



A Model of Functional-Spatial Transformation of Medieval Urban Structure. The Example of Krosno in the Subcarpathia in Poland

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Abstract

Cities of historical origin are a key element of European cultural heritage. Currently, they face a socio-economic crisis and spatial degradation. The subject of this study is the historical spatial layout of a medium-sized provincial town that obtained its municipal privileges in the late Middle Ages. It was a royal town founded under Magdeburg Law in the fourteenth century as a part of an important initiative of Casimir the Great for the urbanization of old Małopolska. The research problem was to find an answer to the question of how to make use of this valuable material historical heritage in the development processes of medium-sized towns in the context of contemporary threats such as unfavorable demographic, climatic, and economic changes. The main objective was to determine the potential of historical spatial structures in the process of regaining lost identity and distinctiveness, while the application objective was to create design and programming guidelines that would be useful in conducting potentially effective spatial policy. The research procedure was conducted in several stages, from the perspective of an architect-urbanist. It began with an outline of the historical urban structure and was followed by its morphological analysis and urban planning analysis. The analyses took into account aspects such as compactness, clarity of separation from the surrounding landscape, topography-dependent morphology, clarity of separation between public spaces, and mobility. It was concluded that the form of the historic urban fabric can largely determine the character of the city and its functional surroundings, can also be its brand and a symbol of cultural continuity, but at the same time can be a friendly place to live.

Keywords

City · Medieval · Urban heritage · Transformation · Planning

1 Introduction

Cities as an organized spatial structure evolve under the influence of internal and external conditions. Evolution does not mean the total loss of previous spatial forms, but their adaptation to new conditions. In many contemporary cities, new structures, and the organization and functioning of the city are anchored in earlier structures. The complexity of the urban organism, its functional, spatial, and social diversity generates not only a difficulty in formulating a conceptual apparatus of the city, but also in searching for scientific concepts that are based on combining historical values with contemporary conditions in a synergic bond (Prokopska & Martyka, 2017). The state of constant changes related to the development of urbanization, political, social, and economic transformations does not facilitate building a structural model of modern cities and creating optimal development strategies (Zuziak, 2008). Studying past patterns allows us to see contemporary urbanized organizations more clearly. Noteworthy is the initial stage in the evolution of a city, i.e., the stage that is its historical documentation, used in order to study the process of transformation of one structure into another and the relations between them (Zuziak, 2015).

By looking for inspiration from the past, we can better understand the functioning of the city today, especially when the medieval spatial layout, which is considered an ideal model, is preserved. Medieval towns at a certain stage of civilization's development were optimal places providing security from both strangers and nature, which was extremely difficult to tame. Concentrations of settlements built to provide security for their inhabitants became local, regional, or global points of exchange and trade, which

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allowed for their continuous development. The medieval city was extremely diverse in its spatial forms, but extremely flexible both in adapting to the changing nature of trade and to specific internal and external conditions throughout history (Mironowicz, 2016). The layouts of medieval towns, together with the main square in the form of the market square, have always constituted the heart of the city while strongly influencing and determining the individual landscape of the city (Martyka, 2020). Towns of special importance and especially the extremely valuable ones from the medieval period are very often still the most expressive component of the city with a symbolic meaning crystallizing its structure (Wejchert, 1984).

In Krosno, the medieval urban layout is a priority element of the cultural landscape and a part of the cultural heritage of Poland. The material heritage of Krosno is mainly the medieval urban layout, which has been largely preserved to the present day. The layout model of the market and the marketplace blocks in the existing urban tissue is readable. The original premedieval transportation system, which influenced the layout of the town, is also clear. The streets leading from the corners and the center of the square are visible. The historic layout is protected by law through an entry in the register of immovable monuments of the Podkarpackie Voivodeship with number decision A-376. However, it is not the monuments that have made Krosno famous in Europe and worldwide but its traditions linked to the oil industry and the manufacture of decorative and functional glass, but this can also be extended to the heritage of medieval urban planning.

2 Methods

This paper presents a multidirectional characterization of the historic spatial layout of Krosno, which belongs to the group of cities of medieval provenance. The aim of the presented research is a synthesis of previous historical research on the process and conditions in the initial period of shaping the structure of the city, which was formed over 670 years earlier. Another objective was to analyze the contemporary urban layout in the context of the preserved elements and its authenticity, as well as a proposal to enhance the attractiveness of the layout and its current protection. The main application objective of this work is to define guidelines useful in strategic and operational documents regulating the direction of Krosno's development and to search for principles that will be helpful in directing structural-creative processes in selected categories and objectives, such as continuity of public spaces, integration of structure, or revitalization of key areas.

The research procedure was managed in several stages from the perspective of an architect-urbanist encompassing

scientific knowledge, experience, and practice in the field of architecture and urban planning and the history of city construction. It began by outlining the construction of the historical urban structure on the basis of research techniques such as queries, literature, and archival research. The historical city structure depicted in the First Military Survey (1779–1783, *Josephinische Landesaufnahme*—First military survey) was confronted with the nineteenth-century cadastral plan and the contemporary composition of spatial elements. An important stage in the research procedure was field research and inventorying of the town area delineated during its incorporation, with particular emphasis on the market square, the block of buildings surrounding the market square, and public buildings such as churches and the town hall. Photographic documentation of buildings and urban interiors was also made.

After a review of the literature and a search of archival material, the current state of affairs, primarily spatial but also infrastructural and social, was identified and analyzed. An urban analysis was carried out on two scales; on the first scale the distinctive elements of the historic urban core were articulated and directions for its harmonization with the immediate surroundings were indicated. The second scale articulates the regions of the city by defining their dominant functions (Lynch, 1960). Urban composition and public space play a key role in defining the relationship between historic spatial and urban layout. The harmonious composition of spatial structures means integrating the urban system at appropriate levels and establishing harmonious relations with individual morphologically distinctive areas of the city (Wejchert, 1984). The analysis of the above parameters interpreted in the form of graphic diagrams made it possible to read the specific structural logic which can contribute better to the orientation of the city's development processes in selected categories and objectives. Those would be, for example, the continuity of public spaces and the integration of structures with priority given to the protection of the medieval urban layout. All of this is in line with the noticeable demand to look for new spatial planning tools in Poland in order to be able to face the threats typical of today's developed world, such as suburbanization and the blurring of urban identity (Zuziak, 2017).

3 Planning Conditions

The Polish Planning and Spatial Development Act (2003) defines the local plan as an operational act of local law, which should specify the principles of protection of cultural heritage and historical monuments, as well as the rules of shaping public spaces. This is also the case in Krosno. The central area of Krosno is covered by the Local Spatial Development Plan (2019). The regulations contained in

the plan also concern the market square as the main public space in relation to the functions of the surrounding quarters, where service, residential and administrative functions are planned.

The Municipal Programme of Monuments Protection of Krosno is another document that covers the spatial policy in the field of cultural landscape protection. Its findings specify the scope of cultural landscape protection of the historical urban layout of the old town complex, as well as particular immovable and archaeological monuments entered in the register of monuments of the Podkarpackie Voivodeship and buildings entered in the communal register of monuments. There are general and specific guidelines related to the development of buildings concerning, among others: protection of cultural assets, development, environmental protection, spatial order shaping, and visual communication. The program for protecting historic monuments is a document that needs to be updated periodically. However, the first one, for the first 4 years, seems to be crucial for the further programs in this respect, as it is based on a broad recognition of the complexity of the issues. It also determines the priority directions, which are an important point of reference for the programs constructed for the subsequent several years. Future modifications of the program should take into account new legal and administrative conditions; changing social, economic, and cultural conditions; new evaluation criteria; and the current state of resource preservation, as well as periodic evaluations of the effects of implementation of the current program.

4 Literature of the Subject Synthesis

The history of the spatial development of cities during the medieval urbanization campaign in historic Lesser Poland is the subject of many valuable scientific publications that deal with issues such as politics, society, and economy. The fundamental publications of this type include items such as the following: Berdecka's (1982) "Lokacje i zagospodarowanie miast królewskich w Małopolsce za Kazimierza Wielkiego, 1333–1370" ("Locations and Development of the Royal Cities in Lesser Poland in the Years of Casimir the Great, 1333–1370") (1982), Kiryk (1985) "Rozwój urbanizacji Małopolski XIII–XVI w: województwo krakowskie (powiaty południowe)" (Urbanization of Lesser Poland thirteenth–sixteenth centuries: Cracow Province (southern counties)) and Malczewski (2006) "Miasta między Wisłoką a Sanem do początku XVI w: powstanie, zagospodarowanie, układy przestrzenne" ("Cities between Wisłoka and San rivers until the beginning of sixteenth century: establishment, development, spatial layout") as well as Krasnowolski (2004) "Lokacyjne układy urbanistyczne na obszarze ziemi krakowskiej w XIII i XIV wieku" ("Local

urban systems in the Cracow region in the thirteenth and fourteenth centuries").

The first study dealing with the history of Krosno was started by Sarna (1898) "Opis powiatu krośnieńskiego pod względem geograficzno-historycznym" ("Description of the Krosno County in terms of geography and history"). The urban planning and architecture of Krosno, a town located on the border of Lesser Poland, was the subject of numerous studies and papers. Typical urban studies in Krosno were initiated by Zychiewicz (1953) in "Studium historyczno-urbanistyczne miasta Krosna" ("Historical and Urban Studies of the Town of Krosno") and the history of the medieval town was one of the first studies conducted by Lewicka (1934) in "Krosno w wiekach średnich" ("Krosno in the Middle Ages"). Garbacik (1972) reconstructed a hypothetical plan of the town in his article "Zabudowa Krosna w XVI wieku" ("Development of Krosno in the sixteenth century").

Archaeological research in Krosno, as in other medieval towns in the region, has been conducted only at points, but unfortunately there is a lack of research on the entire historical urban layout. In the 1970s and 1980s, archaeological and architectural research was conducted on several buildings in Krosno. The results of these investigations were used in Teodorowicz-Czerepińska's study (1974) "Krosno. Studium historyczno-urbanistyczne dla planu szczegółowego" ("Krosno. Historico-urbanistic study for a detailed plan"). Later archaeological discoveries on the market square, in the years 1999–2001, during which a stone town hall building and an alderman's house were discovered in the western part of the market square, were described by Muzyczuk and Bicz-Sukmanowska (2002) in an article titled "Odkrycie dwóch obiektów architektury monumentalnej na rynku w Krośnie" ("The discovery of two objects of monumental architecture in the market square in Krosno"). The chronology and situation of the town's defensive system was researched by Proksa (1990) "Miejskie mury obronne w Krośnie w świetle źródeł pisanych i badań archeologicznych" ("Town walls in Krosno in the light of written sources and archaeological research").

5 Historical Background of the City of Krosno

Krosno was founded on the tear of dynamic urbanization of the historical Lesser Poland. It was carried out by Casimir the Great during his reign from 1333 to 1370. The location of towns in previously poorly urbanized areas was a consequence of the king's ambitions and the search for favorable economic, social, trade, and communication conditions. Krosno was a medium-sized city situated at the crossroads

of important trade routes to Hungary and Ruthenia. On the eastern edge of Lesser Poland cities were not founded due to the expected external threat. Few settlements took into account the need to strengthen the defence of Poland. Casimir the Great's expansion into Ruthenia accelerated the hitherto slow urbanization of the area. From that time onward, a planned economic policy of the King was noticeable, which was expressed in the location of a network of new towns in the area incorporated into the Kingdom of Poland (Berdecka, 1982, p. 96).

Prior to the incorporation of Krosno under German law, the settlement of the same name was owned by the bishops of Lubus, and it is not known when and how it came into the possession of the king. The first mention of the settlement dates back to the end of the thirteenth century, when Leszek the Black granted the Bishop of Lublin immunity in exchange for 34 Lesser Poland settlements. The fact that Krosno belonged to Sandomierz Land proves that it was within the range of Polish settlement expansion and was settled by Polish population before the location. The exact date of Krosno's incorporation is unknown, as the incorporation privilege has not survived and was probably burned in the fire at the town hall. However, it is known that the incorporation charter was issued before 1348, the year from which the oldest source that mentions Krosno as a town comes from. The inhabitants of the young town were still involved in farming. To facilitate the development of uncultivated land and forests, the residents were exempted from paying taxes for 20 years on the areas around the town that had been granted, as it was founded in difficult borderland conditions. Over the following centuries, Krosno developed dynamically and became an important element of the settlement network. Krosno was the most populous town in the Sanok region in the second half of the seventeenth century and at the beginning of the eighteenth century, when it was inhabited by craftsmen of more than 36 specialities and 10 guilds functioned, and their products were exported to Slovakia and Hungary (Motylewicz, 1993). The area around Krosno is regarded the center of the Polish oil industry. The privilege of lighting the town with rock oil appeared as early as the sixteenth century in documents kept at the Franciscan monastery. Oil resources in the vicinity of Krosno are mentioned in subsequent sources from the seventeenth and eighteenth centuries (Czastka, 1973).

From the seventeenth century, the development of the town started to regress, which was caused by wars and disasters. The most devastating events for the town's population were invasions and passages of both the Polish army and the Swedish, Tatar and Hungarian invaders, as well as frequent attacks of robbers. The first Swedish troops appeared in the region in 1655. Swedish troops were stationed in Krosno for a short time. The well-fortified Krosno was no match for the Hungarians, who in

retaliation plundered the suburbs and the surrounding villages (Motylewicz, 1993). Further defeats befell the towns, including Krosno in the early eighteenth century. The stay of foreign and national troops in cities and suburbs was accompanied by frequent fires. Documents testify that Krosno was hit by a fire in 1714, which caused great damage to buildings abandoned by fleeing townsmen. Epidemics of infectious diseases carried by the army, diseases of livestock were another pestilence, the latter drastically reducing their numbers on burgher farms. In addition, attacks and blockades of major roads by bands of brigands, which particularly severely weakened the economic south-eastern areas of the Republic of Poland.

At the end of the eighteenth century, Krosno was considered a center of greater importance, but it still ranked sixth among the eight largest towns in the Podkarpackie region. Krosno was still in crisis in the nineteenth century. In the middle of the nineteenth century, the basis of Krosno's economy was still agriculture and farmers dominated the socio-professional structure of the town's inhabitants. Although the Austrians created an administrative and judicial district in Krosno, this decision did not significantly influence the economic revival of the city. In the last decades of the nineteenth century, the life of the town was still concentrated in the historical center with its old buildings. It was the basic substance on the basis of which the center performed its administrative function. Housing problems were solved by making use of existing buildings. For a number of years after 1867, the year in which the Galician Autonomy began, the local authorities did not manage to erect a single new public building. Only the former Jesuit complex was partially rebuilt from the ruins. The railway station was the first completely new public building, but it was far from the center. Thanks to the development of the railway, crafts, and the oil industry, Krosno finally broke through the period of economic stagnation. Krosno became an important center from where oil was exported by rail to the whole world (Kosiek, 2001). Today, Krosno is a district town located in the southern part of Podkarpackie Voivodeship, which it became part of as a result of the last administrative reform of the country in 1999. In the years 1975–1998 it was a voivodeship town. Currently the city has a population of almost 46 thousand inhabitants (Statistics Poland, 2022).

6 Development of the Spatial Layout of Krosno

The medieval town model has evolved over the centuries. In terms of typology, it was divided into irregular and regular cities. In Europe, the idea of the regular city, which was based on an orthogonal grid of streets, was widespread. The

layout of the square and streets created an infrastructure of trade that allowed for the export and distribution of goods, linking local manufacturers with visitors, and organizing the exchange of goods while ensuring the safety of all participants in this process (Benevolo, 1980). In the center of the city there was the main square: a quadrilateral market square performing commercial and administrative functions surrounded by blocks of buildings on an orthogonal grid of streets within strictly defined boundaries marked by defensive devices. Monumental buildings such as churches and town halls, gates, towers, and towers, in addition to performing important urban functions, were architectural dominants (Adamska, 2019). Such a city model was also realized in Krosno.

Krosno was located in a place with particularly favorable defensive qualities in the Wisłok and Lubatówka forks on a naturally formed hill, which is still limited in some places by an almost vertical high escarpment (Fig. 1). The town was delimited in the direct vicinity of the existing settlement on its southern side and its spatial layout was integrated into the plan of the newly located town becoming a part of the entire layout of the emerging town. In the northern part of the medieval town layout, the triangular square, which constituted its center, is still visible. Even today in the urban layout of Krosno, in the northern part of

the old city, the wide layout is clearly visible. At the fork of the roads, often found in precolonial layouts, a market square was formed. In the north-eastern part there was also a church before the foundation of the town, and on its other side there was a manor house of Przemyśl bishops. This is an example of joining one urban organism into two differently shaped settlement units of a pre-localization village and a town located on an orthogonal plan (Malczewski, 2006).

The plans of medieval towns had a regular layout based on simple numerical ratios. Most of the towns in the region established in the Middle Ages were laid out on a measuring module of the so-called big rope, the length of which depended on the size of the smallest component of the foot (1 big rope = 10 rods = 150 feet). As established by researchers, Krosno was measured on the basis of a foot of 30 cm (Berdecka, 1982). The city area was divided into building blocks and plots—the smallest spatial units. The layout and delimitation of the market, or main market square, took place at the beginning of the location action. Krosno, as already mentioned above, had two squares in the Middle Ages. The older square was originally situated in the place of today's trapezoid-shaped square adjacent to the former palace of the Przemyśl bishops palace by the main street leading from the market square to the Cracow Gate (Fig. 2).



Fig. 1 Contemporary silhouette of the historic layout of Krosno built on a naturally formed escarpment. Photo by Author 2022



Fig. 2 The view of the triangular square, which is a relic of an earlier settlement than the city. To the left of the shot is the Przemyśl bishops residence, which now houses the Subcarpathian Museum. At the end of the street view axis is the Parih Tower. Photo toward the south-east. Photo by Author 2022

The new city square was the central point of the structure mainly due to its size. The square was laid out on a rectangular plan, the shape of which was distorted by the lying of the land and the location of older buildings that were adapted to the new layout. The Krosno Market Square has a parallel layout in terms of the direction of the roads that lead out of it. The market had six entrances and the main trade route from the south to the north, from the Hungarian Gate to the Cracow Gate, ran through its center, dividing the town and the market into two parts. The southern and northern fronts of the market were three strings long, and the eastern and western fronts were two strings long each. The northern frontage was slightly shorter by about two rods, and the shape of the market was similar to a trapezium with dimensions 135.90×90 m (123.5 m), i.e., 3×2 ropes and the rope dimension was 45 m. The market was surrounded by individual blocks of buildings divided into location plots of varying size (Fig. 3).

The location plot formed the basis of the rent and in the early days of the town was built up with wooden houses. One of the characteristic features of market squares dating

back to medieval times was the exceptional rank and role of market buildings. It was here that the most attractive plots of land in the whole layout were located and it was here that the wealthiest residents lived. The buildings built in the fronts stood out compared to other quarters, not only because of their size, but also because of their architecture and functional solutions subordinated to commercial functions. These buildings were subject to numerous reconstructions over the centuries under the influence of not only changing architectural styles, but also as a result of frequent fires (Adamska, 2019).

A residential block, one of the main components of a medieval town, consisted of residential plots. The widths of the plots varied over the centuries, sometimes quite significantly compared to the state in the planning period. In addition to the dwelling house, the plot also housed a workshop. The plots in market square blocks were six rods long. A town hall was located on the square. The location town and the existing settlement were surrounded by a single line of defensive fortifications with two gates. The area of the city within the defensive perimeter was more than 7.5 ha. Krosno had a well-developed street network. The network of main streets leading from the market square was complemented by farm streets serving the rear of the market blocks and back streets leading to fields and farm buildings. The most impressive housing plots were oriented toward the main streets, with less impressive buildings along the lower streets. The width of the main streets was approximately two to three rods (8.6–13 m), the width of the second category streets was one to two rods. After the fortifications had been built, substructure or subaltern streets were created, which allowed access to the defence equipment (Malczewski, 2006).

Buildings in most of the towns were still made of wood in the first half of the eighteenth century. Only in a few larger towns such as Krosno, Jarosław, Przemyśl, and Sambor there were brick buildings. The Krosno Market Square was dominated by two-story tenement houses. Only in the north-eastern frontage stood houses with wooden extensions and arcades. The street was built with brick buildings mixed with wooden ones, but the farther away from the market square the more there were only wooden buildings. In Krosno, the south-eastern block of the market square was completely built up; in the remaining blocks there were farm buildings and gardens behind the residential buildings. In the eighteenth century, the widest plots were 24.1 cubits, 29–33.8 cubits, or even 43.8–53.1 cubits. The depth of a plot also varied in Krosno. The short plots reached dimensions of 62.72 and 87 cubits. The deepest plots reached the length of 241 and 132 cubits (Motylewicz, p. 217).

The reconstruction of cities after the fires was usually chaotic, with no respect for the original assumptions about the planning of the town. The hastily constructed



Fig. 3 The Krosno Market Square was laid out on a rectangular plan with proportions 3:2. A view of the urban interior of the market square. Photo by Author 2022

buildings were at odds with the city's previous planning principles. Some of the houses were extended beyond the building line into the market area. In the economic topography of the city, tenement houses and houses around the market square were of primary importance for trade. Their use is evidenced by the arcades, which had architectural and economic dimensions and served as a place for the display and sale of goods. House owners rented arcades to foreign merchants. The market houses and the tenement buildings had cellars and shops for commercial purposes. The tenement house at the Krosno market belonging to the nobleman Jakub Rojewski had a cellar and two brick shops, which were accessed from the arcade. There were also three living rooms and a porch. Another house had an even more modest usable area. Apart from the arcade, it had an alcove with two rooms, a larger and a smaller one, a cellar and a shop upstairs, and two stables at the back of the plot. The entrance house was arranged differently. A hallway with equipment for horse stabling ran through its entire length.

Apart from the hallway, there was a shop, a kitchen and a small chamber, a porch and two cellars, a stable and a drying room (Motylewicz, 1993, p. 214).

Churches, together with town halls, constituted urban dominants. In Krosno, the parish church plot was located outside the town block, and the church together with the square was an extension of one of the market blocks. Sometimes the church yard occupied the entire corner block of the town (the one closest to the town). The church was a permanent element of the townscape, which was the result of the natural close relationship between the church and the bourgeoisie, which had existed for centuries. The purchase of plots of land by the Jesuit order was met with dissatisfaction by the Krosno burghers. Interestingly, the Jesuits' purchase of land on the south-western side of the square was resented by the citizens of Krosno, who feared impoverishment (Motylewicz, 1993, p. 221).

The public buildings built in medieval towns were connected with the control of trade and the representative

function was secondary. The town hall was a place for council meetings, holding court, authenticating transactions, or holding prisoners. Thus, it was related to the service of trade conducted by merchants, manufacturers, or bankers (Mironowicz, 2016). Town halls were the most important buildings within the market, but in most cities they appeared later than the first commercial buildings. In Krosno, there was an alderman's tower built during the reign of Casimir the Great, which served as the oldest town hall. Most probably, this building was completely destroyed during the fire in 1500 or 1512, as it was not rebuilt, and the material from its demolition was used to build a new Renaissance town hall located on the eastern wall of the market square, as evidenced by the elements of Gothic stonework. The seats of town owners, bishops, and aldermen played a very important role in the defence system of towns. There was a defensive seat of the Przemyśl bishops in Krosno, which was first mentioned in 1386, but it is known to have existed earlier. Located at the Cracow Gate, it strengthened the defence system of the whole town (Malczewski, 2006).

The defensive system was an integral part of the medieval town, which influenced the shape of the town and set the strict boundaries of the legal zone covering the town area. The town walls had defensive and controlling functions. They allowed effective control and taxation of trade, which allowed the city to exist and grow. However, only a few towns could afford to build defensive walls (Motylewicz, 1993). The medieval fortifications of Krosno were built in stages, and the work on their construction lasted practically throughout the whole period of their existence. From the beginning of the construction on the initiative of Casimir the Great, through the works continued under King Władysław Jagiełło (Fig. 4). Until the early sixteenth century, the walls were constantly extended, repaired, and superstructured with new elements increasing their defensive effectiveness. In 1473 and 1474, Krosno repulsed the attack of the Hungarian army, as it was surrounded by walls additionally reinforced with a rampart and a moat, which together made the access of siege machines and artillery difficult. The key elements of the fortifications were the gates and towers. The Cracow Gate and the Hungary Gate had drawbridges. The gates were of great importance functionally, militarily, and in terms of communication.

The Cracow Gate was built during the construction of the fortifications in the reign of Casimir the Great, while the Hungary Gate was probably built later in the reign of Władysław Jagiełło. In the Middle Ages, the full perimeter of the defensive walls was created with a length of up to about 1200 m and its thickness in the lower parts varied depending on the conditions of defence, ranging from 180 to 240 cm reaching only 40 cm along the steep slope. It was a massive wall topped with a blank crenellation, the height

of which ranged from 5.5 to 8–9 m. Sandstone blocks with lime mortar from the quarry in Białobrzegi on the other bank of the Wisłoka River were used to build the wall. There were towers already in the fourteenth century; their exact location is not known, but by the end of the fifteenth century there were probably five of them. In the system of fortifications, there was a quadrilateral tower, which at the same time served as a bell tower in the complex of the first parish church, and it could also serve as an observation and guard point. Interestingly, around the fifteenth century, near the later Jesuit college, a half-cylindrical tower was built, which did not appear in any other town in Lesser Poland, and the nearest area of their occurrence was Silesia (Proksa, 1990).

The area of the town was relatively small compared to the suburbs and the area under the jurisdiction of the town with agricultural and raw material functions. Outside the police-defence area there were buildings and economic facilities such as mills, breweries, malthouses, brewing factories, and brickyards. In the areas granted to the town there were suburbs and town villages, apart from the fortifications there were also hospitals and hospital churches, town pastures and gardens and townsmen's farms. In Krosno, the sources speak of two suburbs, one by the Cracow Gate, the second suburb stretched by the gate and the road to Hungary. A suburb was probably also a small settlement near St. Adalbert's Church, which was adjacent to the town from the Korczyzna side. For sanitary reasons, hospitals were usually located outside the walls, but remained in strong ties with the town. In the area of the suburb by Cracow Gate, there was the Holy Spirit Hospital with the Church of Our Lady of the Snows, which was dependent on the city, but also benefited from the foundations of townsmen and other donors. At the turn of the fifteenth and sixteenth centuries, a second hospital for widows was founded, probably by the town council (Malczewski, 2006).

A careful review of the source material shows that the process of building up most of the towns within the fortifications ended before the middle of the seventeenth century. In the following periods, as a result of destructions, the spatial development of towns was significantly slowed. It was not until the second half of the eighteenth century that the process of development outside the town walls could be observed. This occurred under the influence of changes in military technology, as a result of which the former defensive systems lost their previous significance. The towns took on more and more the character of open settlements.

The nineteenth century brought the development of the oil industry in the area of Krosno, as well as a number of public buildings in the city, such as the building of the former Credit Society; the building of the "Sokół" Gymnastic Society; the Male Teachers' Seminary; and at the beginning of the twentieth century, the County Council building, the



Fig. 4 Preserved fragment of the original city walls on the south-western side of the urban layout of Krosno. Photo by Author 2022

building of the “Zgoda” Bourgeois Society, and the Court building. The complex of the oldest buildings of the glass-works and the so-called “Lnianka” are high-class examples of historic industrial architecture created before World War II (Stojak et al., 2009).

7 Inventory of Krosno on the First Military Map (1779–1783) and on the Cadastral Plan from the Nineteenth Century

The urban layout described above can be found on archival maps, the first of which waxes to date from the eighteenth century, but much of it is legible in today’s layout. Military maps, so-called Mieg’s maps, made on the basis of the first topographic picture of Galicia, i.e., southern territories of the Republic of Poland occupied by Habsburg monarchy in the first partition of Poland, drawn up in a scale of 1:28,000, are the first cartographic documentation of a city’s structure in relatively high precision (Fig. 5). Although it was drawn

up in the modern period, it contains a huge, and often the first resource of spatial information from the medieval period. According to many medieval town researchers, towns in the former Lesser Poland developed extremely slowly, and many of them, including Krosno, did not out-grow the town outline delineated during the settlement.

In the second half of the eighteenth century, Krosno concentrated its buildings within the outline of the walls laid down in the first phase of the town’s functioning. The perimeter of the walls is closed, with two visible gates to the city. The peripheral fortifications are not marked as masonry, but as earthwork on a natural slope. Fragments of the peripheral walls are visible and are single, with a visible quadrilateral outline of towers by the parish church and behind the western block of the market square development. On the eastern side, the walls are even more fragmentary. The square has a clear 3:2 ratio, with the town hall in the middle. The houses in the square blocks on the market are built of brick with narrow outbuildings along one edge of the plot. In addition to the compact market development, the

frontage development is distinct, formed by several houses on today's Slowackiego street in the north-eastern part of the town. Outside the square, there is a parish church to the north and a Franciscan monastery complex to the south-east. The most impressive building is the Jesuit college with an inner courtyard. Outside the town, on the southern side of the Hungarian road, there is a spatially impressive Capuchin monastery surrounded by full walls. See Fig. 5.

The cadastral map from the nineteenth century is definitely more accurate (Fig. 6). It marks the plots of brick and wooden buildings and the land use. In the nineteenth century, masonry buildings were concentrated around the market square forming full frontages. The town hall on the square is no longer visible. Comparing the width of the market plots shown on the cadastral map with the current state, it can be concluded that the vast majority have remained unchanged. There are two dominant elements in the square in the form of perhaps wooden wells. The buildings on the streets leading from the northern side of the market in the direction of Cracow Gate are much less imposing and the frontages of the streets, apart from brick buildings, are made of wood. Interestingly, gardens are visible on many plots of land. Monuments such as the parish church and the Franciscan Monastery, the Przemyśl Bishop's Palace, and the Jesuit College Stand Out in the spatial structure. Outside the outline of the former fortifications stands the Camaldolese Monastery with its park, and on the city side there is an organically shaped town square in front of the former Hungarian Gate. See Fig. 6.

8 The Historical Layout of Krosno Today—Selected Aspects of the Urban Analysis

In this article, the analysis of urban morphology has been narrowed to a qualitative description of forms that are considered elements that make up the spatial structure of a city. The formal analysis is based on field observation, whereas the morphological analysis focuses on the issue of the historical genesis of the forms. The analysis of the elements of the city plan, available from direct observation, is in line with Conzen's (1960) research. It is also based on the Polish school of morphology, which has methodological foundations laid by Dziewoński (1962). The study of the city's spatial structure includes the characterization of the elementary distribution systems and also the determination of the spatial and functional relations occurring between these systems. The analysis presented here was also constructed with the help of a profile based on



Fig. 5 a. Eighteenth-century old town area depicted on the First Military Map (1779–1783). Source Austrian State Archives. Signature: z.B B "IXa 242"



Fig. 6 b. The area of the old town is depicted on the cadastral map of 1849. Source State Archive in Przemyśl. Signature: 56 AP/815 M

available documents and a synthesis of its essential elements, in terms of functional and formal solutions. Due to the varying nature of urban and planning studies, graphical schemes that synthesize important parameters of spatial structure have been prepared in this article. See Fig. 7.

Krosno has a heterogeneous, regular, and irregular layout. The reason for that may be the development of the city over a long period of time and the change in spatial layout along with the socio-economic transformations. In the central zone of Krosno, several prominent functional-spatial units can be distinguished:

- downtown area with a regular layout, where the public life of the city is concentrated within the historical center dating back to the Middle Ages;
- residential areas with diversified development, forming several development zones, mostly created during the twentieth century;
- industrial areas located mainly within the belt pattern between the railway line, the oldest part of the zone, the old town, and the nineteenth-century railway line;
- areas with specialized functions such as sport, commerce, communication, religion, or leisure with their origins at the turn of the twentieth and twenty-first centuries;
- areas with mixed functions, created in the late twentieth and early twenty-first centuries.

As can be observed in Krosno, the level of coordination of urban planning activities in terms of composition and spatial interrelations is relatively low. The observation of urban reality indicates that the chances of such logical relations appearing are far too rare. Even if the provisions indicating the necessity of ensuring functional and compositional links between individual areas can be found, the arrangements of spatial development plans can be found (including in areas of key importance for the city development strategy), such arrangements are not implemented in practice (Zuziak, 2017).

The square is located in the southern part of the old town on the axis of the main established historical route. The trapezoid-shaped market is surrounded by compact buildings with two floors. Inside the market square in the middle there is a model of the town, fixed in the pavement contours of the historic buildings of the town hall and the alderman's house on the market square. The market area is characterized by a concentration of restaurants with summer gardens.

Currently, around the square there are historic houses from different periods. Some of them have characteristic arcades. The arcades in the eastern part of the northern and southern frontage date from the sixteenth and seventeenth centuries, while those in the western part of the southern frontage are a reconstruction from the turn of the nineteenth

and twentieth centuries. The outline of the walls discovered during the archaeological works on the remains of the alderman's tower and the town hall was marked on the square with a different surface. See Fig. 8.

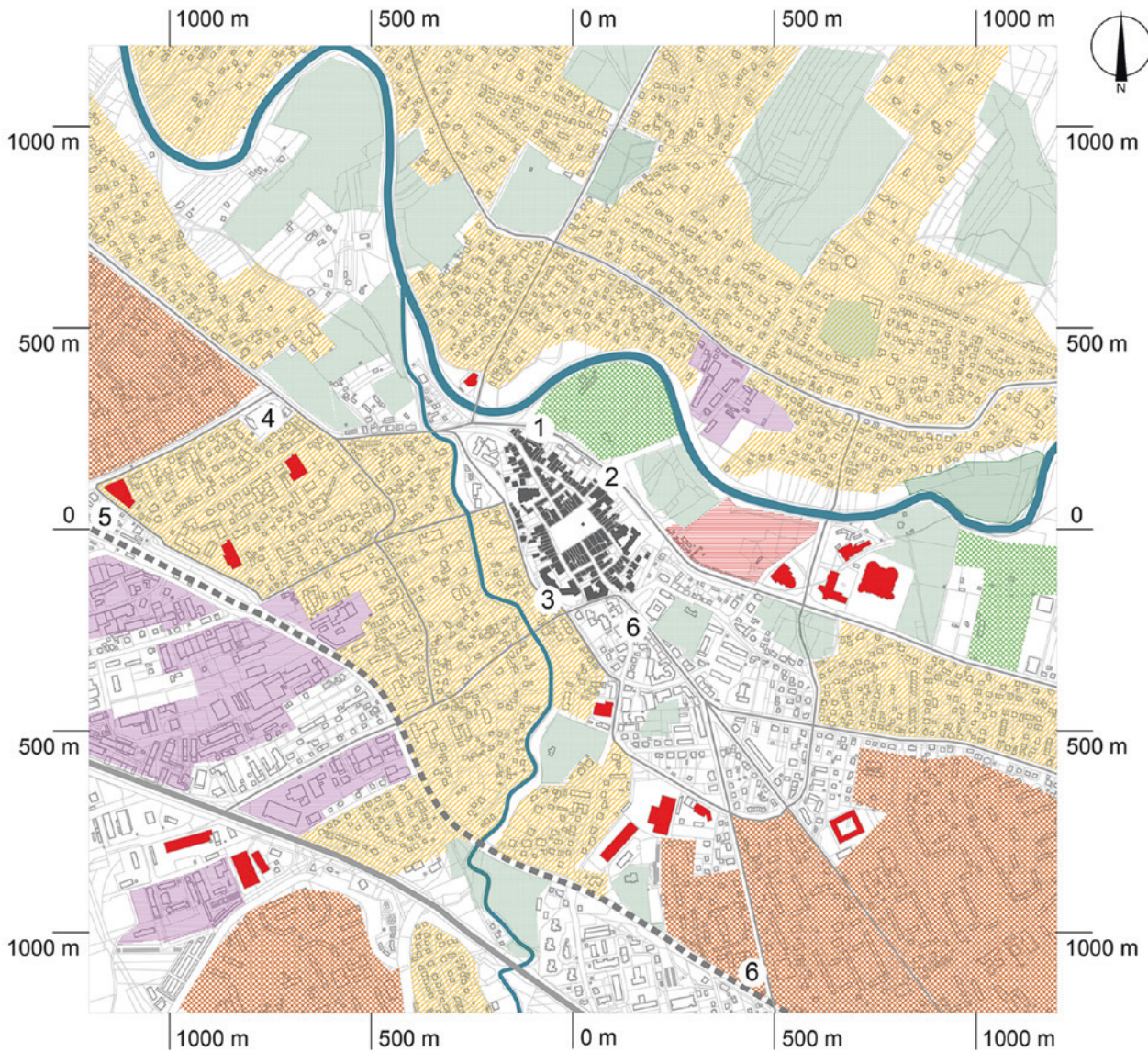
Multifunctional use is a characteristic feature of the market square, differentiating it from other urban squares. The functioning of the market square has undergone changes of varying intensity, but some of its functions have remained the same, such as shopping, services, and housing. However, the communication function has decreased due to the expansion of the road network and the administrative function due to a change in the location of the municipal authorities. In recent decades, the representative function has increased, expressed in the form of celebrations held on the surface of the square. The new market functions that have emerged in recent years are tourist and recreational functions. The specificity of the market is the varied intensity of individual functions, which depends on the size of the city, its importance in the region, as well as the seasons, and the occurrence of local initiatives and activities of local authorities. Together, however, they complement each other and enrich the attractiveness of the square and of the entire historical establishment (Adamska, 2019).

9 Summary and Conclusions

The research related to the history of urban spatial development is a key element in the process of protecting and revalorizing historic urban complexes, especially in the face of socio-economic and ecological crises that can lead to spatial degradation of this valuable cultural heritage.

Over the centuries, the structures of the location town have been subject to transformation, but a harmonious continuity of functional and spatial characteristics has been maintained. In recent history, cities have been able to build their image on the basis of the preserved heritage and contemporary requirements through the creation of an attractive image and public spaces with a multifunctional structure responding to the needs of its users. The medieval historic structures are a valuable national heritage. They carry tangible values in the form of a defined layout, and intangible values in the form of the tradition of the place and building local identity, as well as creating the marketing of the city. Their protection and proper care and the way they are used are also in the context of sustainable development.

Kantarek (2019) argues that at the core of thinking about the city is reading the city and, more specifically, reading its physical form. Reading the city can be done according to several approaches. The first approach, by Conzen (1960), is based on the assumption that the physical form of a city is built by three basic elements: roads, plots of land, and buildings. This rather simple assumption is thus a tool to



LEGEND

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|--|--|--|---|--|
| | BUILDINGS ON THE OUTLINE OF THE MEDIEVAL TOWN WITH MAIN MARKET | | CITY MARKET AREA | 1 BISHOP'S PALACE NOW SUBCARPATHIAN MUSEUM |
| | AREA OF LOW INTENSITY RESIDENTIAL DEVELOPMENT | | BUILDINGS WITH COMMERCIAL AND SERVICE FUNCTIONS | 2 GLASS HERITAGE CENTRE |
| | AREA OF HIGH INTENSITY RESIDENTIAL DEVELOPMENT | | AREAS OF MIXED FUNCTIONS | 3 CARPATHIAN NATIONAL UNIVERSITY |
| | AREA OF CONCENTRATION OF INDUSTRIAL AND WAREHOUSE FUNCTIONS | | RAILWAY | 4 REGIONAL CENTRE OF BORDERLAND CULTURES |
| | GREEN AREAS WITH DIFFERENT FUNCTIONS | | RIVER | 5 TRAIN STATION |
| | AREA OF CONCENTRATION OF SPORT AND RECREATION FUNCTIONS | | MAJOR ROADS | 6 TOWN HALL |

Fig. 7 Spatial-functional analysis of the central zone of Krosno 2022—selected aspects

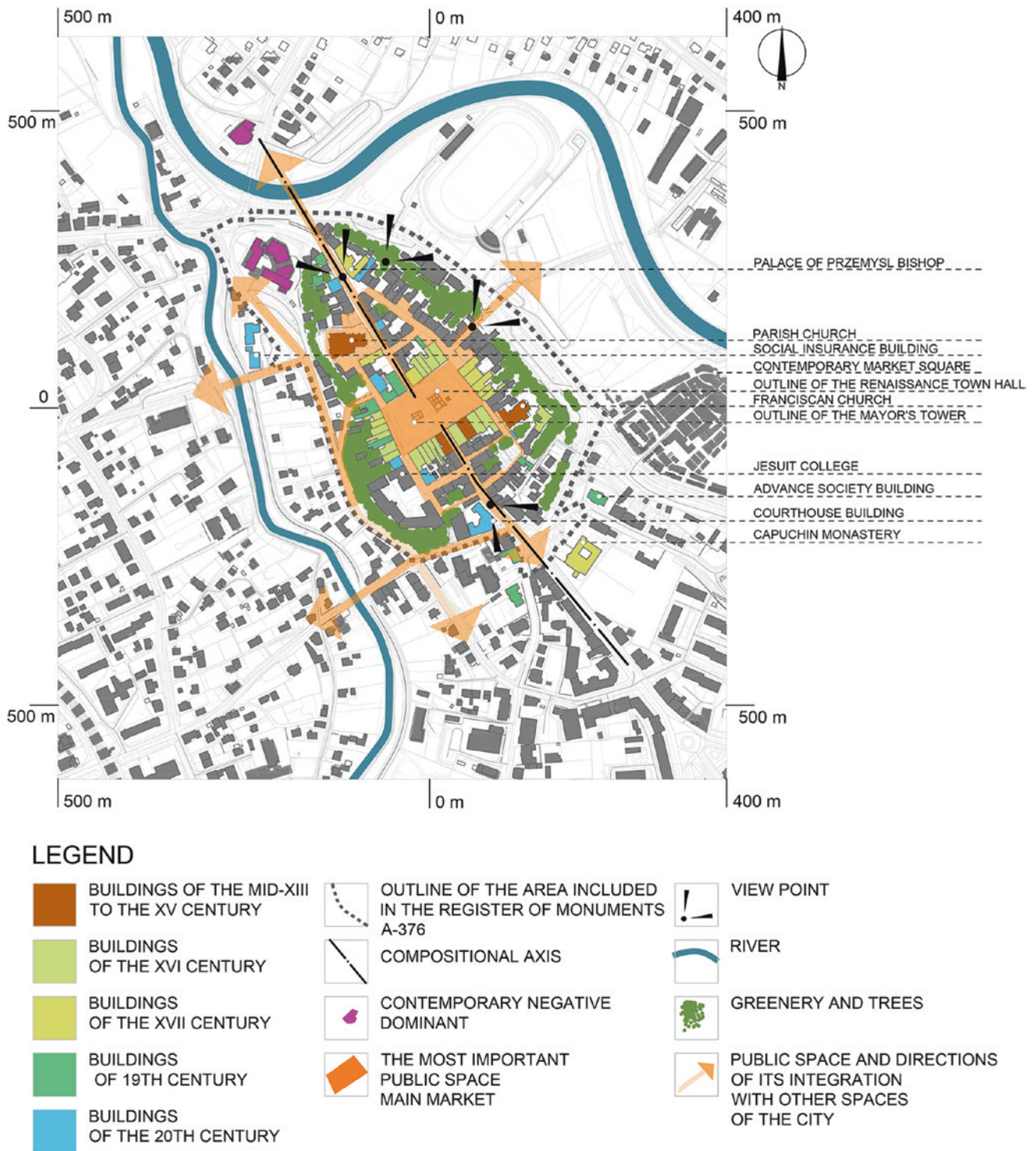


Fig. 8 Spatial-functional analysis of the old town and its immediate surroundings Krosno 2022—selected aspects

show the genesis of the original form and its transformation to the present structure. Another approach is based on examining the structure of the city on three scales: building—plot, street—block, and city—region, which are suitable for analyzing relationships. The third approach, the

most generally defined, is based on the assumption that an understanding of urban form can only come about by studying its history (Kantarek, 2019).

As Rossi (1984) pointed out, in deciphering the city, it is also worth remembering that urban space is a record of

history, culture, social life style, and tradition. The author stresses that the spatial structure of a city, developed over centuries, is not only a reflection of the historical changes of a given city, but it is also one of the most important elements of its identity. Zuziak (2015) additionally notes that the reflection of a city's development processes is its architecture and urban form. Moreover, the changes in urban space, considered against the background of cultural processes, are therefore among the most important tasks of cultural heritage protection (Zuziak, 2008). Deciphering the form of a city, regardless of the perspective adopted, can assist in plotting contemporary scenarios of city development, or, as Zuziak argues, in modeling the development of a city and creating directions for spatial policy. A variety of approaches and time perspectives should be taken into consideration in order to understand and read the process of change, and that is what this study sought to prove.

This paper outlines the history of the founding of the city of Krosno and characterizes the urban layout and the model used for its layout as well as an ex post analysis of the monumental layout. During its over 670 years of history, the layout of the city was subject to constant transformations, but the genius loci and the basic elements of the spatial structure in the form of the market square, monuments, and the main communication system were preserved. Nowadays, traditional functions such as trade and services are being continued, as well as new ones focusing on social life and tourist and recreational functions. An important factor for the future development of the city as a whole is the skillful promotion of cultural heritage and the participation of local communities in decisions on the directions of transformations.

The city center with its historical heart is a place that, due to its values of spatial development and other values that determine the attractiveness of the place, is of key importance for contemporary forms of urban life. Public spaces and places and objects of particular cultural value are an important determinant. Following the example of other cities at the forefront of sustainable development, strengthening the competitiveness of the city center should be one of the main objectives of spatial policy.

Based on the analyses and studies carried out, the general principles of shaping the spatial policy of Krosno were formulated. As a basic guideline, not only the protection of the historic fabric but also the improvement of its quality and attractiveness of the public space is the reorganization of communication in the market square and within the historic compound. This concerns car traffic and parking spaces, and bicycle mobility on foot. The key issue in terms of shaping the high-class tissue is the manner of renovation of historic facades and facades of buildings from the modernism period. The way of shaping visual communication should be continued, but extended to the surroundings

of the historic center. The chaos of advertisements and their number do not harmonize with the noble neighborhood. It is also recommended to secure the salty corroded masonry fragments on the stairs leading to the basement.

In terms of spatial policy, a holistic vision of the area's development is important while taking into account spatial, social, and economic aspects. As far as spatial issues are concerned, the synthesized conclusion in this research is the preservation and authentication of urban interiors and the building of a coherent network of public spaces both in the old town area and in the legible connections with the rest of the city structure, and shaping the continuity of the urban composition in a proper balance with the historical layout of the city. The functional diversity in the old town area is also important. It is worth creating some kind of facilitation and encouragement for residential function, which has seen the greatest downward trend in recent decades.

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