

Silvia Iodice^{1,3,*},
Pasquale De Toro^{2,3},
Martina Bosone³

¹ European Commission, Joint Research Centre (JRC), Ispra, Italy

² University of Naples Federico II, Department of Architecture (DiARC), Naples, Italy

³ National Research Council of Italy, Institute for Research on Innovation and Services for Development (IRISS), Naples, Italy

E-mail: s.iodice@iriss.cnr.it, pasquale.detoro@unina.it, m.bosone@iriss.cnr.it

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*Corresponding author

Circular Economy and adaptive reuse of historical buildings: an analysis of the dynamics between real estate and accommodation facilities in the city of Naples (Italy)

The urban regeneration of historic centres is an extremely topical issue in the contemporary debate and is an essential prerequisite for the pursuit of Sustainable Development Goals. Adaptive reuse of the abandoned heritage represents an effective strategy to give new life to abandoned or underused portions of territory, hosting functions more suited to the needs of the contemporary city and its characterizing phenomena. This work is the result of an experimentation that has as object of investigation the historic centre of Naples where, according to some recent data, there has been a significant increase in Bed and Breakfasts, some often as result of cultural heritage reuse processes. After having spatially represented the market values of residential buildings through the elaboration of a Geographic Information System, it was possible to verify the existence of a relation between the dynamics of the real estate and the rise of new accommodation facilities, often located in historic buildings subjected to adaptive reuse processes.

1. Introduction

1.1 Cultural heritage adaptive reuse as a way to support urban regeneration

In 2015 the General Assembly of the United Nations adopted the 2030 Agenda for Sustainable Development which presents 17 Sustainable Development Goals (SDGs) and 169 targets in order to achieve a more equal, inclusive, sustainable, safe and prosperous future (United Nations, 2015).

In particular, the SDG number 11, i.e. "Make cities inclusive, safe, resilient and sustainable", regards sustainable cities and communities and highlights the interdependence between good urbanization and development (United Nations, 2017). It enhances also the linkages with other positive effects, such as job creation, livelihood opportunities and improved quality of life (UN Habitat, 2016).

Urban regeneration is a very relevant prerequisite for the SDGs achievement and regenerating means giving new life to portions of territory that are in a state of neglect or underutilization, determining the birth of new life cycles capable of restoring the right degree of attractiveness. As a matter of fact, cities are able to reinterpret their components in order to overcome a decline phase, giving rise to

new functions and services. As stated by De Toro et al. (2020), urban development and regeneration projects can produce multidimensional impacts on the city, from an economic, cultural, social and environmental point of view. Furthermore, one of the main conditions of fragility in our urban centres is the state of degradation and abandonment of much of the built heritage and in particular of the historical buildings. This condition of under-use not only affects the aesthetic quality of the urban environment, but also represents a factor of disintegration, slowing down development possibilities and influencing people's lifestyle and the evolution of the local economy. Starting from the shared assumption that heritage with cultural significance can be seen as a form of multidimensional capital, then it is possible to understand the potentiality of this resource not only in terms of cultural and symbolic values but also in terms of an economic asset able to yield a flow of services over time, that in turn generate both economic and cultural values (Throsby, 2001). In this way, it is possible to determine a generative and regenerative process that can give life to important parts of the urban fabric, reactivating the relationships between these assets and the urban and social context in which they are integrated.

Sustainable urban regeneration takes into account many techniques and, with reference to cultural heritage, a very promising approach is known as "adaptive reuse" (Fitch, 1982; Douglas, 2006; Bullen and Love, 2011). Cultural heritage is considered a resource for local sustainable development (Conference of Ministers of Culture, 2018), although «there are some contradictions. The sites recognized as cultural heritage are increasing; the costs for functional maintenance/reuse are growing, while public resources available are becoming scarcer, and private actors are increasingly focused on the short time for payback. The consequence is that there is a growing risk that the decay of heritage increases year by year, because of lack of funding support» and viable business models (Fusco Girard and Gravagnuolo, 2017, p. 38).

For this reason, adaptive reuse can become a solution able to reduce many environmental impacts, such as Greenhouse Gas (GHG) emissions, extending the building's life span and avoiding the production of Construction and Demolition Waste (CDW), planning low carbon cities in order to face the problem of climate change (Yung and Chan, 2012). It is therefore clear that one of the most important tools is the adaptive reuse of urban voids and abandoned heritage assets in order to host functions more suited to the contemporary needs and the characterizing urban phenomena, in line with the principles of Circular Economy (CE) (EMF, 2017; Gravagnuolo et al., 2019). Adaptive reuse is defined as «any building work and intervention to change its capacity, function or performance to adjust, reuse or upgrade a building to suit new conditions or requirements» (Douglas, 2006, p. 1) and can be considered as a way to extend a building's function through its use for another purpose, avoiding to reach the end-of-life phase (Chan et al., 2020). Thus, the aim of adaptive reuse is that of preserving the architectural integrity of historic buildings, through a process of adaptation to the needs of a community (Elsorady, 2014). Definitely, through this process a disused or ineffective item can be reused for a different purpose (Department of Environment and Heritage, 2004), preserving in this way the heritage significance (Günçe and Mısrılısoy,

2019). According to Bullen and Love (2010), conservation can promote sustainability principles in its preventing irreversible loss of heritage, protecting environmental resources and promoting wide use of natural capital with both renewable and non-renewable resources. Adaptively reusing a building means not only reusing its functionality but also its single components and materials, preserving its embodied energy and thus reducing CO₂ emissions. Embodied energy represents the total energy required for the extraction, processing, manufacture and delivery of building materials to the building site. Actually, constructing new buildings consumes raw materials and energy, generating, in addition, carbon emissions. More than 40% of global energy use and one third of global GHG Emissions is caused by buildings (UNEP, 2009), together with the production of million tonnes of CDW (HUD, 2003); the latter represents the largest waste stream in EU according to volume¹. This is confirmed also for the Italian context, in which about 40% of the energy is used to heat, cool, illuminate and ventilate buildings (Di Turi and Stefanizzi, 2015). More specifically, «the buildings and construction sector accounted for 36% of final energy use and 39% of energy and process-related carbon dioxide (CO₂) emissions in 2018, 11% of which resulted from manufacturing building materials and products such as steel, cement and glass» (Global Alliance for Buildings and Construction et al., 2019, p. 9).

Despite this huge environmental impacts, there are multiple opportunities to mitigate GHG emissions and to enhance and exploit the energy and emissions saving potential in buildings (UN Environment and International Energy Agency, 2017). For this reason, it is clearly understandable the potentiality that lie in the possibility of increasing the life of a building through adaptive reuse, in order to lower material, transport and energy consumption and pollution, contributing to face climate change and to meet the principles of sustainability with its multiple dimensions (Bullen and Love, 2010).

Adaptive reuse is advantageous not only from an environmental point of view, but also from a social and economic one (Gravagnuolo et al., 2017). Indeed, it is possible to preserve the *genius loci* (Norberg-Schulz, 1980, 1998; Fusco Girard and Vecco, 2019) of a certain historic area so that the inhabitants are still able to recognize themselves in that area and furthermore, restoring and maintaining the heritage significance of a building can prevent it from falling in disrepair, providing in the meantime new opportunities for the community. In addition, adaptive reuse of historic buildings can guarantee several financial savings and returns (Australian Government, 2004).

The implementation of the concept of adaptive reuse represents, therefore, «the link between the preservation of the past for its intrinsic value, and as a resource for the modern community as a commercial activity» (Ashworth and Tunbridge, 1990, p. 24), so that tourism and heritage are able to coexist in a synergistic and circular way and tourism revenues can be used to sustain environments of

¹ European Commission (2018), EU Construction and Demolition Waste Protocol and Guidelines, www.ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en.

heritage value, giving rise to a form of sustainable tourism, that must be economically viable, environmentally sensitive and culturally appropriated (Nasser, 2003).

This strategy is perfectly coherent with the model of CE, because it represents a solution to “manage change” (UNESCO, 2011) and “close the loops” (Gravagnuolo et al., 2017). In particular, the CE approach opens to new and innovative perspectives for the conservation strategies of cultural heritage and landscape. The adoption of the adaptive reuse approach to cultural heritage allows to determine multiple benefits (Architects’ Council of Europe, 2018) acting as multiplier of values and creating local virtuous loops of value production.

This research work was carried out within the Horizon 2020 project “CLIC - Circular economy Leveraging Investments in Cultural heritage adaptive reuse”² that applies the circular economy principles to cultural heritage adaptive reuse for achieving environmentally, socially, culturally and economically sustainable urban/territorial development. The project is theoretically and practically interrelated to the international research, policy orientation and innovation activities on the role and impacts of cultural heritage/landscape for sustainable local development.

Starting from the awareness about the gap existing between the costs needed for the maintenance or reuse of cultural heritage and the scarcity of the available public resources, CLIC aims to define a transdisciplinary approach to identify evaluation tools to test, implement, validate and share innovative “circular” financing, business and governance models for systemic adaptive reuse of cultural heritage and landscape³. The regeneration of existing buildings through adaptive reuse can define a model for a more inclusive, resilient and sustainable development, playing a key role for the achievement of the CE goals and demonstrating the economic, social, environmental convenience of the adaptive reuse interventions as “multiplier of values” (Fusco Girard, 2019).

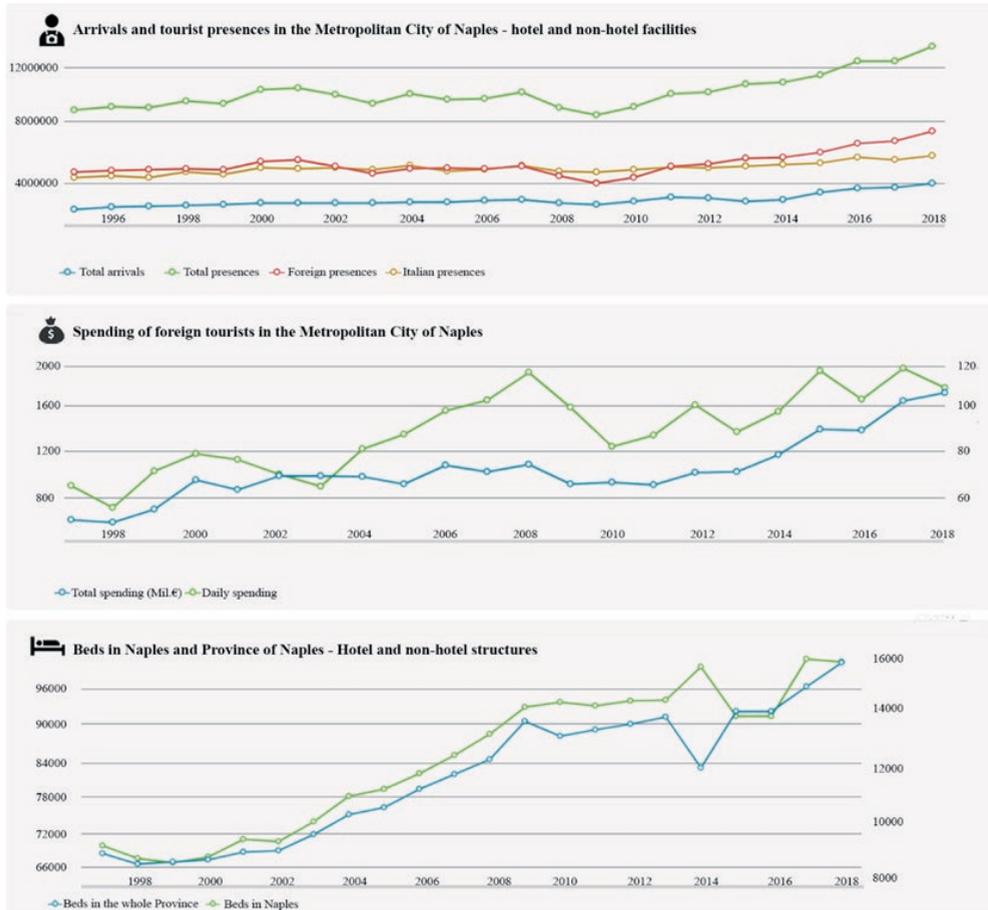
1.2 Heritage-based tourism and its impacts on accommodation facilities: some trends

There is a strong correlation between heritage and tourism, indeed heritage-based tourism is a specific market sector based on local heritage resources (Asmelash and Kumar, 2019). The sustainable tourism approach is that able to respect cultural integrity, environmental resources and that does not exceed the carrying capacity of tourist destinations (Lozano-Oyola et al., 2012). It follows that one of the most significant phenomena in recent years is undoubtedly represented by tourism, which needs to be managed wisely in order to avoid negative environmental, social, economic and cultural impacts (Fusco Girard and Nocca, 2017). Tourism is a sector in continuous development and, from an analysis of

² CLIC has received funding from the European Union’s Horizon 2020 research and innovation programme. The CLIC Consortium includes 15 partners and pursues to guarantee that the progress in the research and innovation on innovative circular business, financing and governance models for cultural heritage adaptive reuse is relevant and transferable in European cities and regions.

³ More info about the project can be found at the following link: www.clicproject.eu.

Figure 1. Some tourism trends for Naples and its Metropolitan Area. Data of tourism trends come from the following sources: comune.napoli.it; dati.istat.it; eptnapoli.info; regione.campania.it. The graphic elaboration come from the following source: https://www.flapane.com/stats_turismo_napoli.php.



some current trends, it seems to be destined to increase also in the coming years (Figure 1).

Consequently, various types of accommodation facilities proliferate on the Italian territory, from the traditional Bed and Breakfast (B&B) to the more “airbnb” recent phenomenon. This determines the need to start some analyses that allow to propose development perspectives capable of integrating tourism into urban regeneration strategies, avoiding negative impacts such as those related to gentrification processes (Beauregard, 1985; Lieto and Beauregard, 2013) as well as the increase in traffic, pollution, noise, wastewater and resources consumption (Lozano-Oyola et al., 2012). The gentrification effect determines the removal of the residents from a certain area, following increases in the real estate values and changes

in the intended use of the properties (Sassen, 1996), affecting the social and cultural fabric and causing an inevitable loss of identity of the cities (Becheri et al., 2018). Moreover, tangible and intangible cultural heritage could be affected if tourism development harms the maintenance of traditional values and severely damages the material cultural asset (Lozano-Oyola et al., 2012).

As already specified, one of the consequences linked to the intensity of tourism phenomena is the proliferation of non-hotel structures with a higher growth rate than those of hotels (Cipolla, 2018), causing repercussions on the market values of properties. These values can be influenced in various ways by numerous positive and negative externalities, not only related to the characteristics of the property, but also to the development dynamics of the surrounding areas and their attractiveness. In general, the analysis of real estate dynamics enable decision-makers to elaborate urban regeneration plans and projects (De Toro et al., 2020).

Starting from these reflections, this work is the result of an experimentation that investigates a portion of the historic centre of Naples where, according to some recent data, there has been a significant increase in B&B, often as the result of reuse processes linked to the built heritage. Consequently, the historic centre of Naples represents a fertile ground for investors who express their intention to start this business. Given the intensity of the phenomenon, the need to verify the existence of a relationship between the presence of accommodation facilities mainly linked to adaptive reuse phenomena and the dynamics of the real estate arises, relating as a result adaptive reuse and market values.

We therefore propose an experimental approach aimed at analysing these dynamics and putting them in relation with the territorial distribution of B&B, especially those that arose following processes of ancient historical residences adaptive reuse, of which the historic centre of Naples is rich. The methodology and its results are detailed in the following sections.

2. Methodology

2.1 Case study: some portions of the historic centre of Naples

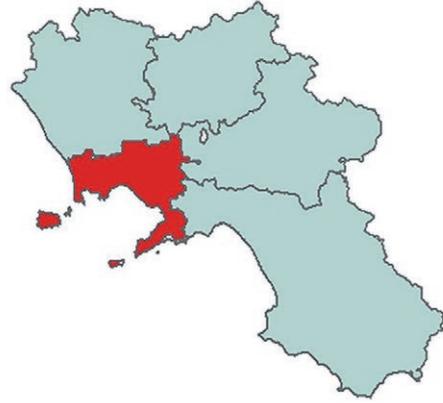
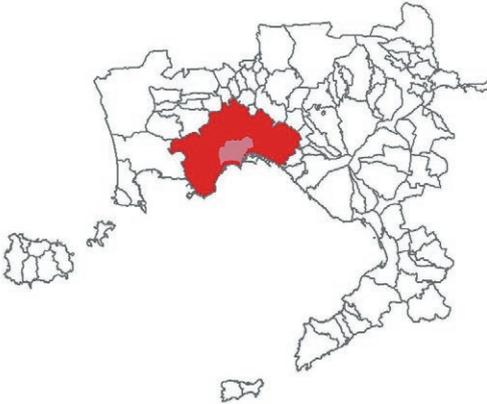
The case study selected for the experimental application is formed by a portion of the historical centre of the city of Naples (Italy), as characterized by the presence of neighborhoods with a strong concentration of B&B and which contains all the most important monuments of the city. The Municipality of Naples is divided into ten municipal offices⁴ characterized by administrative decentralization and with organizational and functional autonomy.

In Figure 2 it is possible to understand the geographic entity and location of the selected area, that comprises the following neighbourhoods:

- Chiaia and San Ferdinando (District no. 1);

⁴ According to the Italian Decree no. 267/2000

Figure 2. Geographical location of the selected case study.

Italy with focus on the Campania Region**The Campania Region with focus on the Metropolitan Area of Naples****Metropolitan Area of Naples with focus on the city****Portion of the Historic Centre of Naples**

- Avvocata, Montecalvario, Pendino, Porto, San Giuseppe (District no. 2);
- San Lorenzo (District no. 4);
- Vomero (District no. 5).

The city of Naples is part of the Metropolitan Area of Naples (MAN), which with its 92 municipalities and more than 3.5 million inhabitants, is the third most populated metropolitan area in Italy. An unregulated urban development, together with socio-economic and environmental disorder, characterize the MAN as a whole, determining a significantly chaotic territorial development, marked by the simultaneous presence of phenomena of density and dispersion of settlements (Formato and Russo, 2014). More in depth, the city of Naples today covers an area

of 117.27 square kilometers with a population of approximately 1,020,120 inhabitants. Naples, with its universally recognized cultural and natural heritage, is famous all over the world and its historic centre is inscribed in the UNESCO World Heritage List. Furthermore, «Naples plays a leading role in the Italian urban landscape, and as it is the third largest city by population, it is at the centre of a vast metropolitan area and is a real laboratory of social and economic analysis. Naples belongs to the volcanic region near Vesuvius and Campi Flegrei, located in one of the most remarkable areas of the Italian seacoast and is characterized by a flat region that spans from east to west with a hilly stretch» (De Falco, 2018, p. 3). As a consequence, tourism in Naples is one of the main factor of economic development and Naples is the fifth destination among international arrivals in Italy after Florence, Venice, Milan and Rome that occupies the first place. Naples places itself at the eleventh place with around 3.7 million presences, equal to 0.9% of the overall national presences, and growing by 13.6% compared to last year⁵.

The historical centre of Naples, with its architecture and monuments, still expresses the power that the city was able to achieve and confirm through the centuries. Also during the Middle Ages the Neapolitan settlement plays in Europe the role of a fundamental economic and cultural centre, confirming this supremacy also in the following 16th and 17th centuries, during which the city became one of the main European capitals.

In particular, under the Bourbon reign, huge building renovation projects were launched having as a result the high esthetic quality not only of the main monuments but also of the whole built heritage, visible especially in the streets of the historic centre (UNESCO, 1995).

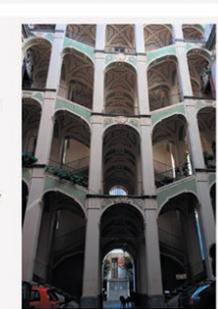
The Neapolitan historical centre is configured as a territory very articulated in its physical, social and functional geography and consists of a regular network of streets to which is added the presence of sumptuous architectural vestiges interspersed with extensions and subsequent additions. This articulation contributes to the formation of spaces imbued with vitality and conditioned by local traditions, customs and lifestyles of the inhabitants (Gasparrini and Russo, 2010).

In the case of Naples, the reuse of historical buildings has contributed to increase the attractiveness of little known areas or parts of the city considered as dangerous by tourists, stimulating the creativity of the local community in creating a new tourist offer and new activities related to it. The rediscovered aesthetic value of many of these buildings has been a tool to raise the awareness of the community about the value of its cultural heritage, increasing care and renovation actions (sometimes conducted independently) on a broader context. This renewed sense of community, together with the cultural and symbolic value of goods, was the major factor of place branding process for the whole city⁶ that led to the progressive in-

⁵ <https://www.ildenaro.it/turismo-istat-napoli-boom-di-presenze-in-un-anno-136/>

⁶ In recent years Naples has become one of the most followed Italian cities on social networks: it ranks third, after Turin and Bologna, for having achieved the best results in 2019 in terms of presence, activity, visibility, popularity and ability to involve users on social channels (www.forumpa.it/citta-territori/comunicazione-social-nei-comuni/).

Figure 3. Some examples of historical Neapolitan buildings hosting B&B.

<p>Palazzo Ruffo di Bagnara Place: Dante Square, Naples Construction period: 16th century Original property owner: Royal Councillor Antonio De Angelis (1647), Francesco Ruffo, Bagnara Duke (1660) Current property owner: private property Original use: residential (17th century), Purists' center (19th century) Current use: b&b Opening Date: 2013</p>		<p>Foro Carolino Place: Dante Square, Naples Construction period: 18th century Original property owner: Carlo di Borbone Current property owner: private property Original use: food storage (17th century), commemorative monument (18th century) Current use: b&b (right side), Convitto Nazionale di Vittorio Emanuele II (1861) Opening Date: 2018</p>	
<p>Palazzo della Grande Loggia Place: Duomo Street, Naples Construction period: 15th century Original property owner: private property Current property owner: private property Original use: residential Current use: residential, b&b, seat of Poland Consulate Opening Date: 2018</p>		<p>Palazzo dello Spagnuolo Place: Santa' Quarter, Naples Construction period: 18th century Original property owner: Nicola Moscati marchese di Poppano (18th century), Spanish nobleman Tommaso Atenza (end of 18th century), Costa Family (19th century) Current property owner: private and public property (Campania Region has only two apartments on the top floor) Original use: residential Current use: seat for cultural association, museum (2nd and 3rd floor), b&b (1st and 4th floor) Opening Date: 2017 (b&b)</p>	
<p>Palazzo Rinuccini Place: Dante Square, Naples Construction period: end of 17th century Original property owner: Marchese Rinuccini (18th century), Donato Tommasi (19th century) Current property owner: private property Original use: literary salon Current use: b&b (1st floor), relais (3rd floor) Opening Date: 2019</p>		<p>Palazzo Carafa di Maddaloni Place: Maddaloni Street, Naples Construction period: 16th century Original property owner: Cesare d'Avalos, Marquis of the Aragon Kingdom (16th century), Flamish Banker Gaspare Rooter (17th century), Carafa Family (17th century) Current property owner: private property Original use: residential Current use: residential, commercial (ground floor), b&b (1st floor) Opening Date: 2011</p>	

crease in tourism in recent years (see Figure 1). This phenomenon has determined the tendency to reuse the historical Neapolitan buildings preferring the function of B&B, relais, luxury home, etc., having as consequence the inclusion of the city in new and virtuous economic networks, the generation of new jobs opportunities and growth and also the attraction of new kinds of users (Figure 3).

In this perspective, the adaptive reuse of historical buildings with particular cultural value has contributed to the process of democratization of culture because, through the public use, has allowed the fruition of places previously inaccessible (for reasons of ineligibility or for bureaucratic reasons) and the promotion of knowledge. This process has the capacity both to perpetuate the memory of the culture of the era in which the buildings were built and, at the same time, to create a circular educational and cognitive process. As a matter of fact, the fruition determined by the new use has as its main consequence that people do not "suf-

Table 1. Average houses prices in the city of Naples (authors' elaboration on BIN data 2009-2018).

Years	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Variation 2009- 2018
Average houses prices (€/sqm)	2,930	3,050	3,060	2,830	2,740	2,610	2,540	2,450	2,380	2,370	-19.1%

fer" the history of the building, but they manage to live it in a new way, attributing it new value. Consequently, the new functions are brought together with the heritage values in an active and meaningful dialogue, through which people strengthen the perceptions of their own traditions and history, providing new future perspectives for the areas that become better adapted to the needs of multi-ethnic and multi-cultural societies (Architects' Council of Europe, 2018). As previously already specified, the ever-increasing tourist demand in Naples determines the growing increase of accommodation facilities on the territory. Given also the significant presence of historic buildings, many of this accommodation facilities in the form of B&B arose in the ancient noble palaces of which the city is rich, especially in the last 6-7 years⁷.

The aim of the paper is that of verifying the possible correlation between adaptive reuse of cultural heritage as a means to develop hotel and especially non-hotel structures and the trends of the real estate in Naples. As a matter of fact, De Toro et al. (2020, p. 5) point out that «Naples is the city in southern Italy that is growing most in terms of real estate sales. The Neapolitan market was the only one, in fact, to recover following the decline in real estate transactions begun with the economic crisis, which in the South of Italy led to halving sales. At the end of 2018, the real estate market of Naples returned almost to the values of the pre-crisis period, with a growth of 10.5% of transactions compared to the previous year».

At the same time, it must be considered that the average values of housing have decreased in almost all the neighbourhoods of the city in the period 2009-2018. In Table 1, the average houses prices for the city of Naples and the percentage variation between 2009 and 2019 are reported for each year.

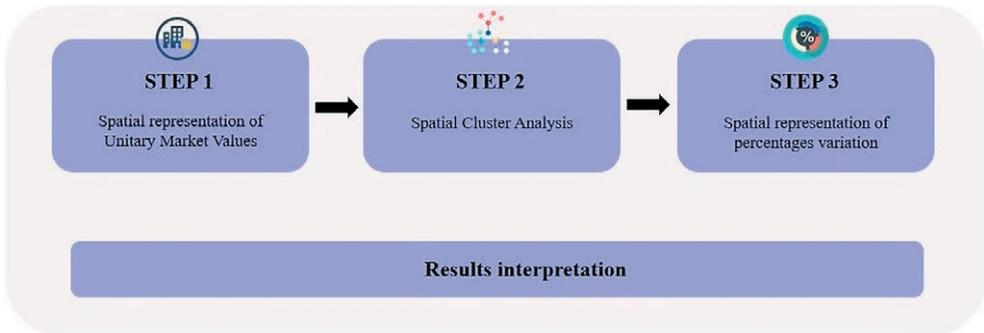
2.2 The three steps for the spatial identification of real estate market values

The experimental application can be divided in three main methodological steps (Figure 4).

The first step is the spatial representation of the Unitary Market Values (in Italian Valori di Mercato Unitari – VMU) of residential buildings through the use

⁷ This aspect has been confirmed through a little survey to the owners of some of the considered facilities.

Figure 4. The methodological steps.



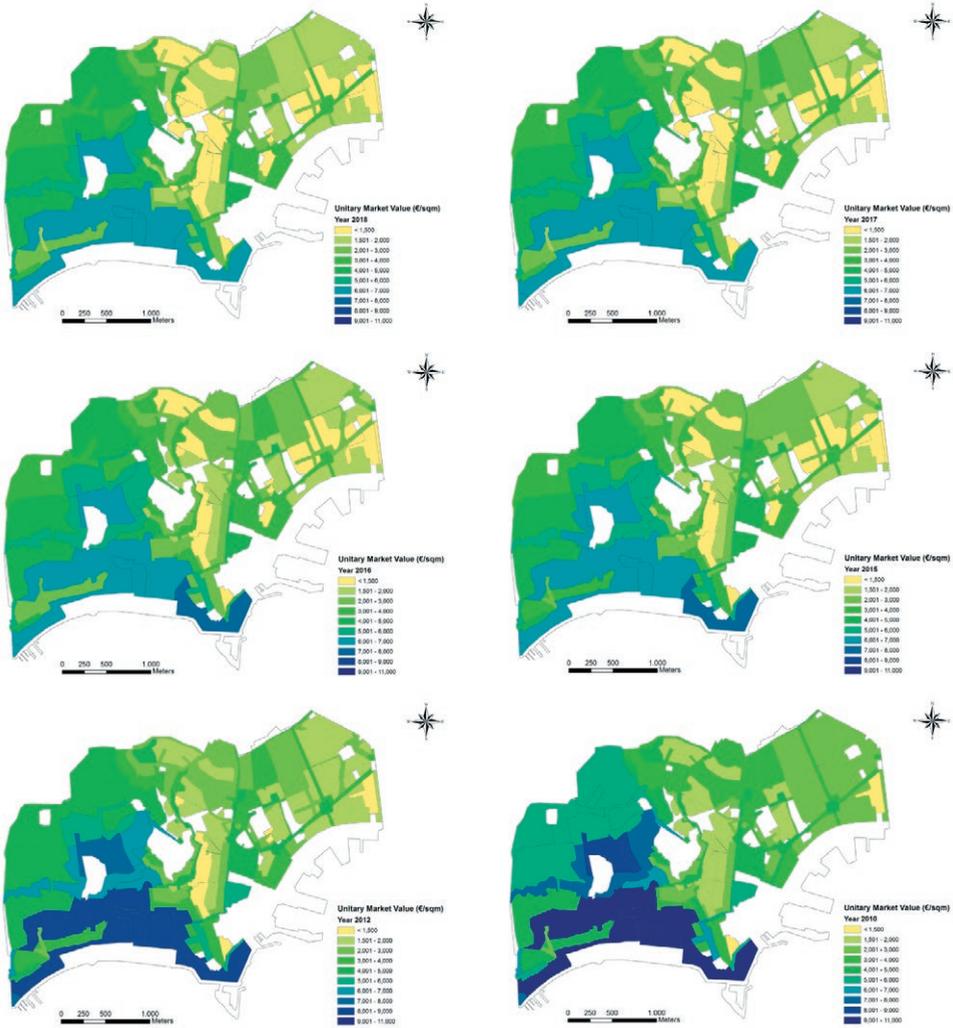
of Geographic Information System (GIS), in order to observe the temporal evolution of this values according to their territorial distribution and to some significant reference years (2010, 2012, 2015, 2016, 2017, 2018) (Figure 5). Data about market values of residential buildings for the selected case study have been provided by the real estate stock exchange of Naples (In Italian: Borsa Immobiliare di Napoli - BIN) that each year collects these values divided according to the Neapolitan neighbourhoods.

In particular, we have analysed the last four years available (2015-2018), i.e. the last data published by BIN, which also correspond to the years in which the phenomenon of the reuse of the built heritage as B&B has mainly manifested. Furthermore, two years (2010 and 2012) were considered in which the effects due to the 2008 crisis were recorded in the Naples real estate in order to have a significant reference. The analysis of even intermediate years (2011, 2013 and 2014) does not allow to appreciate significant differences with the previous and following years, obtaining very similar maps of market values. When the elements of the issue under analysis are characterized by a clear and evident spatial component, it is possible to use thematic maps as representative means (De Toro and Iodice, 2016; De Toro and Iodice, 2018).

In the present application, the use of GIS allows to acquire, store, extract, transform, and visualize spatial data from the real world (Burrough, 1986) and helps to spatially visualize how market values are distributed over the territory.

The second step of the application is represented by a Cluster and Outlier Analysis in order to observe the spatial distribution of homogeneous real estate values according to the same years of reference (Figure 6) and identify similarities of behaviour between data spatially close to each other. This happens through the use of the Anselin Local Moran Statistics Index to determine the relationships among data (Moran, 1950; Anselin, 1995). In general, a spatial cluster has been defined as «an excess of events [...] or values [...] in geographic space» (Jacquez, 2008, p. 395) and the higher the value represented by the cluster, the stronger is the presence of similar values (high or low) in spatially close areas. When the value is negative, it means that there is a discrepancy between values that, although they

Figure 5. Unitary Market Values of the real estate values for some Neapolitan neighbourhoods, authors' elaboration through GIS.

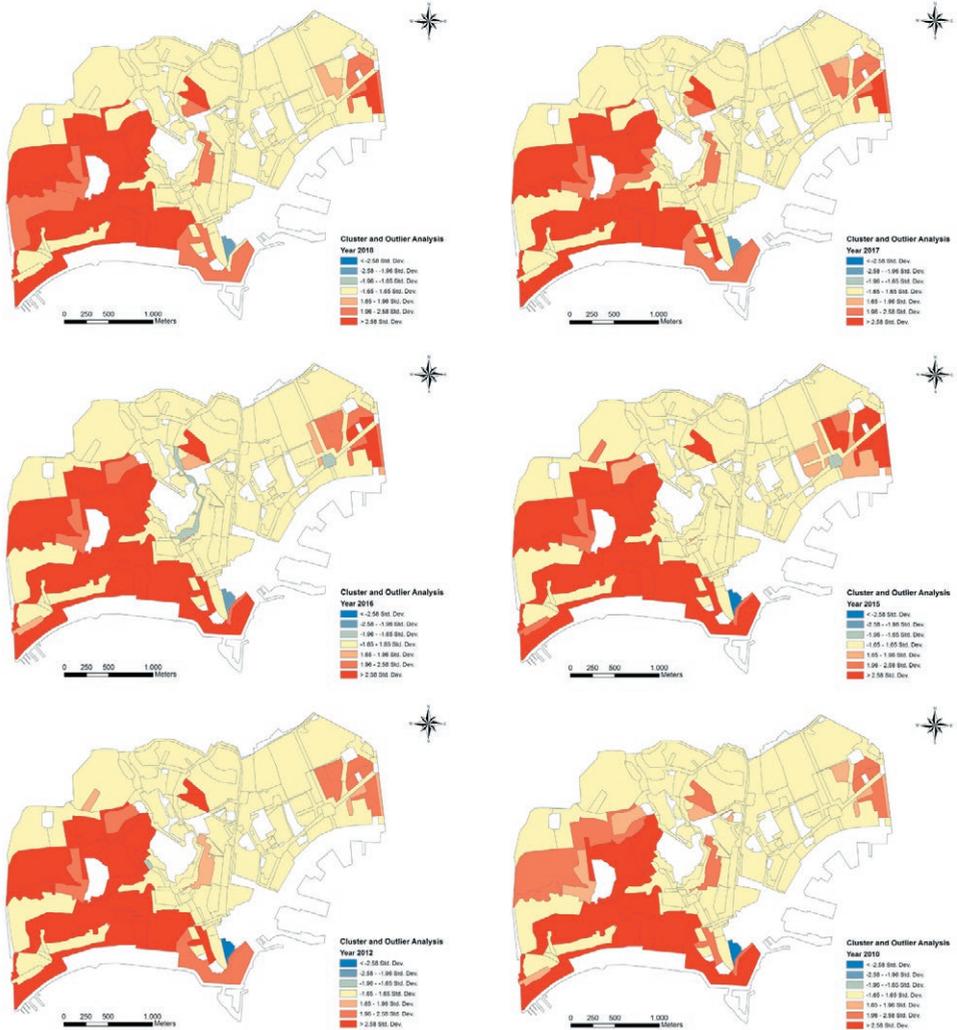


belong to nearby areas, have different values⁸.

The third and last step of the methodology is represented by the spatial representation of the percentage variations of the Unitary Market Values, comparing year 2018 with each of the previous analysed years (Figure 7). The more negative

⁸ For a more detailed technical description of the Cluster and Outlier Analysis see De Toro et al. (2020) in which the same analysis has been carried out for the whole territory of the Municipality of Naples.

Figure 6. Cluster and Outlier Analysis of the real estate values for some Neapolitan neighbourhoods, authors' elaboration through GIS.

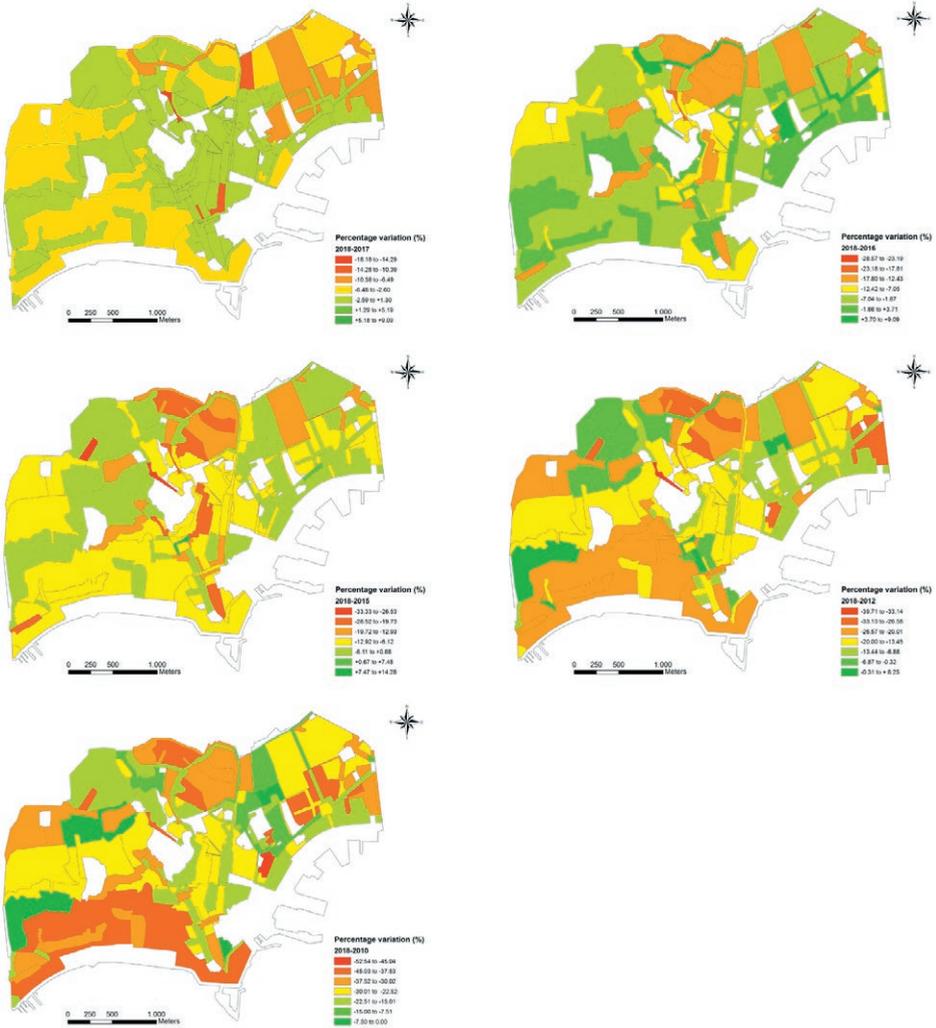


are the values represented for an area, the higher is the decrease of market values that occurred between the two years compared.

3. Results and Discussion: is there a correlation between market values and accommodation facilities?

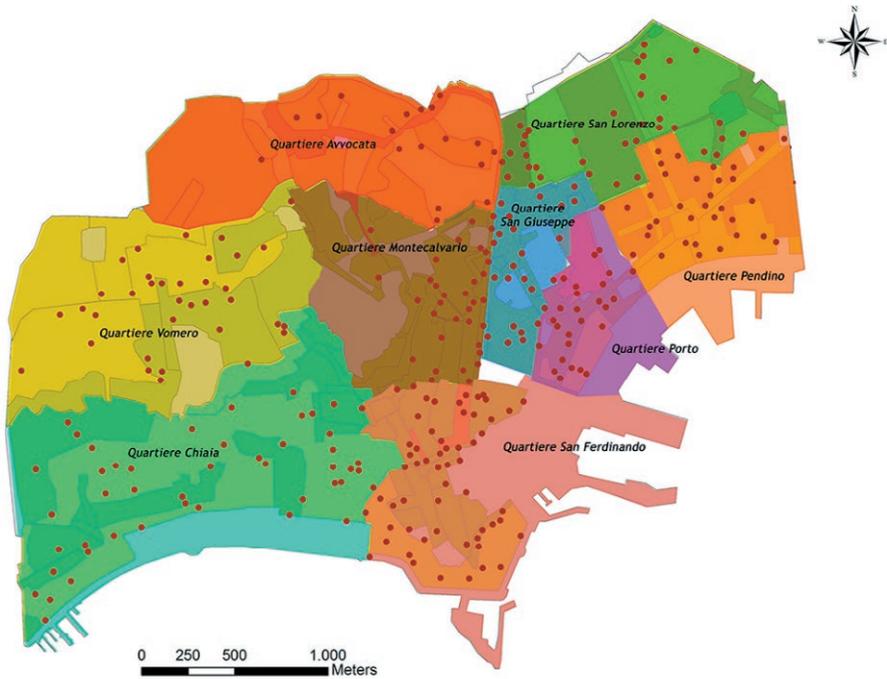
The first analysis (see Figure 5) shows the spatial distribution of the Unitary Market Values of residential buildings in the years 2010, 2012, 2015, 2016, 2017 and

Figure 7. Percentage variations of the real estate values for some Neapolitan neighbourhoods, authors' elaboration through GIS.



2018. The values have been organized into ten classes: < 1,500 €/sqm, 1,501–2,000 €/sqm, 2,001–3,000 €/sqm, 3,001–4,000 €/sqm, 4,001–5,000 €/sqm, 5,001–6,000 €/sqm, 6,001–7,000 €/sqm, 7,001–8,000 €/sqm, 8,001–9,000 €/sqm, 9,001–11,000 €/sqm. The areas in white correspond to the green areas that in this analysis do not present residential buildings and so do not present any spatial distribution of market values. Observing the maps, it is possible to notice that market values in all areas have undergone a decrease over the years, but their spatial distribution has maintained a certain homogeneity, showing the highest values concentrated especially

Figure 8. The neighbourhoods of the city of Naples overlapped by the B&B.



in the neighbourhoods of Chiaia, part of San Ferdinando (the side close to the Chiaia neighbourhood) and part of Vomero (the area of Vanvitelli square) (Figure 8)⁹.

In these neighbourhoods the market values have changed from the highest class of values in 2010 (9001–11000 €/sqm), to the medium-high class in 2018 (6,001–7,000 €/sqm). Furthermore, in the same parts of the city, the values have changed a lot in a period of eight years (3,000–4,000 €/sqm fewer), while in other parts of Vomero neighbourhood, also included in a high class of value, there was not a significant variation. More in depth, in 2010 the areas of Sant’Elmo Castle and the Aniello Falcone and Tasso streets were included in the medium-high class of value (6,001–7,000 €/sqm), while in 2018 they had a value of 5,001–6,000 €/sqm.

The same trend is visible in the areas that in 2010 were included in the medium and low class of market values (San Ferdinando, Avvocata, Montecalvario, Pendino, Porto, San Giuseppe and San Lorenzo neighborhoods) that until 2018

⁹ The figure shows the Neapolitan neighbourhoods overlapped by the red points that represents the B&B located in the historical centre. This figure and can be considered as a reference for the results description.

have changed their class of values moving about 1-2 positions less (corresponding to a negative variation of 1,000–2,000 €/sqm). At the end of this first step of analysis, it can be concluded that the areas that have suffered the greatest decline in real estate values are those belonging to the highest value ranges.

The second analysis, i.e. the Cluster and Outlier Analysis (see Figure 6 above), demonstrates the spatial distribution of the decrease trend, taking into account if it is homogeneously concentrated in some areas, creating “cluster” of values. It also shows that the more clustered neighbourhoods are those that in the previous analysis were characterized by high market values (neighbourhoods of Chiaia, part of San Ferdinando with the side close to the Chiaia neighbourhood and part of Vomero, in particular the area of Vanvitelli square). Added to these, other strongly clustered areas are also those characterized by medium-low values: the Pendino neighbourhood close to Garibaldi station, the areas around Montesanto metropolitan station in Montecalvario neighbourhood and the side of the Spanish Quarter close to the area surrounding Sant’Elmo Castle and included between the Montecalvario and San Ferdinando neighbourhoods. In this analysis an exception is represented by the area delimited by Plebiscito Square, Monte di Dio street, the Vittoria tunnel and Underground Naples in San Ferdinando neighbourhood. As a matter of fact, this area in all the analysed years, presents always the same class of residential market values (< 1,500 €/sqm) which is very different with reference to the values of the close areas.

The third and last analysis (see Figure 7) shows how the value of the residential real estate market has varied in terms of percentage comparing the year 2018 with each of the previous analysed years. The results of this analysis are linked with the observation of the first analysis for the neighbourhoods of Chiaia and part of San Ferdinando (the side close to the Chiaia neighbourhood) in which, comparing the year 2018 with 2010, it was registered the more significant variation (represented through hot colour). In addition to these, also other areas have had an important variation: the areas of Pendino neighbourhood close to the Garibaldi station, those including the Montesanto metropolitan station, Dante square and Pontecorvo street in Montecalvario neighbourhood, the area around Collana Stadium in Vomero neighbourhood and the part of the Avvocata neighbourhood that includes Salvator Rosa street.

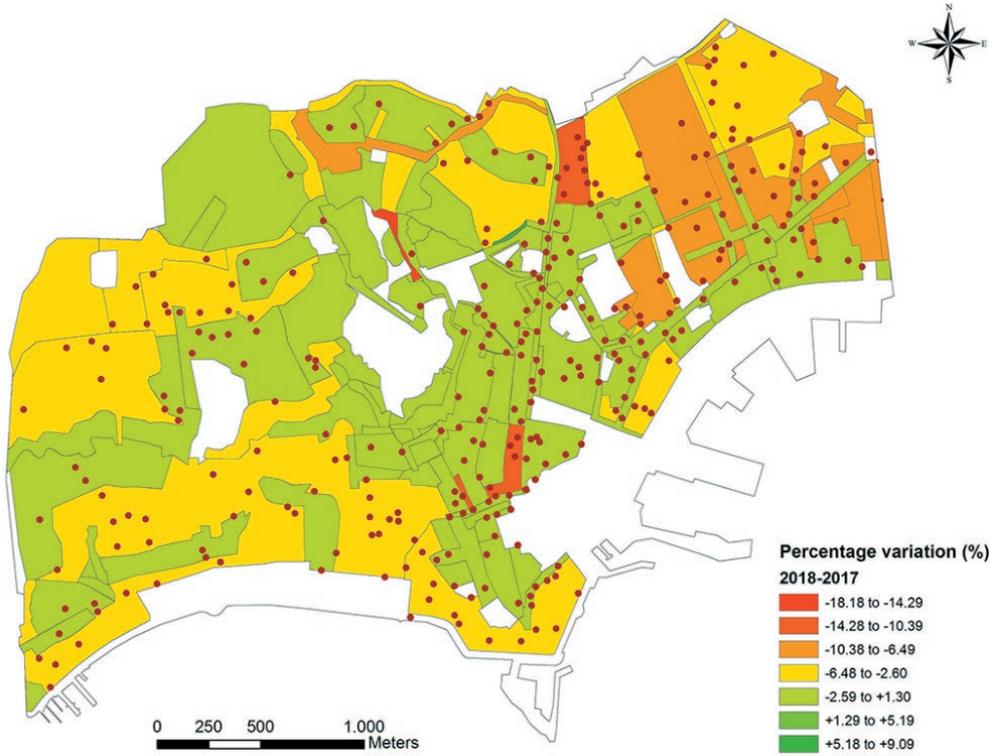
The other part of the map show a less significant variation, with the lowest percentage values in the area of the Vomero neighbourhood, included between Tasso street and the limit of Chiaia Neighbourhood, and the historical centre.

The percentage values of the variation decrease as they are compared years closer and closer to each other.

At the end of these three analysis phases, a final analysis was made to demonstrate the existence of a correlation between the variation of the real estate residential market values and the presence of B&B (Figure 9).

Observing the map, at a first glance it is already possible to notice that the area with the major concentration of B&B is the historical centre, including the neighbourhoods of san Ferdinando, Montecalvario, San Giuseppe, Porto, Pendino and San Lorenzo.

Figure 9. B&B map, authors' elaboration through GIS.



This localization confirms the trends described in the paragraph 2.1 of reusing the historical Neapolitan buildings as touristic accommodation, since in this area the reuse is the only solution to settle new activities, while respecting and valorising the existing built heritage.

Overlapping the map with the B&B localization to the map that represent the percentage variation between 2018 and 2017, it is evident that, where there is a concentration of B&B, often the market values are quite stable or increasing, comparing them to the previous years. Surely the presence of B&B is not the only determining factor for the evaluation of the variables that influence the development of real estate values, but it can reasonably be assumed that the improvement of the aesthetic quality of reused buildings and the reactivation of economic dynamics in the whole context foster a positive evaluation of the properties located in the regenerated area and represent a “positive externality” for the real estate market evaluation.

4. Conclusions

In conclusion, it is possible to confirm that in a CE perspective, adaptive reuse has the capacity of:

- activating a symbiotic relationship between cultural heritage and its context;
- stimulating a generative capacity for the activation of new activities in the context;
- stimulating a regenerative capacity able to reactivate the economy of existing activities and also the social bonds among the actors involved in the reuse process;
- minimizing environmental impacts (adopting energy efficiency systems, water recovery systems, avoiding soil consumption derived from the construction of new buildings and maximising the potential of the existing ones) (Fusco Girard and Nocca, 2019).

On the one hand, the reuse in general is considered as an action that gives an added value to the regenerated resources, re-starting a new life and using the whole potential embedded in them; on the other hand, cultural heritage is recognized by the European Union as a key economic resource in the global competition (European Commission, 2015).

In this perspective, the reuse proposal is not only a problem of conservation of physical and natural systems but also of social and cultural ones, which represent the particular identity of a city and of its organizational structure. The adaptive reuse of abandoned and underused cultural heritage and landscapes represents a strategy to implement in the cities the paradigm of sustainable development, starting from the existing goods and re-adapting them in the actual and modified contexts. Cultural heritage can be considered as a resource and a resilient factor of urban settings, able to incorporate the change (technological innovation and contemporary cultural production) and to transform it through a creative process. Adaptive reuse aims to prioritize, exemplify, and integrate circular, inclusive and sustainable values in the processes of heritage conservation. It offers also a better chance to overcome the threats of mass-tourism or modern urban development (Gravagnuolo et al., 2017).

The reuse intervention increase the attractive capacity of the asset, extending this positive effect also to a wider context. This productive capacity is demonstrated by the “external effects” generated at economic, social and environmental level and also in terms of new use values recognized to the cultural asset, both from the private and the social perspective, that tends to last in the longer-term (Gravagnuolo et al., 2017), reflecting as well the characteristics of the CE model (de Jesus et al., 2017; Kirchherr et al., 2017).

The adaptive reuse technique can be a key driver of economic growth, social wellbeing and environmental preservation, contributing to sustainable development of cities and regions (European Commission, 2014, 2015; CHCfE Consortium, 2015; European Parliament, 2017).

Through a critical analysis of the described work, it is first necessary to recognize that the real estate market is affected by several factors and therefore a more comprehensive investigation would be required. A significant example is the anal-

ysis performed by De Toro et al. (2020), where it has been highlighted that in the city of Naples houses market values are also influenced by other variables such as: the introduction of new pedestrian areas, the construction of new subway stations, the redevelopment of open spaces, the settlement of new university locations, the creation of spaces for trade, crafts and leisure, etc. However, in the considered areas of the historical centre of the city, some of these interventions have already been carried out some years ago and surely the reuse of the built heritage for tourist hospitality represents a recent and significant phenomenon.

Indeed, it is clearly evident that where there is a concentration of non-hotel accommodation activities in the form of B&B, market values often show a holding or a recovery compared to the previous years. It is also shown that some urban areas display a greater homogeneity in real estate dynamics and therefore a more extensive analysis that includes further significant urban areas could be interesting. In addition, where there is a concentration of non-hotel tourist activities, the latter are often the result of cultural heritage adaptive reuse in the historic centre of Naples and it is therefore possible to hypothesize a correlation between the reuse of heritage and the real estate market, however underlining the need to take into consideration other factors that may allow for a more comprehensive investigation.

Author Contributions

Conceptualization: Martina Bosone and Silvia Iodice; methodology and data curation: Pasquale De Toro; formal analyses: Pasquale De Toro; writing, review and editing, Martina Bosone and Silvia Iodice. All authors have read and agree to the published version of the manuscript.

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