Mapping Long-term Urban Space Structures. Barcelona as a Case Study

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Abstract The spatial dimension of demographic, economic and political processes is commonly disregarded or else it may happen that space is only considered when major urban projects or transformations of great morphological impact are involved. The systematic mapping of the data offered by available documents is much less common. Such mapping entails a laborious effort, but it is of great help in revealing the deep dynamics of a city that would otherwise remain concealed. Mapping is also useful to broaden one's capacity of observation and to pose new questions. Similarly, it provides a way of deducing how a method to ascertain how the people inhabiting the city in the past perceived their world. It should not be forgotten that our relation to space is fundamental to the construction of our individual and collective memory and, consequently, to the organization of our experience (Halbwachs 1925 – Pfeiffer / Foster 2013). The systematic application of manual mapping to the Barcelona of the 15th to the 19th centuries shows that, in the long term, space-society relations may be of explanatory value in the study of the form, the social and functional structure and, in short, the lived experience of the city.

Introduction

The spatial dimension is fundamental in many disciplines including archaeology, geography, sociology, anthropology and the history of architecture and of urban planning. Despite this, studies attributing genuine importance to space have been few, fragmentary and little known in general outside the strict limits of their respective academic fields. The scant use of mapping in urban history research is

especially surprising; above all when it is considered that spatial relations are essential to urban life and therefore highly relevant for urban historians, and that their study is vital for a deeper understanding of cities. Systematic mapping may perhaps appear to be a clumsy and often excessively laborious approach, but it is probably the only way to bring the relations between space and society to the foreground, thus shedding light on social relations and dynamics which would otherwise go unnoticed. These urban dynamics highlight the various historical temporalities defined by Fernand Braudel and it is especially important to consider permanence, structural inertia and changes in long-term spatial relations.

Apparent immobility of the pre-industrial urban structure

The persistence of the city's plan and shape and the transmission of its morphology have been recurrent themes in the history of the city and the landscape. Many authors, including Marcel Poëte and Pierre Lavedan, have underscored the amazing permanence of European cities' street systems and even of their plot layouts. It is essential to go beyond the city's map, however, and to study the map's social contents. For this reason, in our research we have sought to relate the permanence and changes of Barcelona's morphological features to the permanence and changes of these features' social and functional contents. Tax documents such as hearth tax records from the 14th to the 16th centuries and the 18th-century cadastre tax enabled us to verify the street layout of the past on the basis of its mapping and then to go on to map the great wealth of demographic, social, economic and functional information that these documents provide on a long period of life in the city.

Only tax documents dating as from 1516 (beginning with the hearth tax for that year) provide enough information to allow the streets of the whole city to be plotted. Nonetheless, if the street layout from 1359 to 1716 (in the cadastre for that year) is taken into account, it can be seen there has hardly been any variation at all. Indeed, Barcelona is a classic case of permanence. In like manner, the tax documents for 1516, 1640 and 1716 allow the mapping and comparison of the hearths per hectare, showing that there has not only been a remarkable stability of the population's spatial distribution but also a close relation between the respective densities of the street layout and of hearths per hectare. The explanation almost certainly lies in the growth process undergone by Barcelona since the 10th century, which shaped the city physically, socially and functionally. It may be observed that, within the late medieval walls, the most populated areas were the part of the city located around the market outside the ancient Roman gate, the waterfront neighbourhood (where mariners and port workers lived), and the area near the Rec Comtal mills' channel (where wool and leather crafts were located). With its dense layout and population, this was the primary working area of Barcelona, accommodating 41% of the inhabitants of the city in a space comprising only 14%

of its overall area. This shows that it can be quite useful to consider the street layout density as a basic reference for the morphological and historical study of medieval European towns (Figs.: 1-2).

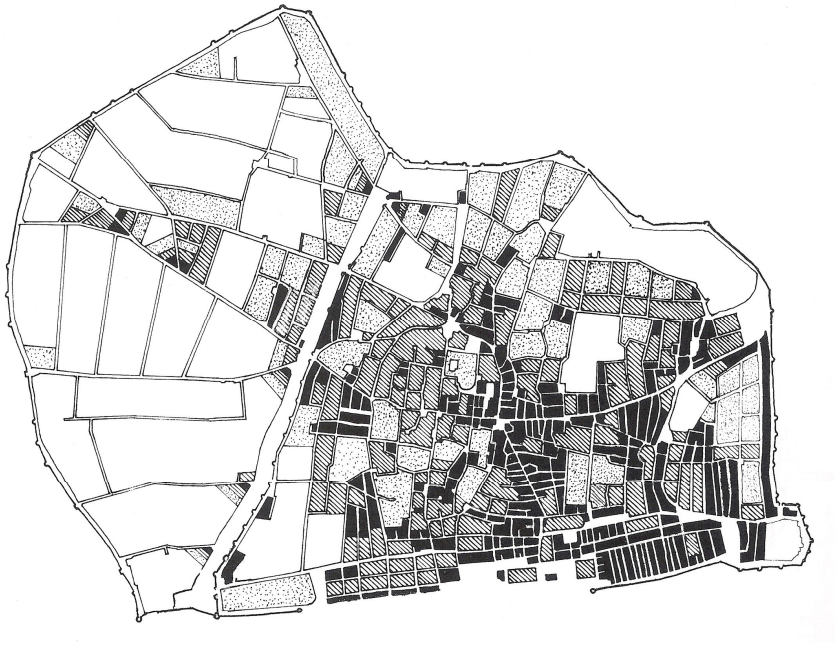

Fig. 1. Street layout density in 1516 (Hearth tax)
< 30 metres between streets
30 to 50 metres between streets
50 to 60 metres between streets
> 80 metres between streets

Fig. 2. Hearth density per hectare in 1516 (Hearth tax)
> 150 hearths/ha
100 to 150 hearths/ha
50 to 100 hearths/ha
< 50 hearths/ha

The mapping of the tax documents' demographic, social, economic and functional information reveals the continuity and permanence of the demographic weights of the city and of its social and functional characteristics.

This stability or quasi-immobility of the pre-industrial city led to its study by means of models like those of Sjoberg (Sjoberg 1960) and Vance (Vance 1971), which seek to identify the common aspects and critical variables of large sets of cities. Both postulated simple uniform models, describing the pre-industrial city as a walking place in which home and work were situated close together. They posited a city of simple uniform social districts; the central core was dominated socially by the homes of an élite class and additionally there was a number of occupationally distinct but socially mixed quarters as well as a residual population of very poor people living in the city's back alleys and on its fringes.

Gideon Sjoberg explained the preindustrial urban residential patterns by means of a rather simple uniform model that reflected the city's social pyramid, with a central core that was socially dominated by the élite class's homes clustered around important religious, political and administrative institutions in the city centre. Around this core there were socially mixed quarters of craftsmen who were loosely clustered by occupations (with a poor population in these quarters' back alleys). The outer edge of the city, where there were vegetable gardens, was inhab-

ited by farmers, a residual population of labouring classes and the very poor, who were grouped ethnically in various parts of the city within neighbourhood clusters.

James E. Vance Jr. considered that social differences in the medieval town were not horizontal because 'the residential structure was chiefly vertical'. Accordingly, he proposed a different city model formed by the aggregate of master craftsmen's houses with shops on the ground floor, the master craftsmen's family quarters on the first floor and, above, the rooms of the journeymen, apprentices and servants as well as the storerooms. This resulted in occupational zoning and social class mixing: the city was 'many-centred' with diverse craft quarters, each with its own shops, workplaces and each reflected a complete social spectrum. Families were located by occupational accident rather than by rent-paying ability.

Both models sought to draw attention to what they considered to be the critical variables and held that pre-industrial societies were divided into 'orders' or 'estates', which were legally rather than economically defined groups in sharp contrast to post-industrial societies. Further detailed historical research and mapping of social indicators help us to redefine such generalizations and to pose new questions. For example, the research of John Langton (Langton 1975) and Harold Carter (Carter 1983) stressed the emergence of the retail centre as the backbone of the city's central area.

The study of Barcelona from the 15th to the 18th centuries shows that, from late medieval times, a specialized retail centre did indeed form the backbone of the city's central area. In fact there is a double centre reflecting the *Ancien Régime's* twofold social stratification based on the financial value of the land in the retail centre and the status value of centrality for the households of higher standing. After mapping the cadastral information from just after 1714, we developed a more accurate synopsis. Although there were some non-uniform or exclusive neighbourhoods, all the areas may be characterized by their predominant features. Briefly, a double centre and a periphery with differentiated parts may be distinguished, as shown in the synoptic social map of Barcelona based on the cadastre tax of 1716.

The black area was the city's retail backbone. Formed by Barcelona's most central and highly frequented thoroughfares, it was a dense area where the houses stood on small, but very costly plots and were inhabited by wealthy craftsmen, encompassing the most accessible and commercial parts of town.

The hatched areas were low-density central parts of the city that were dominated by wealthy higher-status non-working households formed by rentier families with an income derived from property, a legacy or some other source, and who did not need to work. Intermingled within these areas were numerous poor families, often living in ground floor shops or in back alleys. In many cases they provided services for the wealthier families.

The dotted areas were densely populated and predominated by households of low economic standing. The neighbourhoods here were of greater density and were centres of industrial or port-related activities. Wool and leather craftsmen

lived near the mills' channel whereas port workers and mariners lived near the waterfront.

The other peripheral areas (white areas) were of low density, with large neighbourhoods of low economic level including a substantial number of agricultural labourers and farmers (Fig. 3).

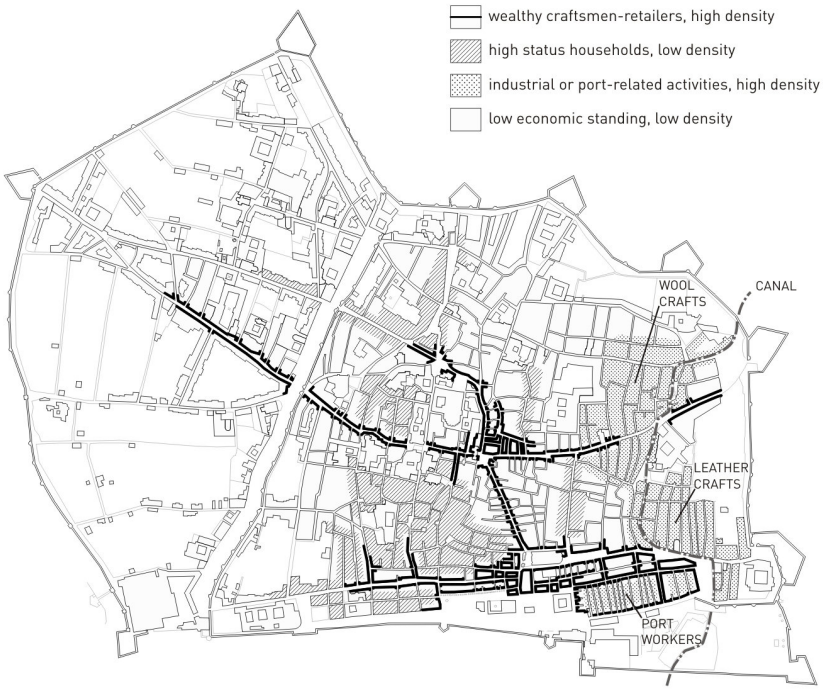

Fig. 3. Synoptic map of Barcelona, 1716 (Cadastre tax)

The 1716 cadastre tax makes it easy to identify and map the master craftsmen's households where the master craftsmen, their families, journeymen and apprentices lived under the same roof, as Vance's model suggests (Fig. 4). They are only found in the retail backbone of the city (the black areas on the synoptic map of Barcelona in 1714).

Fig. 4. Master craftsmen's households. Barcelona, 1716 (Cadastre tax)

Urban structural inertia and the great impact of the demolitions for the Citadel

In the period under study, many physical, social, economic and political changes took place. Perhaps the easiest of all these changes to explain are the demographic ones. It has generally been believed that in the pre-industrial city, the 'residential mobility within the town walls was quite limited, as there were few moves to locations beyond the walls, except in the very large towns, where suburbs had already developed' (Denecke 1988, 138). The study of Barcelona, however, shows a very high degree of mobility among the population, thus questioning this widely accepted assertion.

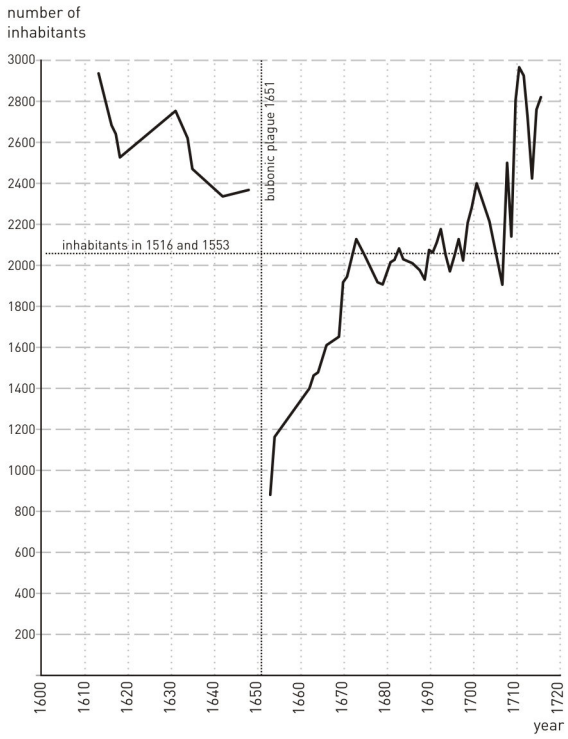

Fig. 5. Demographic fluctuations between 1610 and 1714 (Sant Just parish, Barcelona)

The Easter communion books of Barcelona's Sant Just parish recorded the number of communicants each year and allow an investigation of short-term population changes (Fig. 5). Specifically, the population of Sant Just parish fluctuated between 3,000 and 900 communicants (the latter figure during the Bubonic Plague of 1651). In this period, there was an average of about 2,100 communicants. This sudden population change highlights the fact that the pre-industrial city acted much like a sponge, absorbing people in growth phases and expelling them in phases of contraction. A study of the existing legal documents shows how buildings and dwellings were modified over time to accommodate a greater or lesser number of inhabitants. As the population grew, houses were divided to accommodate a larger number of families and when the city's population diminished, dwellings re-expanded by integrating rooms that had been abandoned.

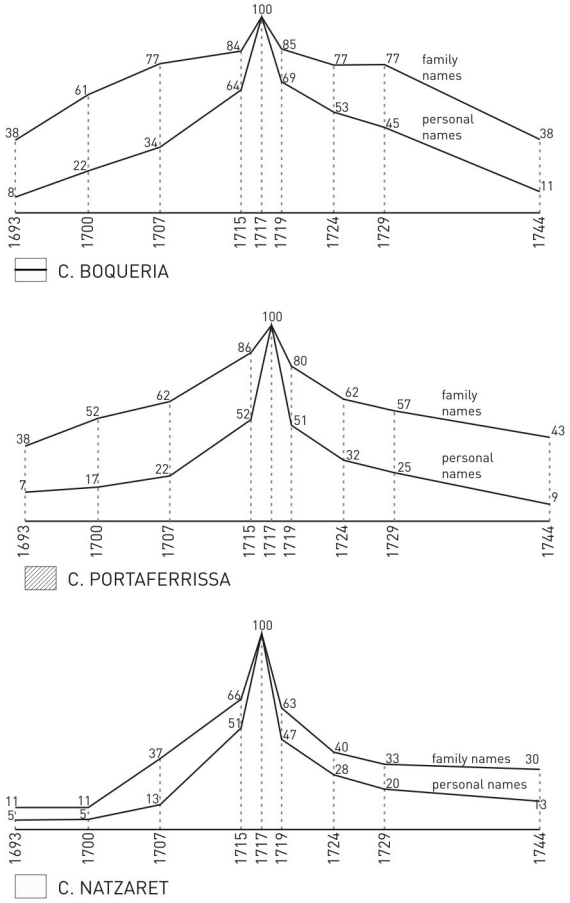

Fig. 6. Barcelona: Street mobility around 1715 (Cadastre tax 1716 – Easter communion books of Sant Just and Santa Maria del Pi parishes)

The same parish communion books, which recorded the Easter communicants, shed light on the population's renewal by streets. We verified which surnames and forenames in the parish communion books of 1717 were also to be found in the books of 1693, 1700, 1707, 1715, 1719, 1724, 1729 and 1744 (Fig. 6). Except in very exceptional cases, the result was that only 40% to 60% of the inhabitants remained longer than two years at the same streets. This was not only due to the high mortality rates but also to people's high level of domestic mobility, which often entailed a change of town to work as apprentices, journeymen, government employees or soldiers, or just to seek their fortune. The research of J. P. Bardet (1983) on the city of Rouen confirms this extremely high mobility, thereby chal-

lenging the very commonly held idea of the pre-industrial city's great residential stability. An analogy may be drawn between these demographic fluctuations and the phases of breathing: the effect of this 'demographic breathing' on the functioning and renewal of the regional urban system is worthy of study.

It should be stressed in any case that there is a sharp contrast between the numerous microscopic changes and the macro-structural stability. The 'demographic breathing' did not substantially affect the urban space's social and functional structure. Consequently, in the long term there were no outstanding changes on the whole in Barcelona's urban structure. From comparing the mapping of the tax documents of 1516, 1640 and 1716, it may be seen that the city remained basically as it was. The demographic stability of the city's various sectors between 1516 and 1714 is indicative of the urban structure's great overall stability.

Fig. 7. Demolition of a high-density area for the Citadel, 1716-1718

In this context, the large impact of a very important permanent change – the demolition carried out to make way for the Citadel – is of interest. This traumatic event allows one to test the extent to which inertia dominates pre-industrial urban structures. The building of the fortress and its esplanade in 1714-1718 after the fall of Barcelona at the end of the War of the Spanish Succession called for the demolition of a very large part of the city's most highly populated and active

neighbourhood and the displacement of 17% of the neighbourhood's population (about 6,400 inhabitants) (Fig. 7). The authorities intended to build two substitute neighbourhoods to accommodate the displaced families. One neighbourhood was to be on the waterfront for port workers, sailors, boatmen and fishermen while the other would be in the Raval (the city's historical suburb) for affluent displaced families. Both projects proved to be a complete failure, however. The displaced people did not trust the legal security of the proposed beach housing district, which would have had to be destroyed if the city was besieged; the Raval neighbourhood, for its part, was an unattractive location, situated far from the central area of urban activity. Only about 30% of the displaced families can be tracked within the city and it has been found that they moved to places quite near the demolition area (Fig. 8). The rest of the displaced people probably moved outside the city walls where a shanty town arose near the port, or they took refuge in other towns. It was easier to move to another town than to a distant neighbourhood like the Raval.

Fig. 8. Families displaced by the Citadel demolitions in 1716

Despite the great extension of the demolition area, the demographic growth from 1716 and the many changes in this period, the district densities of 1770 show that the population was concentrated in the same sectors as in the past, which highlights the resilience of the city's functional structure and the inertia in the

ways of viewing and understanding this structure (Fig. 9). Consequently, the area of greatest density in the city remained close to the place where the demolition had been carried out. As from 1753, the newly planned Barceloneta district became the port workers' area, replacing the shanty town that had grown up outside the walls near the port after the demolition to make way for the Citadel.

Fig. 9. District densities, 1770

Transformation of the urban structure within the medieval walls

After two centuries of continuities and permanence, the building of the Citadel marked the onset of a long period of transformation. The true transformation of the urban structure inside the old walled precinct, however, took place above all

between 1775 and 1850. In Barcelona, a sustained growth of the population, which was common to most cities, was accompanied by far-reaching economic changes that turned it into the Iberian Peninsula's leading industrial centre. The urban structure's transformation has often been focused on the gradual replacement of the so called 'craftsmen's houses' (comprising in one structure the workshop and residence of a single family) by 'tenement houses', which were taller (from five to seven floors) and contained apartments that were rented to a number of families. In addition to revealing the progressive separation between places of residence and work, it was considered that this transition reflected the mercantilisation of relations with a visible replacement of use value by exchange value. Other processes of equal or even greater significance, however, may be added to these gradual changes. The first of these processes involves the progressive displacement of the city's population and activity towards the Rambla and the Raval, an area that had been traditionally considered peripheral. Although the Raval stood within the walled precinct, it was very sparsely inhabited because it stood outside the first medieval wall and had a clearly suburban character. The attempts to carry out its urban development shortly after 1714 failed and, as may be seen from the density of the districts in 1770 (Fig. 9), the city's activity continued to unfold almost exclusively in the neighbourhoods nearest the Citadel. As from this year, however, a long-term change in this trend began to emerge. The critical event in this turning point, which marked an end to the century-old inertia, was the Rambla's urban development, which began in 1775. This process entailed the demolition of the city's first medieval wall and the building of a new tree-lined promenade that changed the standing of the whole Raval district. From 1785 to 1859 many new streets were built and inhabited there and the city's growing densities brought about a complete change in its population's spatial distribution (Figs. 10-11).

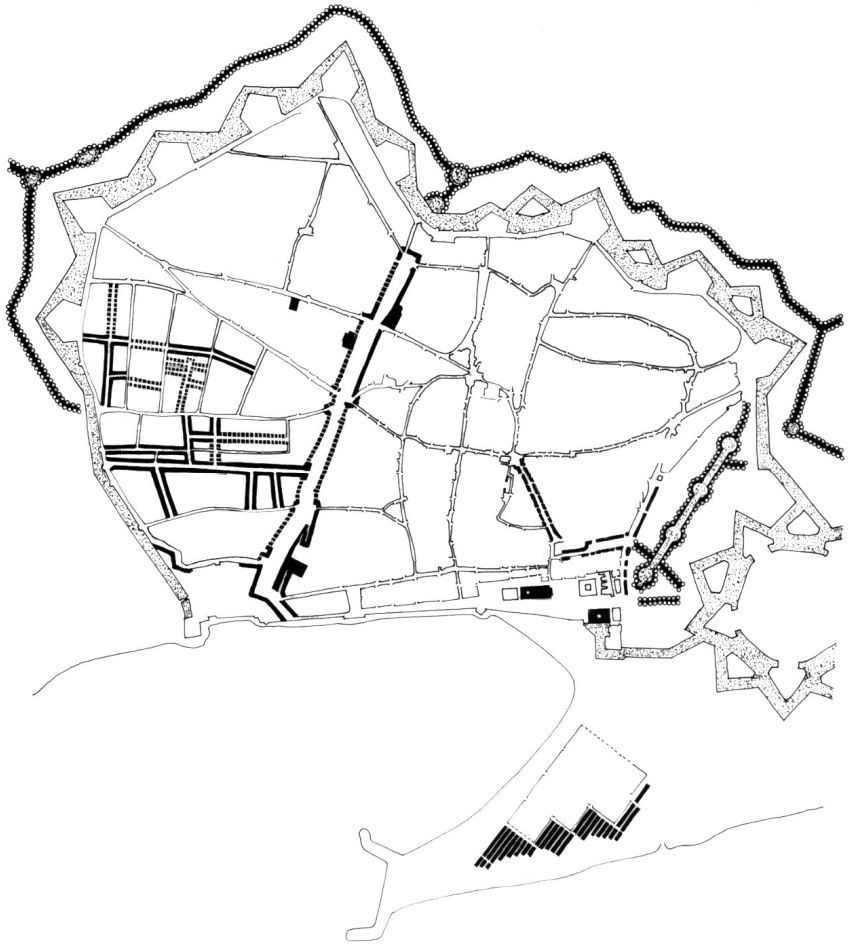

Fig. 10. New streets built in 1785-1808

Fig. 11. New streets built in 1836-1859

The new cotton mills established in Barcelona from the 1740s were initially located in the traditionally productive areas of the medieval city, but by the end of the 18th century most of these mills and above all the large ones with the greatest need of space had installed themselves in the Raval district. When steam engines were introduced in 1833 and the industrial impetus was renewed after the crisis of the early decades of the 19th century, the Raval's industrial character became even more pronounced. This is shown by the location of the various activities of the cotton industry according to the data of a guidebook from 1841 (Fig. 12).

Fig. 12. Cotton industry, 1841

The introduction of steam-driven industry coincided with political changes that put an end to the *Ancien Régime's* foremost structures and completed the city's transformation process within its old walls. Indeed, as from 1836, laws decreeing the confiscation of Church properties allowed the replacement of religious buildings by new public spaces and services (squares, markets, university, theatres, new parish churches, jails, etc.). A change in the general perception as to what constitutes the notion of "city" had been taking place throughout Europe from the end of the 18th century: there had been a shift from a 'heraldic' view that valued cities for their antiquity, nobility, privileges and pious manifestations to a new view of 'service cities', a view that valued their economy, administration and public places and facilities (Teyssot 1977 – Lepetit 1979 – Monclús 1989). The change in the way of looking at the city laid the ground for the interventions carried out between the confiscation of the monasteries in 1836 and the demolition of the city walls in 1854.

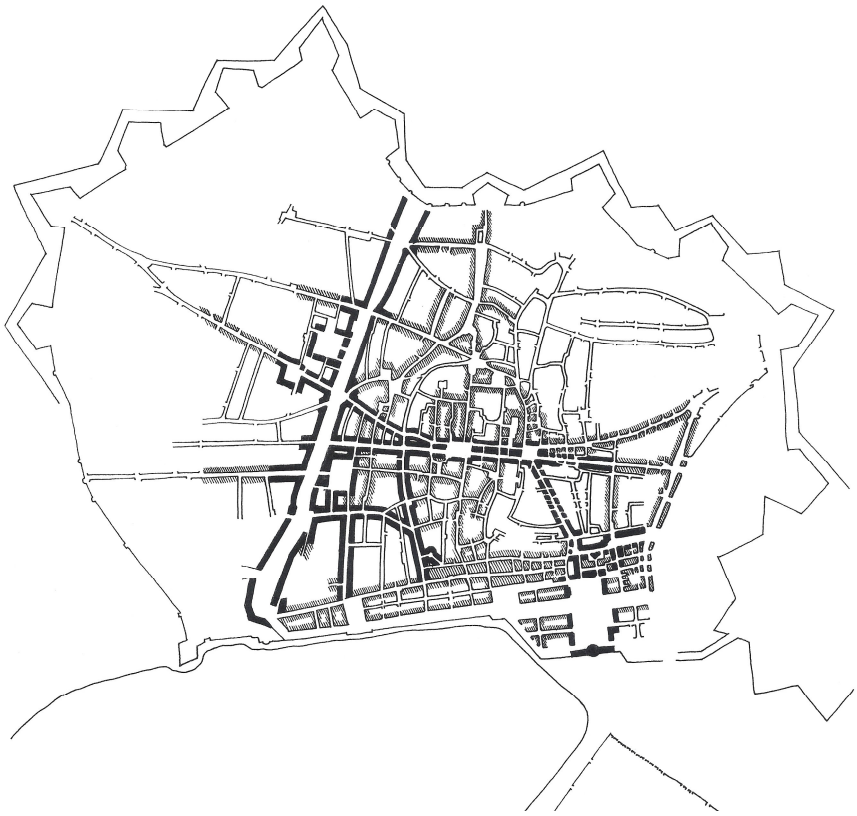

Fig. 13. Street land values, 1859

The data compiled in *Teoría general de la urbanización* (General Theory of Urban Development) by Ildefonso Cerdà, the author of Barcelona's expansion project, provides a useful description of the city in 1859 (Cerdà 1867). Higher densities were concentrated in the peripheral areas where industries were established and industrial worker families settled. The mapping of the cotton industry activities in 1841 contrasts with the higher street land values in 1859 (Figs. 12-13). The political and economic changes between 1836 and 1859 led to a centre/periphery organisation of the city that was based mainly on land prices and rent-paying capacity, reflecting a purely economic stratification.

The struggle for the demolition of the city walls and the spectacular expansion of the city beyond its walled precinct as from 1859 often cause the primordial transformations of these preceding phases in Barcelona to be overlooked.

FIGURES

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