Possible Relationships Between the Spread of Tourism and Urban Zoning

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Abstract. The spread of tourism in Italy, beyond the already well-known art cities, is a phenomenon that is also growing in the south. The well-known phenomena of the spread of short-term tourism and operators such as Airbnb, Booking and many others, raise significant questions of coexistence between resident populations and temporary users brought by the spread of mass tourism. This paper in the first part analyzes hospitality models in their territorial dimension.

Organizational strategies, forms of intermediation, and guest experiences are rooted in specific spatial contexts, characterized by varying levels of supply density, functional specialization, and coordination capacity between operators.

So, it becomes important to understand where and how the hospitality offering is organized across the territory.

In the second part it investigates the possible relationships between the spread of tourism in some cities in the Puglia region in Southern Italy and the urban zoning of the planning tools that govern the land use regime in those territories according to the classical rational model of modern architecture. We want to understand whether the spread of hospitality facilities is related to the different types of homogeneous territorial zones in the municipal urban plan that define the permissible functions in the urban territory. The possible presence of these relationships can provide important insights into urban planning tools for attempting to manage these mass phenomena, which are so fragmented that they often prove unmanageable for the municipal administrations charged with managing them. We will use cluster analysis applying DBSCAN algorithm, aimed at identifying territorial hospitality systems in two Apulian cities, to verify the relationships with the zoning of the urban plan: Bari and Monopoli.

Keywords: urban zoning · fuzzy clustering · tourism planning

1 Introduction

Over the past two decades, the hospitality sector has undergone reconfiguration processes that have progressively challenged established models of supply and intermediation.

The contribution is the result of joint reflections by the authors, with the following contributions attributed to P. Perchinunno (chapter 1), to S. L'Abbate (chapter 2) and to F. Rotondo (chapters 3). Chapter 4 is a joint work done by all the authors.

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The traditional distinction between hotel and non-hotel hospitality, historically based on organizational and regulatory differences, appears increasingly inadequate to describe a landscape characterized by hybrid solutions, networks of independent operators, and digital platforms capable of coordinating supply and demand on a global scale.

At the same time, tourism demand has undergone significant evolution, shifting toward experiential forms of consumption that prioritize authenticity, personalization, and quality of the relationship over the mere consumption of a service.

In this context, the guest experience tends to be configured as a process articulated throughout the entire customer journey, in which material, symbolic, and relational dimensions interact. This evolution has significant implications for operators, who are being forced to reconsider their competitive strategies in a context marked by high uncertainty, seasonality of flows, and growing competitive pressure.

An additional element of complexity is the role of technology and digitalization. Online platforms, data management systems, and artificial intelligence tools are progressively changing the ways in which businesses access markets, interact with customers, and organize internal processes.

However, recent literature suggests that technological innovation does not act as an independent driver of growth, but rather as an enabling factor, whose impact depends on its ability to integrate with strategies geared toward experience and perceived value.

Consequently, understanding the industry's evolutionary trajectories requires an analysis that considers the combination and interdependence of various strategic levers.

In this scenario, analyzing operators' perceptions plays a central role. The expectations and assessments expressed by industry players are not simply individual opinions but reflect collective learning processes and strategic adaptation to structural constraints and emerging opportunities.

Examining these perceptions therefore allows us to detect early signs of change and identify the levers deemed most relevant for future growth. Considering these transformations, the analysis of hospitality models cannot ignore a territorial dimension. Organizational strategies, forms of intermediation, and guest experiences are rooted in specific spatial contexts, characterized by varying levels of supply density, functional specialization, and coordination capacity between operators.

From this perspective, understanding where and how the hospitality supply is organized across the region represents a preliminary step in interpreting the competitive dynamics and development trajectories of the sector. For this reason, the following section adopts a spatial analysis approach based on the DBSCAN algorithm, aimed at identifying territorial hospitality systems that go beyond the simple concentration of accommodations, returning a functional geography of regional tourist territories.

The second part of the paper compares the distribution of tourist facilities analyzed using the cluster analysis techniques illustrated in the first part with the distribution of zoning in the master plans of the cities of Bari and Monopoli, attempting to highlight possible relationships.

2 The Cluster Analysis

2.1 The DBSCAN Method

The territorial cluster map was constructed using the DBSCAN algorithm [1], a spatial clustering technique that does not impose a priori the number of groups but rather makes them emerge directly from the geographical distribution of accommodation facilities.

The DBSCAN method is based on two fundamental parameters:

– *Eps*, proximity radius, is the maximum distance within which two facilities are considered "close." In our case, eps was chosen to be around 3 km, a value that allows us to connect facilities belonging to the same territorial context and avoid merging distinct but geographically close tourist areas into a single group. In practice, two facilities within 3 km of each other tend to be considered part of the same local system.
– *MinPts,* minimum density, is the minimum number of facilities that must be within the eps radius for an area to be recognized as a cluster. Setting values around 5–6 facilities ensures that an area is classified as a "tourist area" only if there is a continuous, non-episodic concentration. Isolated or very scattered facilities are therefore excluded from the main clusters and classified as "noise".

2.2 Cluster and Geographical Distribution of Accommodations

Unlike density maps, such as the "classic" Airbnb-style (Fig. 1), which simply shows where accommodations are most concentrated, the DBSCAN map (Fig. 2) identifies actual tourist territories, that is, continuous areas where the accommodation offering is sufficiently dense and spatially connected to function as a single system (cluster).

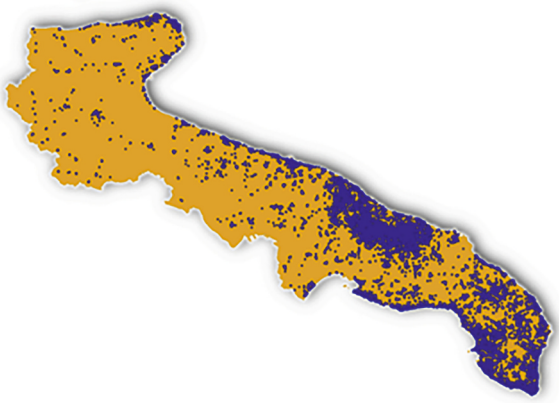

Fig. 1. Geographic distribution of Airbnb accommodations in Puglia (Source: Inside Airbnb March 2025).

Identifying territorial clusters allows us to interpret the accommodation offering as a spatially organized system, divided into functional areas characterized by different configurations of density and type of accommodation. Within this framework, analyzing the concentration of short-term rentals in Puglia allows us to identify the five municipalities with the highest absolute number of listings, based on data from Inside Airbnb.

Bari emerges as the municipality with the most listings, followed by Ostuni, Lecce, Gallipoli, and Porto Cesareo. This initial comparison allows us to immediately identify the main supply hubs in absolute terms, highlighting the central role of large urban centers and more established tourist destinations.

However, an interpretation based solely on raw values risks underestimating the intensity of the phenomenon in smaller municipalities, where even a smaller number of listings can translate into significant pressure on the local housing market.

This configuration reflects the structure of the Apulian tourism system, characterized by a strong bias toward coastal resorts and more accessible urban centers, and suggests that the spread of short-term rentals responds to territorial attractiveness rather than uniform distribution.

In particular, the analysis highlights how the phenomenon is strongly polarized in a few municipalities, corresponding to the region's main tourist and urban hubs. Among these, Bari, Ostuni, Lecce, Gallipoli, Porto Cesareo, Otranto and Monopoli stand out, representing the municipalities with the highest number of Airbnb listings.

The recurrence of the same municipalities already identified by the analysis of absolute values confirms the existence of areas where the short-term rental market is structurally more developed and consolidated, establishing itself as a significant component of the local housing system.

In these contexts, the pressure of the short-term rental market appears particularly significant, suggesting that the critical issues related to housing availability and competition with the residential market are concentrated primarily in these areas rather than uniformly across the entire region.

Analyzing the map resulting from the DBSCAN application (Fig. 2), it emerges that the clusters represent homogeneous macro-tourism areas and not individual municipalities. Each cluster corresponds to an area where the offerings are dense and spatially connected, meaning they follow similar patterns within a few kilometers.

The largest clusters coincide with the region's main tourist hubs:

- coastal Salento (Gallipoli–Otranto–Leuca area),
- the urban area of Bari,
- the Lecce system and hinterland,
- the Itria Valley and the central Adriatic coast (Monopoli–Polignano–Ostuni),
- the Gargano.

Among these we will focus, in our work, on the two following areas:

1. the urban area of Bari,
2. the central Adriatic coast (Monopoli).

The areas in gray or classified as "noise" do not indicate a lack of offerings, but rather a presence too dispersed to be interpreted as a true tourist district: these are areas where facilities exist, but do not form a continuous territorial system.

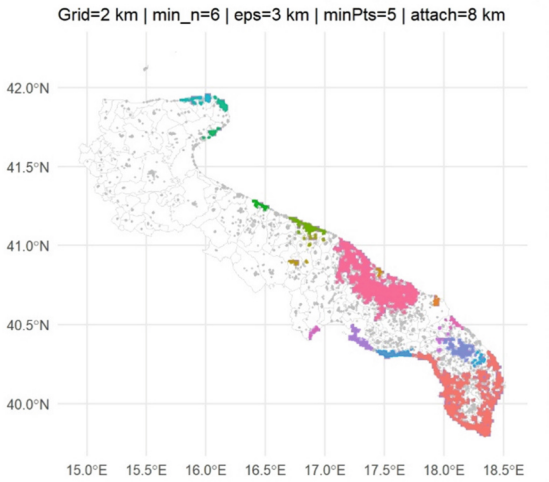

Fig. 2. Territorial clusters of accommodation offerings in Puglia (DBSCAN).

Unlike other methods, DBSCAN does not require to predetermine how many clusters we want. The final number emerges automatically based on how broadly we scope (eps) and how strict we are in requiring density (minPts).

This way, the clusters are not an arbitrary choice, but the result of a balance between geographic proximity, territorial continuity, and the intensity of the accommodation offering.

The result is not just a concentration map, but a true functional geography of tourism in Puglia, made up of recognizable and comparable tourist areas.

2.3 Breakdown of Clusters by Type of Accommodation

The breakdown of clusters by accommodation type (Fig. 3) shows an interesting distribution.

The *"Entire home/apt"* category dominates in all major tourist areas, particularly along the coastal Salento, the Itria Valley, and the Lecce area. This confirms that the prevailing model of non-hotel accommodation in Puglia is that of the complete housing unit.

However, the other types are not simply marginal but follow specific territorial logics.

"Hotel rooms" are concentrated primarily in the main urban centers, along some more structured coastal stretches, and in areas with a more consolidated tourism tradition.

"Private rooms" show a more widespread but less continuous distribution, often linked to medium-sized urban centers, inland areas with more mixed tourism, and contexts where hospitality is more integrated into the residence.

"Shared rooms" while representing a lower overall share than entire apartments, are not distributed randomly and are concentrated in a few specific clusters, especially in areas with high tourism intensity and in contexts with a strong presence of Young or international tourism.

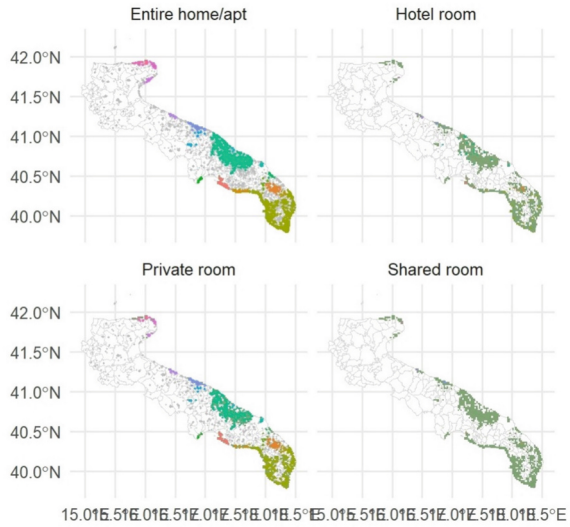

Fig. 3. DBSCAN Cluster by Type of Accommodation in Puglia.

Overall, the clusters not only describe where the facilities are concentrated but also show that each tourist area tends to have its own "offer profile".

In this sense, the map illustrates not only the geography of tourism, but also the geography of hospitality models in Puglia region.

The identification of territorial clusters allows us to understand the accommodation offering as a spatially organized system, characterized by differentiated configurations in terms of density and type of accommodation.

3 The Spread of Tourism in Some Cities in the Puglia Region and the Urban Zoning of the Planning Tools

3.1 Introduction

After attempting to understand, through analysis of data provided by the Airbnb platform, where tourist flows are concentrated in the cities of the Puglia region, we seek to understand whether these densities have any possible relationship with the urban destinations of the municipal plans of these cities, observing two of the cities with the highest tourist density: Bari and Monopoli.

The history of urban planning and its first tool, zoning, is essentially the story of how cities tried to control growth, land use and raising the level of health and safety, as they became more crowded and complex.

Urban planning and zoning have evolved significantly over time in response to changing social, economic, and environmental conditions. As we know, the Industrial Revolution in the 19th century marked a turning point in urban development. Rapid industrialization led to overcrowded cities, pollution, and poor living conditions. Polluting

factories were often located near residential areas, without any particular restrictions, exposing people to harmful environments.

In response, governments introduced public health laws and basic land-use controls to separate industrial and residential functions. These early efforts laid the groundwork for modern zoning. Modern zoning began in the late 19th and early 20th centuries. Germany was among the first countries to implement systematic zoning regulations, dividing cities into districts based on land use [2].

In the United States, New York City adopted the first comprehensive zoning resolution in 1916. This law regulated building heights, land use, and density, largely in response to concerns about skyscrapers blocking light and air [3].

Several urban planning movements shaped zoning practices. Later, modernist planners like Le Corbusier advocated for strict functional zoning, separating cities into areas for living, working, recreation, and transportation. These ideas influenced urban development throughout the 20th century. After World War II, zoning became widespread, particularly in suburban development.

While this improved organization, it also led to urban sprawl, increased car dependency, and social segregation. By the late 20th century, critics argued that rigid zoning reduced urban vitality and contributed to inequality. Large residential zones lacked diversity, and cities became less walkable [4].

In recent decades, urban planning has shifted toward more flexible and sustainable approaches. Movements such as New Urbanism promoted mixed-use development, walkability, and human-centered design. Cities are increasingly adopting form-based codes, which focus on the physical form of buildings rather than strictly separating land uses [5, 6].

Modern zoning also addresses global challenges such as climate change and housing shortages. Strategies like transit-oriented development encourage dense, mixed-use areas around public transportation, while inclusionary zoning policies aim to increase affordable housing [7].

Public space returns to the center of urban policies with the 15-min city proposal implemented during Mayor Hidalgo's two terms in Paris [8, 9]. The history of zoning in Italy reflects the country's broader urban development, shaped by centuries of cultural, political, and social change. The late 19th century saw the introduction of early planning tools aimed at improving infrastructure, sanitation, and urban growth [10, 11].

A major turning point came in the early 20th century with the introduction of Law No. 1150 in 1942. This law laid the foundation for modern urban planning in Italy by establishing the *Piano Regolatore Generale* (PRG), or General Master Plan. For the first time, Italian cities adopted formal zoning practices, dividing land into functional categories such as residential, industrial, and agricultural areas. This approach was influenced by modernist planning principles, promoted by figures such as Le Corbusier [12].

In the post-World War II period, Italy experienced rapid urbanization and reconstruction. Cities expanded quickly to accommodate population growth and rural-to-urban migration. Zoning became a central tool for managing this growth, with the PRG guiding development [13].

Further reforms in the 1960s and 1970s strengthened the zoning system. The Ministerial Decree No. 1444 of 1968 introduced a standardized classification of land-use zones, which remains fundamental today. These included:

- Zone A for historic centers;
- Zone B for existing built-up areas;
- Zone C for expansion zones;
- Zone D for industrial areas;
- Zone E for agricultural land;
- Zone F for general urban public services (different from neighborhood services).

The decree also established minimum standards for urban services, such as green spaces, schools, and public facilities, helping to improve living conditions. From the 1970s onward, planning responsibilities were increasingly decentralized, with greater authority given to regional and local governments. This shift allowed for more context-specific planning but also introduced complexity and variation across different parts of the country [14].

In recent decades, Italian urban planning has evolved to address new challenges such as sustainability, heritage conservation, and urban regeneration. Modern approaches tend to move beyond rigid zoning, incorporating more flexible and integrated planning tools [13].

Despite these advancements, Italy continues to face challenges, including bureaucratic delays, illegal construction, and the need to balance development with preservation. Issues such as climate change and tourism pressures, especially in historic and coastal cities, have made urban planning even more complex.

3.2 Relationships Between Zoning and Geographic Distribution of Airbnb Accommodations

This is the context in which we superimposed the distribution of Airbnb listings at the municipal level with the urban zoning of the two cities chosen as case studies: Bari and Monopoli.

Bari is a major city in southern Italy and the capital of the Puglia region. Located on the Adriatic Sea, it is an important economic, cultural, and transportation hub, with strong connections to the Balkans and the wider Mediterranean. The city has a population of approximately 315,000 inhabitants (2021 Census), while its metropolitan area exceeds 1 million people, and it covers a territorial surface of about 117 km^2.

In The case of the city of Bari, its General Master Plan is yet a *Piano Regolatore Generale* (PRG, approved in 1976), despite the fact that the Puglia Region has amended its regional law (R.L. 20/2001), replacing this instrument with a new generation one called the *Piano Urbanistico Generale* (PUG), which is more flexible and attentive to landscape and environmental issues.

In the Fig. 3, we can see that short-term rentals offered on Airbnb platform is mainly located in Zone A (historic centers) and Zone B (existing built-up areas, nearest to the historic centers) and just in some Zone C (expansion zones established by the PRG approved in 1976) located on the most attractive coast for mass tourism.

Very few, if any, tourist facilities in agricultural areas or other homogeneous areas of the PRG. Given the landscape, economic, and social characteristics of the city of Bari, it evidently attracts a type of tourism more closely tied to its historical, architectural, business characteristics.

This may offer potential keys to understanding these initial findings. In the following image (Fig. 4) we show the overlap between the distribution of AirBnB tourist facilities and the urban zoning of the Bari PRG.



Fig. 4. Spatial distribution of short-term rentals offered on Airbnb in September 2025 in the city of Bari superimposed on the urban zoning of the Bari PRG (Source: authors' elaboration on Municipality of Bari's data).

Monopoli is a coastal city in southern Italy, located in the Apulia (Puglia) region along the Adriatic Sea, not far from Bari. It is known for its picturesque historic center, and strong connection to the sea. The city has a population of approximately 49,000 inhabitants and covers a territorial area of about 157 km^2. Monopoli's economy is based on fishing, agriculture—particularly olive oil production—tourism, and small-scale industry.

In recent years, it has become an increasingly popular tourist destination due to its beaches, cultural heritage, and relaxed Mediterranean atmosphere. From an urban planning perspective, the Municipality of Monopoli approved a new-generation municipal planning tool (compliant with Regional Law 20/2001, unlike the older one in Bari) in 2010.

The Plan developed new forms of economic and social development (with a significant focus on tourism), significantly increasing the protection and enhancement of the environment and landscape.

Also in this case, like Bari, in the Fig. 5, we can see that short-term rentals offered on Airbnb platform is mainly located in Zone A (historic centers) and Zone B (existing built-up areas, nearest to the historic centers) and just in some Zone C (expansion zones established by the PRG approved in 1976) located on the most attractive coast for mass tourism.

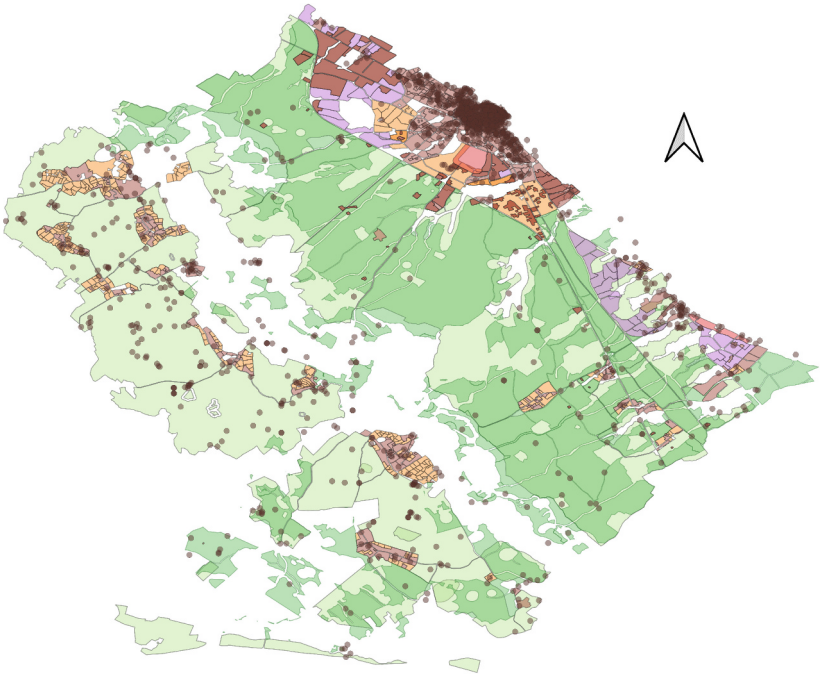

Fig. 5. Spatial distribution of short-term rentals offered on Airbnb in September 2025 in the city of Monopoli superimposed on the urban zoning of the Monopoli PUG (Source: authors' elaboration on Municipality of Monopoli's data).

However, unlike the city of Bari, the agricultural areas of Monopoli are significantly affected by the presence of tourist activities, particularly in the western part of the municipal territory, where a hilly area of notable landscape value develops, traditionally inhabited during the hot summers by the resident population.

4 Conclusions

This study first analyzed hospitality industry operators' perceptions regarding future growth prospects, with the aim of understanding which choices and factors are considered most relevant for long-term growth.

The results clearly show that there is no one-size-fits-all strategy, but that growth expectations depend heavily on the business model already adopted by operators' decisions. This means that development trajectories are differentiated and that the most effective strategies must be consistent with the organization's identity and the context in which it operates.

The analysis also highlights structural limitations that characterize the sector. The fragmentation of the offering and the difficulty of coordinating between operators are perceived as persistent problems, difficult to resolve in the short term. This suggests that many of the identified potentials may remain untapped unless accompanied by more stable forms of collaboration and shared governance tools.

The second part of the paper shows how the short-term rentals offered on Airbnb platform are more diffused areas classified by the urban city plan as Zone A (historic centers), Zone B (existing built-up areas, nearest to the historic centers) and only in the C areas present on the coast.

As we know, the growth in tourism demand and the spread of short-term rentals have prompted several European cities, including Barcelona, Venice, Florence, Lisbon and Amsterdam, to adopt new regulatory measures.

These include authorisation systems, licence limits or specific restrictions to curb the impact on the local property market, opening a debate between local administrations, tourism operators and digital platforms on the delicate balance between economic development and the protection of the right to housing.

The issue has also gradually entered the agenda of the European Commission working on the first Affordable Housing Action Plan [15] in cooperation with several mayors of European capitals.

The results suggest that the future development of hospitality will depend also on possible rules to regulate this type of tourism in areas where they are most prevalent, including through urban zoning, as the city of Florence has already done in 2025, prohibiting the opening of new Short-Term Tourist Rentals within the area or homogeneous zone identified as the Historic Core (Zone A), as defined in Article 65 of the NTA of the city's Urban Planning Regulations [16].

Zoning, therefore, despite the limitations that international literature has now identified in this traditional model of urban planning regulation, still appears to be able to play an effective role as a tool for limiting or regulating phenomena distributed across the territory, also in this relevant phenomenon for housing market and the quality of life of residents.

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