (1996) believes that the practice and ideology of the continuity of individual households dominated the patterning of Çatalhöyük which is the largest and best preserved Neolithic site found to date. The dominance of the social role of the house and the location of the large open spaces where rituals could have taken place shaped the morphological structure of

the settlement design which was largely based on the individual households, each increasingly independent, with its own boundary walls, rituals and history.

Settlements of the Hellenistic, Roman and Byzantine traditions have played a major role in the formation of Anatolian cities. Archaeological research on these classical sites has made it possible in a number of cases to reconstruct the development of their street patterns. The layout of the small town of Priene is cited by Cohen (2001) as an example of a model planning system of the classical period, with rectilinear street blocks, plots and public spaces.

From the fifth century BC, public squares and buildings became the dominant elements of the form of cities. In Priene and Miletus large areas were reserved for the construction of public buildings in the city centres. The public sector, rather than the private sector, dominated the Greek *polis*, as is well shown in Bergama and Ephesus. This dominance peaked during the Roman Empire. The Byzantine era brought a resurgence of the private sector (Kolb, 1996).

Ottoman and Turkish towns

Cities of Ottoman and Turkish origin exhibit a distinctive morphological structure, reflecting in particular the grounding of their cultural, religious and social patterns in Islam. According to Özcan (2006) surveys of the cultural development of Byzantine settlements in Anatolia and Turkish urbanization in Central Asia and Iran during the Seljuk period between 1075 and 1277 have revealed the urban models of this period. The evolution of the Turkish city in Anatolia was also studied by Tanyeli (1987), who explored the inheritance from the Hellenistic and Byzantine periods. The transition from the pre-Turkish city to the Turkish one is a cultural transformation. The structural changes in the cities of south-east Anatolia had begun before the Turks. The influence of the Turks and Islam between the eleventh and the fifteenth centuries is accepted as the first stage in the

evolution of the Anatolian-Turkish city.

The establishment of the Ottoman city and aspects of the social and religious influences on the form of cities during the foundation of the Ottoman Empire have been studied by Yenen (1992). She illustrates the characteristics of Turkish cities of the Ottoman period in her study of the spatial organization of the city of Bursa from the late-fourteenth century to the end of the sixteenth century. The Ottomans employed systematic measures, such as resettlement policies linked to voluntary and forced migrations, rearrangement of the network of trade routes and the establishment of social service institutions, to develop strategic cities as administrative, commercial and cultural centres. They interpreted the *wakf* (pious foundation) as an institution to supply the religious and socio-economic needs of society through service facilities and buildings and created *imaret* complexes (charity establishments for distributing food to the poor) which were founded and managed by the *wakf* institution. These principles, especially the institution of the *wakf-imaret* system, played an important role in the creation and development of Turkish cities.

The changes that have occurred over time in the organization of urban life in Turkey are examined by Tekeli (1973, 1980) between the sixteenth and twentieth centuries. He focuses on the largest cities because of the greater availability of the data for them and their more fully developed period characteristics. The influence of social structure on urban spatial organization is considered in terms of the settlement pattern, the demographic processes and the changes in the structure and form of cities.

According to Tekeli, the Ottoman Empire remained heterogeneous in both religion and ethnicity in order to maintain social order. A special type of social organization (the *millet*) was formed along both communal and religious lines for the Muslims, the Greek Orthodox Church, the Armenians and the Jews. Each developed its own social characteristics and these were reflected in the structure of the Ottoman city. One outcome of the Islamic conception of separation of private

and public spaces is the functional division of urban space. Activities of commerce (*çarşı*) and production are concentrated in the city centre while the residential districts (*mahalle*) are located in the outer urban areas. This functional division is clearly identifiable within the urban form: the architectural typologies of commercial and residential uses and their disposition in space are completely different. The *hans* (caravanserais), *bedestens* (traditional covered bazaars selling valuable goods), *arastas* (sections of the bazaar occupied by particular types of craftsmen), rows of shops and warehouses form a dense urban fabric in the centre. In contrast, development densities in the residential districts of the surrounding areas are lower and the dimensions of urban blocks are greater.

The residential district (*mahalle*) in Anatolian towns is generally associated with a particular mosque, large or small. It comprises one or more streets in which the inhabitants have a considerable sense of social solidarity (Çadırcı, 1996). The 'neighbourhoods' that were the settlement units of old Turkish cities maintained the same organization principles until the early-twentieth century and were the basis of the social organization of the Ottomans (Aru, 1996). They were clearly distinguished from one another by groups of trees, vegetable plots and market gardens. Each neighbourhood had certain characteristics, with a core area containing, for example, a mosque, shops, tea houses, a library, a *madrassa* and a soup-kitchen. Until the Constitutional (*Tanzimat*) reforms, these institutions and services were very important for the development of cultural life (Yücel, 1996).

Pinon (2002) developed a method for analysing the urban structure of the Ottoman cities in Anatolia and the Balkans in terms of streets, parcels (lots) and housing units. He compared the Anatolian cities shaped during the Ottoman period with both their Islamic-Arabic counterparts and medieval cities of Europe. He proposed a typology of urban texture based on, for example, street pattern, density of different grid types, and density of cul-de-sac streets (Pinon, 1989).

The origins of the Ottoman realm and the house types associated with it have been investigated by Cerasi (1988, 1998a, 2001). According to Aru (1996), though the old Turkish city has an organic fabric, it also has regularities. The traditional Ottoman settlement fabric and dwellings were maintained until the end of the 1940s. However, thereafter migration from the rural areas to the cities rapidly gained impetus, especially movement into the large cities, such as Istanbul, Ankara and Izmir. This led to the uncontrolled development of cities and the creation of new forms of settlements very different from traditional ones.

According to Aru, examples of traditional neighbourhood relationships can now scarcely be found in the large cities of Turkey. Major fires contributed to the destruction of old neighbourhood patterns in Istanbul. Implementations of Western examples, often subconsciously, have also played their part.

Aru (1996) selects three cities, namely Konya, Antalya and Tokat, located in the different regions of Anatolia, and examines samples of the changes to the old urban fabric. In a later book, Aru (1998) presents a comparative study on the typical Turkish urban fabric using plan schematics. This could be regarded as the first systematic research on a wide range of Turkish cities. It examines seven different geographical regions of Anatolia. One aim was to create awareness of Turkey's architectural heritage. He produced systematic city-scale analyses of selected cities. He then focused on the micro-scale analysis of the fabric of particular cities. This book is a significant resource not only for architectural and city planning studies but also for research in urban morphology.

Istanbul as a central focus

Founded in the seventh century BC, Istanbul was the capital city of three successive empires: the Eastern Roman (AD 324-395), the Byzantine (395-1453), and the Ottoman (1453-1923). It has for long been a laboratory for research on urban form. Map evidence

derived from, for example, the maps of Jacques Pervititch (2001), the publications of Kayra (1990) and the nineteenth-century maps of Ayverdi (1958), has been a detailed basis for morphological research. Cadastral plans drawn by Pervititch for insurance companies in the period 1922-1945 provide basic chronological data for morphological studies. The value of these plans as historical sources is explained in detail by Sabancıoğlu (2003). Because of their detailed legends and very large scale they are fundamental to the historical survey and morphological analysis of Istanbul. They show in colour the characteristics of individual buildings.

The frequent fires in the city were major disasters for its inhabitants, but at the same time created opportunities for the city administrators who were intent on accomplishing modernization. The maps prepared by Pervititch covered almost the entire area of the city for the Central Office of Turkey, following those produced in 1904-06 by C. E. Goad & Company for a limited area of the city. Research has also been based on maps from different historical periods of Istanbul collected together by Kayra (1990) and nineteenth-century maps of Istanbul in the work of Ayverdi (1958).

Work on Istanbul includes detailed archaeological and historical studies (see, for example, Çelik, 1986; Eyice, 1968; Inalcık, 1978; Kuban, 1970). Histories of individual towns have usually been surveyed on the basis of political, socio-economic and cultural aspects. The three scholarly monographs on the historical development of Istanbul are Inalcık's 'Istanbul' in the *Encyclopedia of Islam*; Eyice's '*İstanbul-Tarihi eserler in İslam Ansiklopedisi*' and Kuban's '*İstanbul'un tarihi yapısı*'. These studies complement each other and together give a reliable, concise, encyclopedic view of Istanbul's historical development. Inalcık focuses on settlement patterns, demographic structure, urban administration, and the impact of social and economic institutions on city planning. Eyice surveys chronologically the building types in an art history approach. Kuban focuses on urban form: his essay conveys a clear image of

the city's development from its foundation as a Greek colony to the 1990s. Çelik examines the transformation of Istanbul's physical form between 1838 and 1908. Modern Western impacts on the urban structure are explained by numerous illustrations and rich historical documentation. An 'architectural survey' of the city is also provided; from the foundation of Constantinople in the fourth century AD to the end of the Ottoman Empire. Amongst the topics related to urban morphology are the Islamization of the Byzantine city, Turkish/Islamic heritage, the commercial centre, and the neighbourhoods of Muslims, Armenians, Greeks and Jews.

Kuban (1996) describes the history of the urban development of Istanbul in relation to its cultural background, integrating research on topography, history and monuments. A further important source is provided by Batur (1996) at the time of the exhibitions organized for Habitat II in Istanbul in 1996. This book is an important source for the knowledge and understanding of the morphological transformation of 'Byzantine Constantinople/Istanbul'. It is enhanced by the contributions of Turkish scholars and scientists.

Cerasi and Bugatti (2004) and Cerasi (2006) explain the ceremonial axis linking the Emperor's Palace to the gates of the city. This was not only a commercial and monumental strip but also part of the Ottoman architectural heritage and residential pattern. The Ottoman urban spaces of Istanbul are assessed by Cerasi in relation to aesthetic and ideological criteria.

The assumption behind the work of Gencil (1996) is that the study of existing urban form can provide a major contribution to the search for appropriate concepts of urban space today. He proposed a method of working at four levels – city, district, street block and finally building. Although the study area was limited to the historical core of Istanbul, development farther out was considered in so far as it provided a better understanding of the formation and transformation of the core. Changes have had major impacts at the various levels. By identifying the morphological patterns of selected sites in historical Istanbul, Gencil hopes his study will contribute to

future decision-making about urban design.

Yenen (2001) considers that the transformation of Istanbul was much more influenced by the industrialization and urbanization process than other cities in Turkey. The key factors were the large scale of immigration, the expansion of industrial and commercial land use, increases in the density of middle- and high-income housing and the rise of squatter settlements. Yenen explores the largely unplanned transformation of the city from the 1970s onwards.

Monographic studies

The influence during the Ottoman period of socio-economic structure, administrative and organizational structure, organization of city life, population size, occupational differentiation, and land-use relationships is analysed by Aktüre (1975). She develops a model for analysing the structure of an Anatolian-Turkish city based on a set of dynamic relationships. According to Aktüre, the historical development of the spatial structure of seven Anatolian cities (Manisa, Kütahya, Çorum, Amasya, Tokat, Niğde and Antalya), which are all regional trade centres as well as having administrative functions, reflected basic similarities in the rigid structure of Ottoman society, and this was duly reflected in the physical development of Ottoman cities.

The analysis of the changing spatial structure of the Anatolian city at the end of the nineteenth century due to the changing socio-economic structure of Ottoman society is Aktüre's other contribution to the field of urban morphology (Aktüre, 1978). As a conceptual framework for the analysis of Ottoman society, a 'functional-structural model' has been used. It is tested with empirical data from the Anatolian cities of Ankara, Tokat and Afyon.

Aru (1996) selects three Anatolian cities – namely Konya, Antalya and Tokat – and examines the changes in their old urban fabric. He describes the general trends and the results of uncontrolled urbanization that started in the mid-twentieth century in Turkey as unplanned

development took place at urban fringes and the historical urban fabric deteriorated.

The urban form of Izmir and the transformation to which it was subjected in the nineteenth century have been examined by Bilsel (2001), using city maps prepared by Western engineers from the 1830s onward. She has also investigated the difference between the models chosen for the planning of Izmir and the modernization ideology in the early Republican period (Bilsel, 1996) and the transformation of a characteristic urban quarter of the same city (Bilsel, 1999).

Yenen (1992) described the characteristic features that shaped the Turkish city between the fourteenth and sixteenth centuries and analysed the relation between the social and religious institutions of the *wakf* settlement form. These institutions influenced the form of Bursa city, the first capital of the Ottoman Empire. On a related topic, Dostoğlu and Oral (2001) analysed the physical transformation of the urban structure of Bursa, the first Ottoman capital. This reflected the political organization between the final years of the Ottoman Empire (the Tanzimat era) and the foundation of the Turkish Republic. Similar studies analysing morphological patterns from different perspectives have been prepared by several other researchers, including Erton (1995), Karalı (2001), Topçu (2003), and Demiralp (2006).

Building styles are a major physical manifestation in the urban landscape, and considerable attention has been given to the architecture of individual buildings. For example, Saf (2004) studied Kula in the Aegean region of Turkey. There have also been historical architectural studies, notably that by Alioğlu (1989) of Mardin which is a characteristic Islamic city in Eastern Anatolia. The morphological structure of Mardin is also analysed, together with that of the two neighbouring cities, Urfa and Diyarbakır in south-eastern Anatolia, by Karaman (1998, 2001). This type of work follows Kubat's (1996) typological approach to building façades in selected historical towns of Anatolia and explores the relationship between urban form and urban design.

There have also been some significant publications in architectural history that have considered the broader urban consequences of the architectural forms examined. Amongst these are Cerasi's studies (Cerasi, 1998a, 1998b) of the structure of Ottoman and Islamic cities with particular reference to their residential buildings.

Yerasimos, with his command of many languages and fields of interest, was particularly influential within urban morphology. Most significant were his collaborations with Pinon and Borie in which the different strata of urban form were examined in relation to domestic space (Borie *et al.*, 1991). The relationships between the 'residential unit, urban lot and enclave pattern' of Anatolian-Ottoman towns are also broadly analysed in their studies.

Studies analysing modernization processes and the contemporary urban fabric

Urban planning perspectives

An analytical approach not unlike that of the Conzenian school (Conzen, 1960) has been applied in many pieces of research within urban planning. However, researchers rarely systematize and conceptualize in the way that Conzen himself did. Studies with similarities to this approach are those by Pinon (2002), Yerasimos and Pinon (1993) and Bilsel (2005).

Kubat (1985) examines the spatial development of the structural and functional appearance of a sample of cities in the Mediterranean region of Turkey in the period between 1950 and 1980. She considers the form of urban centres during the development process and the factors influencing development, and she formulates development models for short- and long-term planning. She is influenced by the research project on Istanbul prepared by Suher *et al.* (1977), but develops a new methodology for the period of industrialization.

The studies in the cities of İzmit and Istanbul by Suher *et al.* (1982, 1983) and those

by Kubat (1985, 1987) at a local scale, investigate 'street, parcel (lot) and the building unit' and 'building fabric, land and building utilization'. They thus have parallels with Conzen's studies. Kubat (1987, 1988) also undertook projects on the effects of industrialization and urbanization processes on the patterns of selected sample urban centres of Turkey in order to inform planning policies. Statistical data pertaining to selected city centres in southern Anatolia that were in the process of industrialization were evaluated. A morphogenetic approach depending on analysing the urban landscape by methods parallel to those of the Conzenian school was developed. The land and building utilization and number of storeys were depicted in coloured maps.

A mathematical urban model has been used by Kubat (1990a, 1990b) for understanding the variables defining urban structure. The model is an aid to the prediction of the probable consequences of future planning. The study included the application of a Garin-Lowry model to the metropolitan area of Istanbul. By applying the model, it was possible to address a number of problems relating to urban form and to consider the effects of alternative urban policies and different forms of future development projects.

Locational variables and the capacity and boundaries of the CBD of Istanbul are examined and a spatial delimitation technique is proposed by Kubat (1990c). She considers the distribution of the working population in commercial, banking and other office buildings in the city centre. A characteristic commercial strip connecting the historical centre to the newly developed CBD zone of Istanbul is selected as a sample region for this study. Applications of the results and the technique for delimiting the CBD enable the identification of areas suitable for population increase and future commercial use. An important contribution on the development of the morphological structure of the central areas of Istanbul has been conducted by Tümertekin (1968a, 1968b).

The rapid development of Mersin, a city in the south of Turkey has been studied by Ünlü

(2007). A similar study was made by Ayataç (2007), who analysed the Turkish experience of the international diffusion of planning ideas since the second half of the nineteenth century, starting with the Tanzimat reforms and continuing until the inter-war period. Ayataç (2007) also analysed the town planning process in Turkey, which has been significantly influenced by Western ideas, and Karaman (1985) provides a planning framework based on such factors as the range of urban typology.

Kubat *et al.* (1990) explore the symbolic use of historical public space in Istanbul. While they consider preservation, revitalization and redevelopment at a macro level, they also take into account streetscape, archaeology, and urban and building history at the micro level. This work is based on a design project which was awarded second prize in the urban design competition organized by the Greater Municipality of Istanbul. Their focus of interest is urban morphology. They reveal the culture of different periods of history and connect them to the present.

The typology of urban façades on the main spine roads of selected towns in Anatolia is also analysed by Kubat (1996). An important contribution to urban conservation is made by Gülersoy *et al.* (2008). This includes a detailed analysis of the physical fabric related to transportation, land and building use, building condition, building height, construction materials, land ownership, building occupancy, building compatibility with the morphological structure of an area, and listed buildings.

Legal aspects and real estate have been studied by Türk (2004). An increase in housing demand after the second half of the twentieth century in Turkey made land acquisition methods one of the key factors in the effective operation of the land market. Türk related urban land acquisition methods to the plan of cities in Turkey. She also analysed the applicability of alternative methods in providing service land in Turkey.

Yenen *et al.* (1993) point out the possibility of water transportation solving the rapid and

inevitable changes that occurred in the urban structure of Istanbul. They propose an urban development model of growth for Istanbul.

Earthquakes have long been a problem in Turkey as it is located in one of the most active earthquake zones in the world. Comparisons with Latin American and Asian countries of the effects of these on urban form are made by Kubat *et al.* (2008). In this article the fragile urban structure of Istanbul, which has been destroyed by several earthquakes, is explained and the highest risk areas and their vulnerability characteristics are documented.

Recent urban landscapes

The years following the Republican revolutions in Turkey brought new urban landscapes. The new residential landscapes that appeared in the 1980s differed even from their predecessors of the first half of the twentieth century. We can observe two main types of residential buildings during this second period: illegal buildings forming squatter settlements on the urban fringe and the gated communities that have been developed in the various parts of the big cities.

The waves of migrations from rural to urban settlements have been largely responsible for the squatter settlements and constitute a significant urban problem. There have been numerous studies on the squatter settlements in Turkey and their effects on the configurational structure of existing settlements. Recent research projects by Erkut (2001) and Uzun (2003, 2005) are related to the transformation of the urban fabric of two important Turkish cities.

Gated communities have increasingly become a major feature of the housing market in Turkey. These self-contained communities are radically transforming urban environments. Amongst many recent studies on this subject are those by Baycan and Gülümser (2007) and Gülümser and Baycan (2005). They investigate the spatial patterns of gated communities in the Istanbul metropolitan area, noting how they create pressure on the natural environment, threaten the sustainability of

natural resources, and affect the morphological structure of the city. Ercoşkun *et al.* (2005) consider urban sprawl in Ankara and measure the effects of five consecutive development plans on its morphological structure.

Computational analyses and urban morphology

Space syntax

Space syntax is an approach describing and analysing patterns of architectural space, both at the building and urban scales. The approach has been precisely defined, particularly in terms of 'spatial configuration', as the arrangement of spaces and the possibilities and patterns of movement through them (Hillier, 1996). The applications of space syntax have largely focused on studies of axes of movement and, more recently, visibility: 'what is original to space syntax is the important insight that the pattern of movement in a city or urban area is likely to be shaped to an extent by the topology of its route network alone, irrespective of all other factors' (Steadman, 2004, p. 484). The aim is to investigate the spatial logic of built environments in order to develop an understanding of their social outcomes (Hanson, 1989; Hillier, 1989; Hillier and Hanson, 1984; Hillier *et al.*, 1983; Peponis *et al.*, 1989).

The main theoretical argument in space syntax is that settlement patterns originate in the social life of the user. In other words, the architecture of the urban network shapes the distribution of movement flows. Space syntax research has shown that configuration of street layouts influences the way people navigate through urban areas, over and above other determinants, such as the location of retail outlets. The analytical method is based on the representation of plans and networks as graphs and the quantification of the spatial qualities of nodes using mathematical formulae. Such a method offers a simple objective procedure for describing, comparing and interpreting settlements. The technique integrates architecture, urban design, urban planning and

transportation planning, incorporating the rationales of these disciplines within studies of urban morphology in a unique and powerful way.

Space syntax has been used in considering significant urban design, urban planning and transportation planning issues in Turkey. In the first published example of this type of analysis in Turkey, building upon studies by her students, Kubat (1997) analysed the forms of seven towns in Anatolia. She defines characteristics of space that are intrinsic to Anatolia by means of numerical interpretation. This study and an examination of the morphological history of Istanbul (Kubat, 1999) were the beginnings in Turkey of the use of the term 'morphogenetic'.

Kubat and Topçu (2007) undertake comparative quantitative analyses of pedestrian movement patterns in two Anatolian towns. In one, Konya, Ottoman and Turkish characteristics are evident. In the other, Antakya, Roman and Islamic patterns overlap. The terminology and the morphological methodology are adapted from Kubat's previous study on Anatolian citadels (Kubat, 1997).

Çıl's doctoral thesis (Çıl, 2005a) focuses on Kula, a small Anatolian town in the Aegean region, and explores the impact of certain changes since the mid-nineteenth century on its physical identity. Çıl also analyses the social and practical role of the mosques, churches and schools, the location of the water fountains and wells in relation to the streets and open spaces, and overall urban form in three different periods of the twentieth century (Çıl, 2005b).

Dursun (2002) attempted in her doctoral thesis to formulate various spatial patterns which have been formed throughout the history of Trabzon, a city in the Black Sea region of Turkey, giving attention to both urban and architectural scales and undertaking comparative analyses of different time periods. Kubat *et al.* (2007a) attempted to explore this approach in relation to architectural and urban design, and urban regeneration. By means of an assessment of the problems and constraints of the historical core of Istanbul using space

syntax, this study has identified possible physical design solutions for the historical site of the CBD that could enhance the functioning of the area and decrease its isolation from surrounding zones without losing its historical character.

In a heuristic study, Özbil (2004) analysed selected pairs of landmarks in Istanbul using existing documentation and space syntax. It is argued that the multi-scale visibility and imageability of landmarks due to dynamic morphological and topographical patterns of the city ensure an enriched spatial perception. Özbil *et al.* (2008) also compare selected neighbourhoods in Atlanta and Istanbul to establish correlations between pedestrian movement and the configuration of street layout using syntactic measures of street connectivity. They demonstrate that spatial layout plays a significant role in determining the distribution of movement within an area independently of land use.

Another interesting approach to urban and landscape design and its morphology is analysed by Kaya and Kubat (2007) and Kaya (2007). They discuss the relationship between spatial configuration and fear of crime in urban green areas. The study is concerned with the visual and morphological characteristics of landscape based on graph metrics, with the aim of distinguishing safe and unsafe areas in urban parks.

The aim of Baser and Kubat (2007) is to explore the potential of the urban fabric for creating a web of well connected open spaces for the movement of pedestrians in the dense existing historical urban fabric. A new morphological structure is proposed for the fragmented open spaces to create a sustainable, continuous environment that maximizes the ecological integrity of the mosaic of the city.

The effects of globalization are increasingly evident in the morphological structure of Turkish cities. During the last decade, the effects have been especially felt in smaller Anatolian cities. Güney *et al.* (2009) describe the effects of such changes on the form of the CBD of Balıkesir using space syntax.

Rapid urbanization is also accompanied by physical decay within cities. Land-use

patterns and pedestrian preferences are being considered in socio-economic analyses to establish rates of decay. Existing movement patterns and their effects on the configuration of urban structure are examined by Kubat and Özer (2007), and an analytical basis is established to estimate possible effects of new development proposals on activity patterns. Space syntax is used as a tool in urban design and the effects of spatial configuration, quantified through space syntax, on pedestrian movement patterns are also analysed in this study. Walkability studies (Özer, 2006) and pedestrian movement analyses (Kubat, 2001a) have been developed in several regions of Istanbul to assess the effects of the physical environment on pedestrian movement.

The various cultural and religious characteristics of ethnic groups are reflected in Istanbul's morphological patterns. These have been investigated by Asami *et al.* (2001) and Kubat *et al.* (1999).

The spatial development of the metropolitan area of Istanbul is examined syntactically by Kubat (2001b). Land-use characteristics are explored in light of the 'sub-region master plan' of Istanbul.

The main aim of Topçu and Kubat (2009) is to discuss the factors that affect urban land values in residential areas and based on this discussion to propose an original model with reference to Istanbul. Topçu (2008) generated from the data set the parameters of accessibility, visual and environmental quality, security, street/density relationship and a configurational parameter.

In addition to the direct impact of her space syntax studies, Kubat influenced several pieces of research through the doctoral theses and masters' dissertations that she supervised at Istanbul Technical University. Alkim (2006), Altınöz (2003), Cin (2005), Güler (2007), Özer (2006), Sarı (2003), Topçu (2003) and Yalkut (1995) have attempted to explore the same space syntax approach in terms of its architectural and urban design relevance. This has excited considerable professional interest.

Sarı (2003) explored the alternative structures of street networks of urban planning and design proposals prepared for the urban

design competition for the waterfront of Izmir. Cin (2005) studied the relationship between folk music and morphological structure in selected traditional towns from different regions of Anatolia.

The morphological structure of Süleymaniye, a Muslim neighbourhood located in the historical area of Istanbul, has been explored quantitatively by Alkim (2006) by comparing data before and after different phases of urbanization. Yalkut (1995) undertook comparative analyses in two neighbourhoods of Istanbul, namely Galata and Arnavutköy, and Altınöz (2003) measured a new design solution for an urban piazza located in Amasya.

GIS, space syntax and other computational approaches

With developments in mathematics and computer technology, the evolution of cities can be analysed from a different point of view using an essentially new approach to urban space based on chaos theory and fractal geometry. According to this approach, cities are fractal and their evolution is strictly dependent on their initial conditions which can be investigated in terms of sustainability and continuity of cultural values. Especially in traditional or historical cities, the continuity of spatial organization and built environment over time is a major feature in giving a unique character to cities. Kaya and Bölen (2008, 2009) investigated the changes and analysed the complex properties in the morphological structure of cities by using fractal analyses combined with space syntax. Istanbul's urban structure retains a number of basic patterns, some shaped as the result of general human needs and others shaped by different cultures and changing conditions through time. The changes in spatial organization and in the level of complexity are measured by fractal geometry. Kaya (2008) considers this method to be of major importance in dealing with the geometrical, topological and complex properties of the physical environment. In another study, Terzi and Kaya (2008) attempt

to analyse urban form by using a sprawl index and adaptation of fractal analyses, thereby characterizing the dimensions of urban sprawl. A measurement for urban sprawl is used by Terzi and Bölen (2008a, 2008b, 2009) to examine the changes in urban form at a macro scale and provide a sprawl measurement methodology.

In her doctoral thesis, Altınöz (2002) focuses on developing an 'information-based' method for structuring, analysing and evaluating data about historical stratification in multi-layered towns to provide information that will support conservation decision-making. The context of the thesis is 'multi-layered towns' which have been continuously inhabited since ancient times and where inhabitation still exists. The majority of Anatolian towns have such a structure.

The work of Asami *et al.* (2001, 2004a) and Kubat and Asami (2001) employs quantitative indices that reveal the traditional Turkish character in street network patterns. Network analyses are illustrated by using GIS and space syntax with a discriminatory analysis technique to reveal the traditional character of the street network in several cities in Turkey and in comparators in other parts of the world.

The form of Istanbul is analysed by taking account of its rich topography and thus the street network of Istanbul's historical peninsula is illustrated on a three-dimensional surface by the use of GIS and space syntax. In this way Kubat *et al.* (2003) and Asami *et al.* (2004b) have extended the conventional space syntax approach.

The study in Kubat *et al.* (2007a) aims to investigate the possible effects of the new alternative suspension bridges of Istanbul connecting Europe to Asia, on land use, urban spread, and the location of Central Business Districts, by comparing the data for earlier, current and future situations. The impacts of the existing and proposed bridges on the spatial development of the metropolitan area of Istanbul and the interaction between land use and urban macro form and transportation network are simulated. Two syntactic maps quantifying the effects of spatial configuration

are prepared for two different time periods: the current situation and the future city network according to the proposed alternatives. Land use and urban growth data have also been collected for two time periods – before the two bridges were built and the current situation. Space syntax has been developed as a pedestrian-oriented design tool, and Kubat *et al.* (2007b) have modelled motorized traffic aspects of urban form.

A similar study of the effects of the existing and proposed Bosphorus bridges on spatial development has been conducted by Kubat and Güler (2007) and Güler (2007). New settlement areas are recommended in the regions of water basins and forests. Consequently, with the spread of settlement towards northern areas, natural zones such as forest areas, agricultural lands and water basins of Istanbul will be reduced and the morphological structure of the city will also be affected. Sustainable urban development scenarios are proposed as a prerequisite for preventing damage to the natural environment by the positioning of the third bridge.

Conclusion

Contributions to the study of urban form in Turkey are both numerous and varied in their approaches. Although urban form has, in recent years, received adequate attention by Turkish academics, when these studies are compared to those conducted in Europe and North America, the study of urban form in Turkey is a relatively recent and much less developed field consisting of uncoordinated efforts by individual researchers from varied backgrounds.

A review of the literature reveals that the most significant contributions to the study of urban form in Turkey have come from architects and planners, who have mostly adopted a typo-morphological approach, and urban geographers and historians, who have tended to examine urban form in relation to the factors underlying its evolution. Inevitably the view provided in this article reflects the author's background: in this case that of an

architect and an urban planner.

Although the studies are diverse in nature and range widely in their scope and depth, some generalizations can be made. Morphological studies have tended to analyse the overall plan of towns and cities and their central business districts, with inner-city residential areas and urban history coming next if measured by the attention they have received.

Studies focusing on the history of urban form have tended to be concerned only with initial city plans. While a few have examined the subsequent evolution of urban forms, there are many research topics relating to historical development that await systematic investigation.

Nevertheless, it is encouraging to observe that a number of urban morphological analyses have found practical applications in urban planning and design competitions, as well as in policies and development guidelines. The recent interest in theoretical and comparative work on urban form suggests that substantial developments in the study of urban form in Turkey are in the offing.

Acknowledgement

The author would like to thank Süveyda Bayraktar for her diligent assistance in collecting the necessary documents on which this article is based.

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Sixteenth International Seminar on Urban Form, Guangzhou, China, 4-7 September 2009

The ISUF 2009 conference was held on the campus of South China University of Technology (Figure 1). Co-hosted by Guangzhou Urban Planning Bureau, the conference took the theme of 'Urban morphology and urban transformation'.

Guangzhou was an exciting location for such a conference. It lies in the intense settlement concentration of the Pearl River Delta, which has a population of 55 million. Here the recent scale of development and urban change represents serious transformation. The adjacent city of Shenzhen has grown from a village street to a city of 14 million inhabitants in less than 20 years. In its transformation, China has of course attracted world attention. This is clearly reflected in the quantity of recent research focussed on China not just within urban morphology but as described in the journals of cognate disciplines such as planning, urban design and architecture.

Until recently the development of knowledge and understanding in the field of urban morphology had been largely drawn from Euro-American sources. The Guangzhou conference offered an opportunity to draw from the associated field of knowledge in Asia.

The conference proceedings opened on the afternoon of Friday 4th with introductory and plenary sessions (Figure 2), followed by three days of parallel sessions, each day commencing with a plenary. An impressive total of 154 papers were presented, from 29 countries. A very successful balance was achieved between papers focussed exclusively on China, of which there were 72, those focussed on other countries, and those dealing with international comparison between China and elsewhere.

Perhaps not surprisingly, the tendency for China to shed its traditions in the pursuit of internationally common urban form became a significant discussion topic. This was introduced by Piper Gaubatz in a plenary paper entitled 'Reconceptualizing the Chinese City: urban form in the context of rapid change', in which she interrogated the images sought by major Chinese cities, concluding that while China was pursuing convergence towards ideal international models, it was only one of many countries doing so.

The question of balance between tradition and development was in fact examined in a number of papers. An interesting paper by Ka Man Hui and

Keywords: Turkey, rural, urban, primary school, classroom, student, spatial statistic, geographical information system.

1. Introduction.

1.1 An Introduction to the Problem. Primary schools in Turkey form a crucial part of primary education, which is an educational step where pupils are provided with basic, but important, knowledge, skills, good behavior, and habits that every citizen should have. Low-level basic skills an individual needs in order to participate in social, economic, and political life are given in primary education. For example, GrzeÅkowiak (2015) studied the similarities or otherwise of educational processes in Poland using spatial statistical tools such as Moran I and LISA. studies of Islamic urban form, which had previously focused on defining the urban forms through an epistemological approach. Additionally, Eugene E. Beaudoin, Arthur Upham Pope and Osman Nuri Ergin's interpretive-historical researches on Isfahan and Turkey aim to define the socio-political * Assist. Prof. Dr., Mustafa Kemal University, Faculty of Architecture, Department of Architecture and urban features of the urban form and the historical developments of urbanism in Turkey. Studies of Islamic urban form were interrupted by the outbreak of the Second World War, until the early 1950s when a second Orientalism period was launched in Edmond Pauty's (1951) observational-historical research of North-African cities. * a Bilkent University, Faculty of Art, Design and Architecture, Department of Urban Design and Landscape Architecture, Ankara 06800, Turkey b Gazi University, Faculty of Architecture, Department of City and Regional Planning, Celal Bayar Blv., Maltepe-Ankara 06570, Turkey. Abstract. In this study, we explore this topic using various theoretical perspectives on urban retailing. We begin our analysis with the late 1980s and early 1990s, when more liberal and more outward-looking policies began to emerge in Turkish economic policy. To evaluate the impacts of shopping malls on traditional retail forms and urban land use in Turkey, we adopt a broad perspective, composed of components of different theories on urban development. Architectural and Urban Studies from Kadir Has University seeks to play a leading role in promoting this intertwined, multi-scalar conceptualization of architecture and the city, both in history and in the contemporary world, and invites original graduate level research projects about the design, production and representation of the built environment from critical, interdisciplinary perspectives. Readings in Society and Space. Situating the Modern: Vernacular Forms and Practices. Trans-National Histories of Modern Architecture and Urbanism. Aesthetics of Architectural and Urban Research. Space, Politics and Power. Modernity, Architecture and Urban Space in Turkey. Gendering Space: Feminist Approaches to Space, Place and Society. Key information.