Territorial Inequalities in Adaptive Reuse Opportunities: Evidence from Lombardy Region (Italy)

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Abstract. In recent years, the official and academic debate has focused on heritage adaptive reuse as a strategic driver to promote sustainable territorial development by fostering local communities' sense of belonging, creating economic opportunities, and embracing the circular economy paradigm in territorial transformations. Despite the focus, many marginal areas still struggle to capture benefits from reusing built heritage assets, thus highlighting the need for new knowledge bases and decision-support tools for the policy realm. In this context, the paper aims to answer this need by proposing a methodological tool, inspired by a mass appraisal logic, to assess economic opportunities related to reusing abandoned heritage properties at large administrative scales. Such a tool can help analyze and quantify imbalances between urban and marginal areas, providing preliminary information that supports effective funding allocation and heritage-based policy design for spatial justice. The tool's preliminary application to a subset of abandoned heritage properties in the Lombardy Region (Italy) demonstrates its potential for heritage-based territorial cohesion policies, together with the limits and future research challenges toward its spreading and effective implementation as a decision-making tool.

Keywords: Territorial inequalities · Abandoned Heritage · Adaptive Reuse · Mass Appraisal · Evaluation

1 Introduction

Cultural heritage is widely recognized as a key and multifaceted resource in promoting sustainable territorial development [1, 2]. Its benefits range from fostering local communities' sense of belonging and responsibility toward their 'places', thus enhancing well-being, to creating new economic opportunities [3–5]. Concerning its 'built' dimension, heritage reuse contributes to the global challenge of making the 'circular' paradigm effective by reducing environmental impacts through the reduction of resource consumption and waste generation [6, 7].

For these reasons, the official and academic debate has focused on reusing and enhancing heritage resources as drivers to promote development in marginal territorial contexts [8–12].

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However, despite this focus and awareness [13], many marginal regions at the international level are still unable to capture any benefit from built heritage assets or approach them as a means for social justice [14]. The "negative spiral" affecting these territorial contexts, stemming from the interplay of several factors and historical processes (deindustrialization, depopulation, marginalization, etc.), has exacerbated the spatial imbalance and inequalities between urban areas and marginal territorial contexts [14]. Understanding the extent of such inequalities represents a crucial knowledge task to orient policy efforts toward their reduction by assisting marginal territories in their development challenge and effectively deploying heritage's potential and contribution.

Based on these premises, the paper proposes a methodological tool, inspired by a mass appraisal approach [15], to expeditiously assess the economic opportunities related to reusing abandoned heritage properties at large administrative territorial scales, thus highlighting and quantifying the existing imbalances between urban and marginal areas. Its implementation offers a preliminary information layer which, if properly integrated with the necessary cultural and social considerations about heritage reuse, can provide valuable support to effective funding allocation and orient policy design in the heritage field toward achieving spatial justice. In this sense, it aligns with the Council of Europe's recommendation for local and regional authorities to «take measures to acquire information and improve their knowledge base» and «to produce new tools and instruments» for a more effective policy implementation [14].

After providing an overview of the challenges and territorial inequalities related to abandoned heritage reuse in Sect. 2, Sect. 3 describes the proposed methodological tool.

The tool, inspired by a mass appraisal logic, addresses the expression of a 'specifically valid' judgment about the economic opportunity of reuse through the lens of the transformation value appraisal criterion [16]. Section 4 describes its preliminary application to a subset of abandoned heritage properties in the Lombardy Region (Italy), included in the Italian Ministry of Culture's dataset, and its results [17]. These results are then assumed, in Sect. 5, as the basis to discuss the opportunities, limits, and future research efforts related to implementing and spreading the proposed methodology as a decision-support tool for heritage and territorial cohesion policies.

2 The Adaptive Reuse of Abandoned Heritage Properties: Challenges and Territorial Inequalities

The adaptive reuse of heritage properties, intended as the process of providing a building or structure with a new function to give it new life [18] and recognized as an established practice in contemporary placemaking, entails a high level of complexity stemming from multiple and co-occurring challenges.

First, the willingness to include heritage properties in contemporary life schemes requires balancing the preservation of their tangible and intangible values with modern requirements concerning safety, usability, and energy efficiency [19–21]. Together with it, the high costs associated with restoration and maintenance interventions and the need to deal with legal constraints act as deterrents to the private sector's engagement in heritage reuse affairs [22, 23], thus imposing most of the technical and financial burden of addressing heritage abandonment on public administrations. The inability to manage

such a burden, also depending on the scarcity of adequate resources, has often led to overlooking another crucial challenge for the success of adaptive reuse interventions: engaging the social fabric, managing conflicting interests, and aligning priorities and decisions with local needs and demands [24, 25].

These challenges, related to the 'intrinsic' nature and specificities of heritage assets, become even more pronounced in marginal areas. Indeed, these territorial contexts often experience a weak administrative capacity in terms of financial and human resources, clashing with the complexity required by approaching heritage assets [26]. Compared to urban contexts, the lack of a vibrant economic environment and the related demand for vacant spaces further reduce private sector involvement, which is discouraged by the investment risk and the high uncertainty in yielding any return [27]. Both these factors limit the reuse possibilities to accessing funding channels with the related risk of prioritizing the requirement of funding calls over the characteristics of the assets and the actual local needs in the design of the intervention.

Within the complex 'marginalization' vortex affecting these territorial realities, the ongoing demographic shrinking dynamics, more pronounced among the population's younger segment [28], pose another relevant challenge to the prospects of reusing abandoned properties in marginal areas. The demographic loss in the younger population, inevitably attracted by the educational, employment, and social opportunities offered by urban contexts, indeed, while reducing the demand for new activities or spaces, deprives these areas of their social innovation capital [29].

The co-occurrence of all these hurdles outlines a critical situation that the most recent policy efforts at different scales have only partially mitigated. To further push these efforts toward effectiveness, thus creating a policy and funding environment able to counter spatial inequalities, new knowledge bases and decision-support tools are required. From this perspective, identifying and understanding the extent of territorial inequalities in heritage adaptive reuse opportunities between urban contexts and marginal areas can provide valuable and necessary, even if not sufficient, information to answer this need.

3 A Methodological Tool to Assess the Economic Opportunities of the Adaptive Reuse of Abandoned Heritage Properties

The willingness to orient policy efforts toward reducing territorial inequalities in marginal areas by leveraging the potential from the adaptive reuse of abandoned heritage properties calls for a sound knowledge base and appropriate methodological support to build it.

From this perspective, the paper proposes a methodological tool to assess the economic opportunities from reusing abandoned heritage properties at large administrative territorial scales, thus highlighting and quantifying the existing imbalances between urban and marginal areas.

The applicability, practicality, and speed of use attributes required for a tool to be effectively applied at large territorial scales and to many assets hint at adopting a mass appraisal logic for its structuring.

Mass appraisal is a systematic approach to expressing a value judgment for many properties at a specific point in time using standardized procedures [30]. It is a cost-effective approach to valuing multiple properties simultaneously while ensuring consistency and fairness [31]. However, the unique features of heritage properties, which clash with the standardization requirements behind mass appraisal approaches, have hindered their implementation in heritage valuation issues.

To deal with this aspect, the proposed methodological tool addresses the expression of a 'specifically valid' value judgment about the economic opportunities of adaptive reuse through the lens of the transformation value appraisal criterion [32]. The adoption of this 'lens' enables expressing a convenient judgment as the difference between the 'gross development value' of the property under the provided reuse hypotheses and all the incurred costs [33]. In this sense, it allows balancing the need for standardization with considering the specific conditions of the asset and the compatibility of the reuse scenario, which both represent essential factors when dealing with heritage resources.

The proposed methodological tool is structured into three steps. The first step, *Knowledge frame structuring,* involves collecting all the basic and relevant information about the heritage properties under analysis as the input for the value judgement expression. This information includes: the location; the construction period; the typology of the property, expressed in terms of its original use; the conservation state (on a five-point qualitative scale: from very poor to optimum); the ownership status (public, private, or mixed); and the legal protection status (*ope legis* or by a specific legal act). Together with collecting this information, the first step also requires defining the 'compatible' reuse scenarios in terms of new uses for the considered property.

The second phase, *Transformation Value appraisal*, requires elaborating the information gathered in the previous step into cost and revenue parameters, which serve as inputs for estimating the transformation value related to the defined reuse scenarios, according to the formal Eq. (1):

$$TV_i = \frac{V_{mi} - K_t}{q^n} \tag{1}$$

where:

- V_{mi} is the most probable market value of the abandoned heritage property after its transformation related to the reuse hypothesis i. It can be assessed through one of the internationally recognized direct or indirect market value appraisal methodologies [33].
- K_t is the transformation cost related to the considered property. This cost can be appraised through a synthetic direct procedure based on the property's conservation state and typology.
- $q^n = (1 + r)^n$ is the discount factor, based on the definition of the discount rate r [34].

After the transformation value appraisal, the phase requires identifying the reuse hypothesis, ensuring the best economic performance and, thus, the "highest and best" reuse of the property from a financial perspective [33].

The third and last step, *Judgment about the economic opportunities of adaptive reuse*, feeding on the result of the appraisal step, deals with grouping the abandoned

heritage assets, according to their reuse opportunities into two clusters: the 'financial sustainable' cluster, including properties for which the 'high and best' reuse hypothesis leads to a positive performance in terms of estimated transformation value; the 'financial unsustainable' cluster, including the other properties, for which the 'high and best' reuse is not able to generate a positive financial result. Together with it, within each cluster, it is possible to further categorize the properties under analysis based on the magnitude of the result.

The output of the three-step methodological tool (Fig. 1), thus, can provide a useful knowledge basis to orient public decision-making and funding allocation, as well as private investments, in the heritage field toward effectiveness and, by highlighting territorial differences in the adaptive reuse economic opportunities, toward spatial justice.

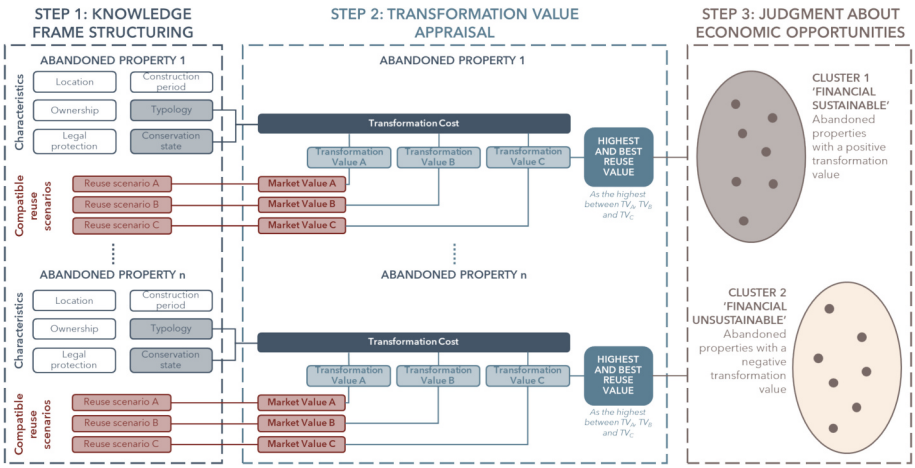


Fig. 1. Proposed three-step methodological approach inspired by a mass appraisal logic (Authors' elaboration)

4 Investigating the Economic Opportunities from the Adaptive Reuse of Heritage Properties: Evidence from Lombardy Region

4.1 Introduction to the Case Study

The proposed methodological tool's opportunities in supporting decision-making about adaptive reuse of abandoned heritage properties while properly managing territorial inequalities require testing it on a case study. Italy, the country with the highest number of UNESCO sites and more than 200,000.00 protected heritage assets [35], represents a relevant territorial context for this purpose.

The widespread presence of heritage assets across the country, many of which are managed by public administrations lacking the financial resources for proper conservation and management, has made protecting abandoned properties a key concern in

territorial planning. To address this concern, in 2019, the Italian Ministry of Culture launched a project to map abandoned heritage properties across the national territory [17].

To date, this project has documented about 3,000 abandoned heritage properties widespread across the national territory (Fig. 2): most of the mapped assets are in the Lombardy Region (515 assets) in the North, followed by the Marche Region (290 assets) in the Center, and Sardegna island (280 assets).

Concerning the Lombardy Region, as the territorial context with the highest number of records included in the Ministry of Culture's census, 11 out of the 12 provinces host abandoned properties with the highest concentration in Milan (118), Mantova (110), and Cremona (95) (Fig. 3).



Fig. 2. Number of mapped abandoned heritage properties per Italian Region (Authors' elaboration on the Italian Ministry of Culture's Mapping of abandoned heritage properties)

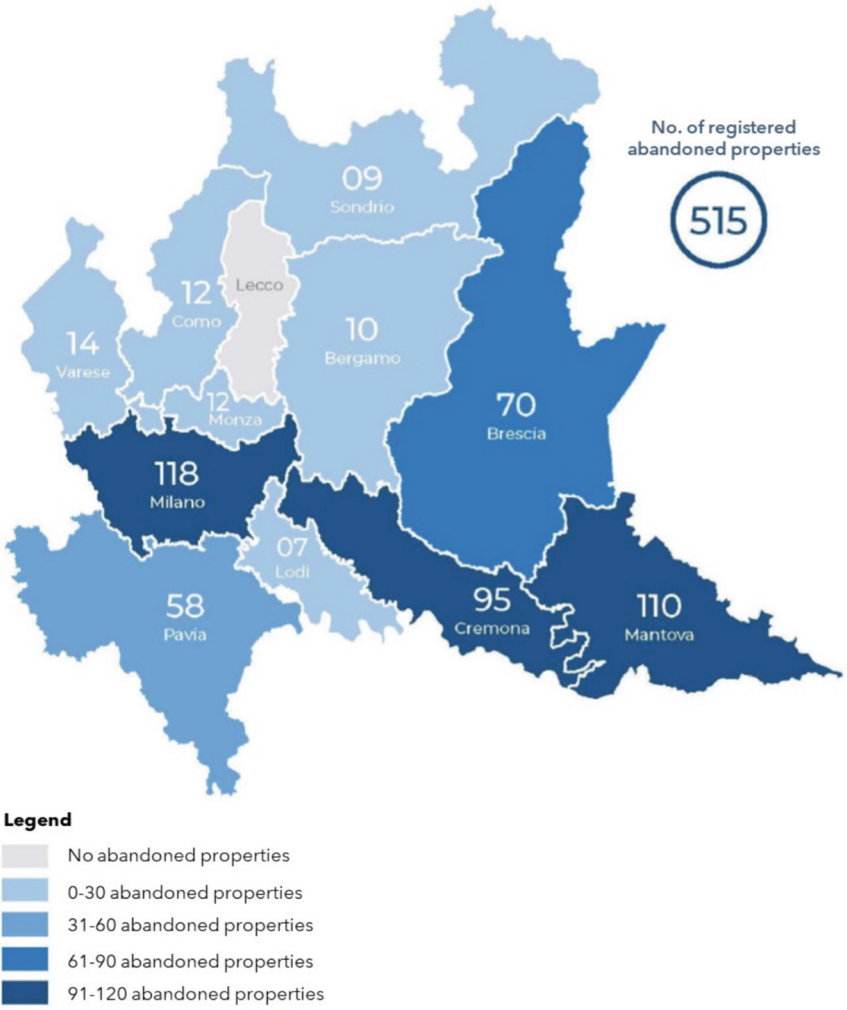


Fig. 3. Number of abandoned heritage properties for Lombardy Region's province (Authors' elaboration on the Italian Ministry of Culture's Mapping of abandoned heritage properties)

Regarding these assets' typology, expressed in terms of original use, it is possible to identify 12 typologies: industrial, leisure, military, hospital, administrative, religious; residential, hospitality, rural, school, museum, and railway station. The residential typology is the most frequent (107 assets, corresponding to the 20.8% of the whole sample of mapped properties), followed by the industrial typology (70 assets, equal to the 13,6% of the sample) (Fig. 4).

The focus on the property's conservation state, instead, reveals their critical condition and the related risk of losing some cultural witnesses of the past. Instead, in all the Lombardy Region's provinces at least 50% of the assets are in a poor or very poor conservation state (Fig. 5): the most critical situation can be observed in Bergamo,

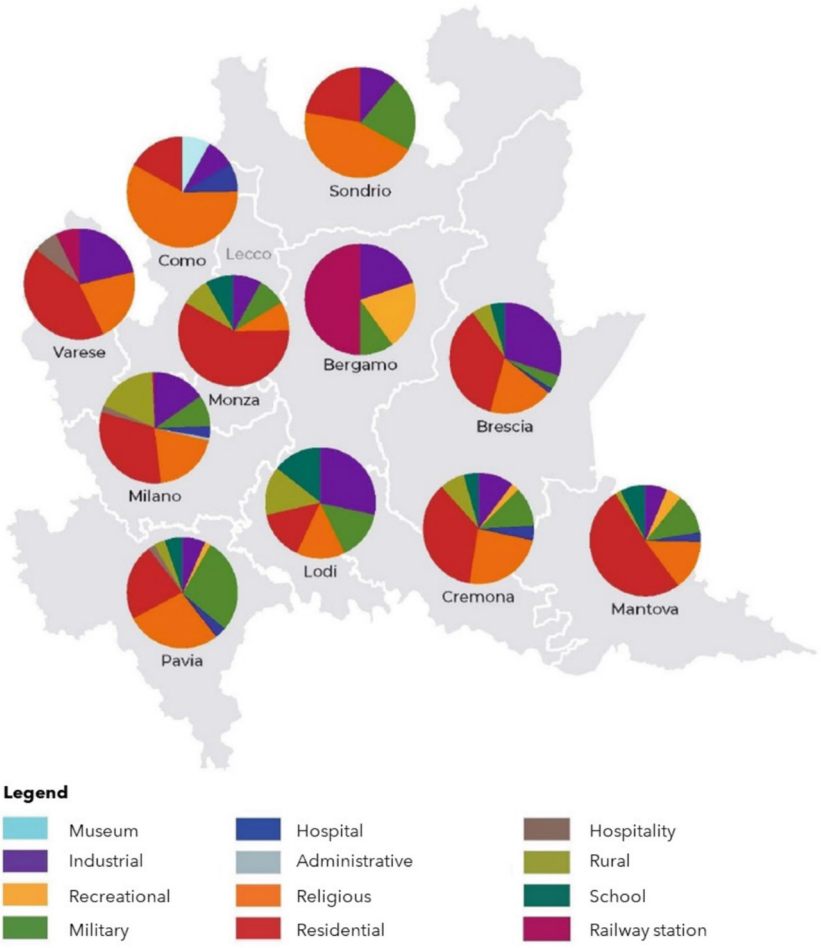


Fig. 4. Distribution of the identified typologies of heritage properties per Lombardy Region's province (Authors' elaboration on the Italian Ministry of Culture's Mapping of abandoned heritage properties)

Sondrio, Pavia and Lodi provinces, where the percentage of properties in a poor or very poor conservation state range from 80% to 90% of the total.

Given the variety of typologies, location, and conditions, the set of abandoned heritage properties mapped by the Ministry of Culture's census in Lombardy Region is an interesting sample for testing the proposed methodological tool.

However, in its first application as a 'pilot' case study, the tool's implementation focuses on a subset of the sample of abandoned properties. This subset is identified according to two criteria:

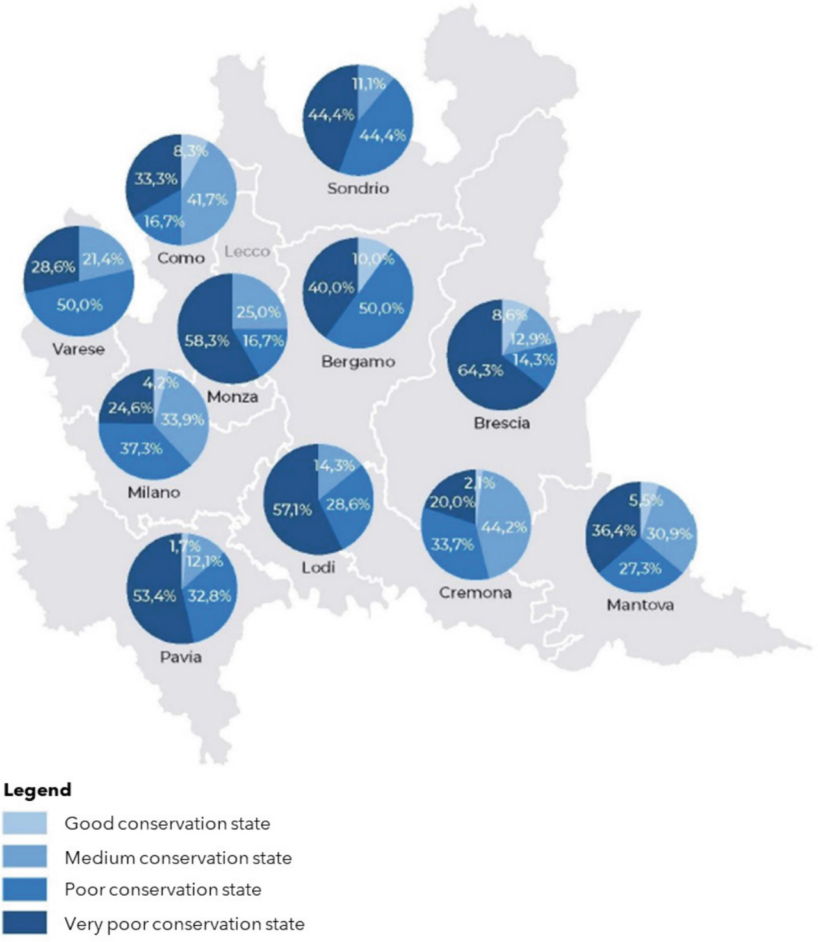


Fig. 5. Conservation state of abandoned properties per Lombardy Region's province (Authors' elaboration on the Italian Ministry of Culture's Mapping of abandoned heritage properties)

- A 'typological' criterion. This criterion leads to focusing on military and industrial properties that, given their less rigid functional layout, are more prone to undergo adaptive reuse processes under different scenarios.
- A 'territorial distribution' criterion. Based on this criterion, one province is selected since it allows for evaluating and comparing the economic opportunities of adaptive reuse between contexts characterized by different marginality conditions: Brescia province. This criterion, thus, enables highlighting the existence and the extent of territorial inequalities in the reuse opportunities for abandoned properties.

For these reasons, the proposed methodological tool is applied to military and industrial properties in Brescia province.

4.2 The Methodological Tool Implementation

The proposed methodological tool (Fig. 1) implementation to the selected subset of abandoned heritage properties in Lombardy Region first requires structuring the reference knowledge frame (Step 1) about their characteristics and reuse opportunities. To this aim, an information sheet is built for each property based on the data provided by the Ministry of Culture's census. Together with it, as a first application, for each property, three general reuse scenarios are defined: reuse as a residential asset, reuse as a commercial asset, and reuse as a tertiary asset.

Based on this information and hypotheses, it is possible to move to the second step in the methodological tool implementation: the Transformation Value appraisal. This step requires turning the information about the properties and the defined reuse scenarios into cost and revenue data, as input for applying the formal Eq. (1).

Concerning the transformation cost, it is appraised through a syntethic direct procedure based on parametric construction costs (€/sqm), which are identified, for each conservation state, through the analysis of different Estimate Metric Computations (EMC) related to projects for properties like the ones under analysis in terms of characteristics and location. This parametric construction cost is, then, turned into a whole transformation cost through a parametric estimation of the other cost items (professional fees, urbanization fees, when necessary, overheads) (Table 1).

Table 1. Parametric construction cost for each conservation state (Authors' elaboration)

Property's conservation state	Typology of intervention	Transformation cost
Medium conservation state	Minor intervention	**1,354 €/sqm**
Poor conservation state	Medium intervention	**1.924 €/sqm**
Very poor conservation state	Major intervention	**2.495 €/sqm**

The market value appraisal, instead, is performed for each reuse scenario through a direct mono-parametric procedure by referring to the value provided by the Official Real Estate Observatory in Italy (OMI), for the property's zone, related to: residential properties in an optimum conservation state for the residential scenario; commercial properties in an optimum conservation state for the tertiary scenario; office properties in an optimum conservation state for the tertiary scenario [36]. Once the input parameter for the formal Eq. (1) is provided, it is possible to appraise a transformation value for each of the three defined reuse scenarios and, by comparing them, identify the 'high and best' reuse scenario as the one ensuring the best financial performance. This performance, thus, can be assumed as the basis for the last step in the proposed methodological tool's implementation: the *Judgement about the economic opportunities of adaptive reuse.*

4.3 Results

The proposed methodological tool's implementation to the industrial and military abandoned heritage properties in Brescia Province, as of today included in the Italian Ministry

of Culture's census, provides preliminary insight about the territorial dimension of the challenges of reusing these assets (Table 2).

Table 2. Results from the implementation of the methodological tool to the mapped abandoned properties in Brescia province (Authors' elaboration)

Id	Property	Municipality	Classification	Typology	Conserv. state	Residential TV [€/sqm]	Commercial TV [€/sqm]	Tertiary TV [€/sqm]
1	Ex Cavallerizza di Brescia	Brescia	Center	Industrial	Medium	1845.8	1745.8	1145.8
2	Ex Mulino di Brescia	Brescia	Center	Industrial	Very poor	-295	-1095	-995
3	Ex Segheria Vallaro	Vione	Peripheral	Industrial	Very poor	-345	-1195	-995
4	Ex Mulino della Lama	Trenzano	Peri-urban	Industrial	Very poor	-1245	-1595	-1585
5	Strada delle Cartiere	Toscolano Maderno	Intermediate	Industrial	Medium	2245.8	-54.2	395.8
6	Cartiera di Garde	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
7	Complesso produttivo Maina di Mezzo	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
8	Complesso produttivo Maina Superiore	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
9	Complesso produttivo Vago	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
10	Complesso produttivo Contrada	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
11	Complesso produttivo Luseti	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
12	Insediamento produttivo Covoli	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
13	Complesso produttivo Quattro Ruote	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
14	Ex Filanda di Palazzo Bargnani Dandolo	Adro	Peri-urban	Industrial	Poor	-595	-1195	-1095
15	Ex Serre di Villa Mazzotti	Chiari	Peri-urban	Industrial	Very poor	-795	-1045	-995
16	Ex Mulino Pilù	Palazzolo sull'Oglio	Peri-urban	Industrial	Very poor	-695	-1295	-1245
17	Fabbricati Casere - Ex Magazzini Generali	Brescia	Center	Industrial	Poor	-245	-1195	-745
18	Ex Mulino della Borgognina	Brescia	Center	Industrial	Poor	-45	-695	-495
19	Fornaci da calce di Ponte Crotte	Brescia	Center	Industrial	Very poor	-45	-945	-795
20	Centro nautico del Garda	Toscolano Maderno	Intermediate	Industrial	Very poor	1105	-1195	-745
21	Ex Officina del gas	Salò	Intermediate	Industrial	Poor	2305	1105	605
22	Ex Caserma maggiore Giovanni Randaccio	Brescia	Center	Industrial	Poor	205	-845	-695
23	Ex Caserma Achille Papa	Brescia	Center	Industrial	Very poor	-395	-1195	-945
24	Ex Caserma dei Bersaglieri Goito	Brescia	Center	Industrial	Poor	2005	2205	1305

Classifying the municipalities in which the properties are located according to zones defined by the main territorial cohesion policy in Italy – the National Strategy for Inner Areas (NSIA)[1] [37] – reveals the territorial disparities in the economic opportunities from the reusing abandoned properties. Indeed, the effect of the municipalities' accessibility on their local real estate market's dynamics [38] becomes evident from comparing the economic opportunities related to the different reuse scenarios in terms of appraised transformation value. Indeed, properties belonging to the 'Financial sustainable' cluster are mainly located in the only municipality classified as a 'center' (Brescia) and in "intermediate" municipalities, which are attractive from a touristic point of view due to their location on the Garda Lake (Toscolano Maderno and Salò). On the contrary, the other 'peri-urban' and 'peripheral' municipalities show negative results in terms of transformation value for all the defined reuse scenarios, thus confirming the existence of a territorial disparity issue in the economic opportunities of adaptive reuse.

Together with the centrality of the 'location' aspect, the results from the tool's pilot application also reveal the crucial role of the conservation state in the reuse opportunities of abandoned properties: also in Brescia, as the main center in the province, the poor or very poor conservation state of an asset leads to a negative result in terms of transformation value. Finally, it is worth mentioning that for all the analyzed properties the 'high and best' reuse option, ensuring the best performance in terms of transformation value, is related to the residential function. Furthermore, in several cases - as the abandoned properties in Toscolano Maderno – the residential reuse option is the only one ensuring a positive financial result. Such evidence adds another point to the already complex challenge of tackling the abandonment of heritage properties through their adaptive reuse and further highlights the extent of territorial inequalities. Indeed, even if industrial or military heritage properties are more flexible than other heritage assets in terms of transformation potential, the need to preserve their tangible and intangible system of values can clash with the interventions required to host a residential function.

5 Discussion and Conclusions

The paper aims to contribute to the challenge of orienting policy efforts in the heritage field toward effectiveness and spatial justice by providing a sound knowledge basis to leverage abandoned heritage properties' potential in reducing territorial inequalities and promoting marginal territories' development. From this perspective, it proposes a three-step methodological tool, inspired by a mass appraisal approach [15], to expeditiously assess the economic opportunities of reusing abandoned heritage properties at large administrative territorial scales, thus highlighting and quantifying the existing imbalances between urban and marginal territorial contexts.

[1] The National Strategy for Inner Areas (NSIA) divides the national territory into five zones (centers, peri-urban areas, intermediate areas, peripheral areas, and ultra-peripheral areas) according to an accessibility indicator, that is measured in minutes needed to reach the closest center. According to this classification, inner areas, as the focus of this territorial cohesion policy, include all the municipalities resulting in intermediate (20–40 min to reach the closest center), peripheral (40–75 min required), and ultraperipheral (more then 75 min required).

The 'pilot' test on the case study, represented by the abandoned heritage properties in Brescia Province as mapped by the Italian Ministry of Culture's mapping, allows for reflection on its possible contribution to the challenge against heritage abandonment. It provides a preliminary information layer about the economic opportunities of reuse which, if properly integrated with the necessary cultural and social considerations about the properties' characteristics and values and their potential role within their territorial contexts and planning processes, can offer valuable support to public and private interventions in the adaptive reuse field. From a public perspective, it can guide the definition of effective and tailored funding allocation mechanisms to reuse processes, based on the specific features of the assets and their location, thus orienting policy design in the heritage field toward achieving spatial justice. From a private perspective, instead, it can provide an information ground to orient and promote investments in the adaptive reuse, thus triggering public-private collaboration mechanisms in addressing the abandonment challenge [39].

The willingness to fully deploy the proposed methodology's potential as a decision-support tool, thanks to its implementation in different territorial contexts, requires dealing with its current limits. They can be identified in the narrow perspective toward the defined reuse scenarios – currently limited to the residential, commercial, and tertiary functions – and the lack of accurate data for their scalability and replicability to other heritage typologies and territorial contexts. For this reason, future research perspectives will be mainly devoted to building a comprehensive dataset of cost input data, related to the different heritage typologies and conservation states, and revenue data, related to a broader array of reuse hypotheses, that must be necessarily defined by considering their reference contexts' vocations and directly interacting with their reference communities. Such an effort can help reconcile the standardization required for the tool's large-scale implementation by adopting the necessary context-based and heritage-sensitive perspective toward the adaptive reuse theme.

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