REGION
The Journal of ERSA
Powered by WU

Volume 9, Number 2, 2022, 109–129
DOI: 10.18335/region.v9i2.394

journal homepage: region.ersa.org
ISSN: 2409-5370

The THEMA tool to support heritage-based development strategies for marginal areas: Evidence from an Italian inner area in Campania Region

Marco Rossitti[1], Francesca Torrieri[2]

[1] Politecnico di Milano, Milan, Italy
[2] Università degli Studi di Napoli Federico II, Napels, Italy

Received: 25 October 2021/Accepted: 2 August 2022

Abstract. The ongoing forced reflection on the leading urbanization models' crisis has led to greater attention to marginal areas. In Italy, the scientific and media debate has focused on inner areas that, since 2014, have represented the target of an innovative national cohesion policy aimed at tackling their shrinking dynamics: the National Strategy for Inner Areas (SNAI). Indeed, Italian inner areas are endowed with extraordinary natural capital and settlement models far from urban density. Thus, they seem to respond perfectly to the new raised living needs.

However, leaving aside the optimistic rhetoric, strong political and administrative choices are necessary to trigger a 'return process' based on this broader attention toward inner areas, thus countering humankind's natural tendency to concentrate on urban realities.

In this light, the paper proposes a tool to support SNAI in designing and implementing heritage-based local development strategies to address inner areas' real needs. After a critical reading of the new challenges for planning posed by the pandemic and SNAI's role within them, the contribution moves to frame the THEMA (Tool for Heritage-based Enhancement of Marginal Areas) tool, focusing on specificities of the inner areas as cultural heritage. Finally, the tool's application to a case study, an inner area in Campania Region, allows to outline and discuss its possible benefits for SNAI implementation and its limits.

Key words: Marginal areas, inner areas, public policies, decision support, local development

1 Introduction

The ongoing forced reflection about the leading urbanization model's crisis (Sharifi, Khavarian-Garmsir 2020) has led to a focus on marginal areas and their possible role in addressing this crisis (Pinto et al. 2020). This reflection has resulted in growing attention toward territorial cohesion policies that, starting from the Lisbon Treaty in 2007, are at the core of European programs to reduce disparities between and within EU member states (Atkinson, Pacchi 2020). In the Italian context, the emerging debate has focused on inner areas, which, since 2014, are the core of the National Strategy for Inner Areas (SNAI), an innovative national policy representing one of the most interesting laboratories toward EU territorial cohesion (Cotella, Vitale Brovarone 2020). The SNAI aims to tackle

the negative demographic trends affecting some Italian marginal areas by promoting actions for local development and rebalancing welfare services (Lucatelli 2015). This national policy focuses on Italian inner areas defined and identified as (Barca et al. 2014):

- Significantly distant from the main centers offering essential welfare services (education, healthcare, and mobility);
- Endowed with significant environmental resources (water resources, agricultural systems, natural and human-made environment) and cultural resources (historical villages, craft centers);
- A diversified territory as a result of the different natural systems' dynamics and human activity.

In operational terms, inner areas are identified by dividing the national territory into five zones (centers, peri-urban areas, intermediate areas, peripheral areas, and ultra-peripheral areas) according to an accessibility indicator (Calvaresi 2015).

This accessibility indicator is measured in minutes needed to reach the closest center, defined as a municipality or a cluster of neighboring municipalities, offering simultaneously: all the secondary education provisions, hospitals with I level DEA, and at least a Silver railway station, according to RFI classification (DPS 2014). According to this classification, inner areas include all the municipalities resulting in intermediate (20-40 minutes needed to reach the closest center), peripheral (40-75 minutes required), and ultraperipheral (more than 75 minutes required). Among them, seventy-two project areas, including several municipalities classified as inner areas, have been chosen for the SNAI implementation.

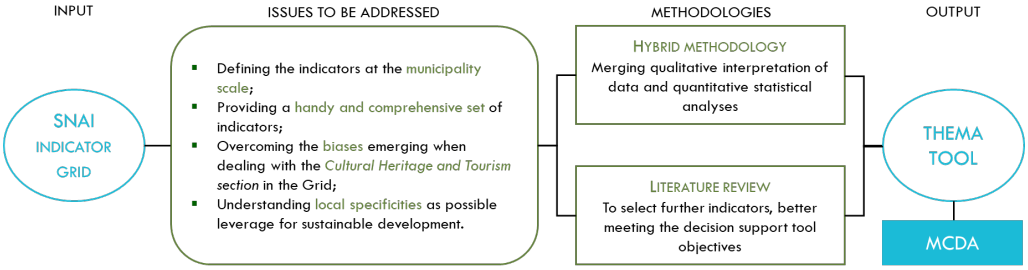
Thanks to their endowment of natural and cultural resources and their settlement model, far from urban density, inner areas seem to be a good response to the new living needs raised by the Covid-19 pandemic (Bruni 2021). However, leaving aside the optimistic rhetoric, looking at inner areas as the new centers of territorial development, strong political and administrative choices are necessary to trigger a 'return process', thus countering humankind's natural tendency to concentrate on urban realities (Lucatelli 2020). In this light, there is an urgent need to provide decision-makers in the SNAI perspective with effective decision-support tools. On the one hand, it is essential to leverage inner areas' specificities and potentialities, thus shunning prepacked and ineffective development models. On the other hand, it is important to overcome the limited vision, identifying a territory's marginalization degree merely with its peripherality level and ground development strategies for inner areas on a more in-depth and aware analysis of their dynamics. Indeed, defining marginality as "an involuntary position and condition of an individual or group at the margin of social, political, economic, ecological, and biophysical systems, that prevent them from access to resources, assets, services, restraining freedom of choice, preventing the development of capabilities, and eventually causing extreme poverty" (Gatzweiler et al. 2011, Gatzweiler, Baumuller 2014), it seems evident that it cannot be reduced to an accessibility issue, but must be addressed through a broader perspective. Furthermore, some virtuous experiences in inner areas show that the peripherality level does not necessarily index the area's weakness (Barca et al. 2014, Martinelli 2020).

Based on these premises, the research proposes a decision-support tool, named THEMA (Tool for Heritage-based Enhancement of Marginal Areas), to help decision-makers in the SNAI context defining local development strategies for Italian inner areas based on one of their primary, even if undervalued, sources: the cultural heritage (Rossitti, Torrieri 2021). Indeed, even if cultural heritage is widely recognized as territorial capital for sustainable development (Camagni et al. 2009, Foster 2020) and included within local development priorities, heritage-based actions in the SNAI implementation Strategy are often missing or reduced to tourism-oriented interventions. This is evident by looking at the planned interventions within the Area Strategies and the Framework Program Agreements (Agenzia per la Coesione Territoriale 2017, 2019, 2021a,b) of the four selected inner areas in the Campania Region. Indeed, by analyzing the data about the incidence of funding for cultural heritage interventions on the total of local development funding, it emerges how the built cultural capital is not adequately considered. This incidence is around 5% for three inner areas. The only exception is represented by the Alta Irpinia

Table 1: Planned cultural heritage fundings by the four inner areas in the Campania Region

Inner Area	Total Local Development Funding	Cultural Heritage Funding	% of Cultural Heritage Funding on Local Development Funding	% of Tourism oriented funding on Cultural Heritage Funding
Alta Irpinia	€20,579,482	€7,000,000	34.01%	100.00%
Cilento Interno	€10,779,280	€520,000	4.82%	100.00%
Tammaro – Titerno	€17,443,370	€860,100	4.93%	12.77%
Vallo di Diano	€13,756,900	€646,600	4.70%	100.00%

Source: Authors' elaboration on data provided by the Framework Program Agreements of Campania Region's inner areas



Source: Authors' elaboration

Figure 1: The methodological path towards the THEMA definition

inner area, but in its Strategy, all the interventions are limited to tourism promotion (Table 1).

After describing the complex methodological path leading to its definition, the THEMA tool is implemented through a case study: Tammaro-Titerno inner area in the Campania Region. Finally, the tool's value as a cognitive and operative device for SNAI implementation is discussed.

2 The methodological path towards the THEMA tool for heritage-based local development strategies in inner areas

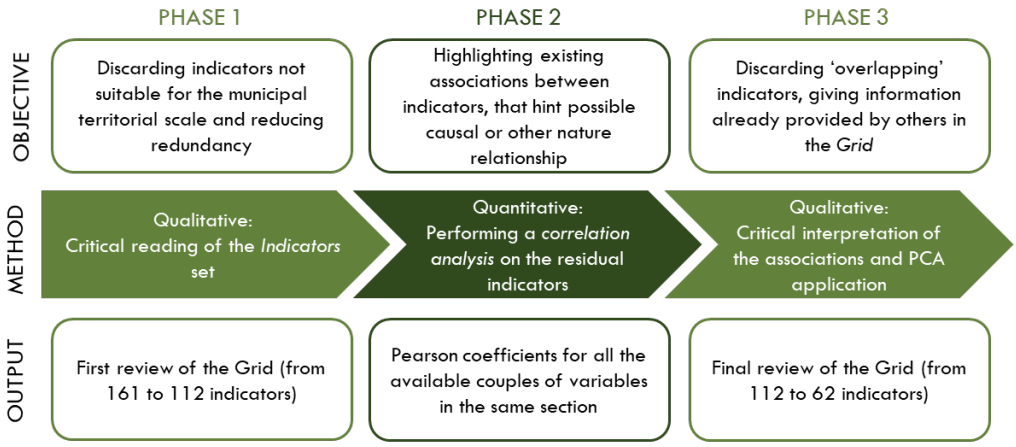
The complex challenges in territorial planning and the need to reduce disparities among and within territories call for proper tools to support policies and strategies toward territorial cohesion and local development, as the SNAI is. Such tools must consider the multiple dimensions of local development, recognize the differences among territories and provide objective data as a reference for decisions.

In this light, the SNAI Indicator Grid, used by the Technical Committee for Inner Areas in selecting project areas, represents a valuable starting point for the THEMA tool definition. However, its application as a decision-support tool for heritage-based local development strategies brings along some issues that need to be detected and solved. With this aim, the research integrates a hybrid methodology, merging qualitative data interpretation and statistical analyses with a literature review process to meet the THEMA tool objectives (Figure 1).

The two methodologies' integration returns a comprehensive tool for heritage-based local development strategies in inner areas that can be used as a cognitive tool or integrated with Multi-Criteria Decision Analysis (MCDA) techniques to support decisions in the SNAI perspective effectively.

2.1 2.1 The SNAI Indicator Grid

The SNAI Indicator Grid, used by the Technical Committee to evaluate the candidacies to inner areas submitted by the different Regions, represents the starting point for the THEMA tool definition.



Source: Authors' elaboration

Figure 2: Hybrid methodological approach toward SNAI Indicator Grid's review

It is a matrix to understand inner areas' characteristics through quantitative indicators. It includes both context variables (i.e., productive specialization indexes, demographic indicators) and result variables, measuring essential services' quality (i.e., share of population reached by broadband) or specific activities' economic success (number of visitors per 1000 inhabitants) (Carlucci, Lucatelli 2016). The Grid is divided into nine sections:

- Main characteristics;
- Demography;
- Agriculture and sectoral specialization;
- Digital divide;
- Cultural heritage and tourism;
- Health;
- Accessibility;
- School;
- Cooperation among municipalities.

Each section includes several indicators, which return an exhaustive and objective overview of the project areas' conditions to be integrated with qualitative considerations and the evidence from on-field activities.

2.2 The SNAI Indicator Grid: which issues to address?

The awareness of the Grid's potential in yielding a picture of inner areas' conditions hints at its use as a reference for a decision-support tool to guide heritage-based local development strategies. However, this new application field brings out some issues to be addressed towards improving its effectiveness. They can be listed as follow:

- The high number of indicators (161 indicators) makes it cumbersome to collect the necessary information to update the Grid or to apply it at the municipality scale to understand the power balances among municipalities within an inner area;
- The Grid contains much information, which is not always easily accessible, while it requires cooperation among different public institutions. The related effort to access data, if appropriate for the Grid's original use, which is the project areas selection, can discourage its extensive use as practical support for decisions;
- Both the large amount of information to manage and the difficulties in accessing data sources hinder the process of comprehensive qualitative analysis aimed at investigating the relations among different variables;
- The Cultural Heritage and Tourism section in the Grid reflects a partial and limited vision of cultural heritage as a tourism attraction. Indeed, all the indicators

Table 2: Selected indicators for the Cultural Heritage and Tourism section after the critical analysis of the indicators set

E. CULTURAL HERITAGE AND TOURISM			
e.6	Number of state and non-state cultural sites in 2015	e.7	Number of visitors in 2015
e.8	Number of visitors per 1000 inhabitants in 2015	e.10	Accommodation rate – bed places for 1000 inhabitants in 2016
e.11	Tourism rate – number of presences per 1000 inhabitants in 2016	e.13	Arrivals in 2016
e.14	Percentage variation in arrivals 2014-2016	e.16	Presences in 2016
e.17	Percentage variation in presences 2014-2016	e.18	Percentage of presences in hotel facilities in 2016
e.19	Percentage of presences in extra-hotel facilities in 2016	e.20	Percentage of arrivals in hotel facilities in 2016
e.21	Percentage of arrivals in extra-hotel facilities in 2016		

belonging to this section are measures of tourist flows, and there is no variable providing information about built heritage conditions. In addition, indicators in the Cooperation among municipalities section are limited to describing the relations among municipalities without considering the existence of associative forms within local communities;
- Applying some indicators to the municipality scale is impossible since they are only conceived for the inner area's territorial dimension.

To overcome these issues, raised from the willingness to adapt the Grid to different needs, the research resorts to the integration of two different methodologies:

- a hybrid methodology, merging statistical analysis and qualitative data interpretation to reduce redundancy in the indicators set and keep only the relevant variables for the SNAI purposes;
- a literature review aimed at identifying other indicators to fill the existing knowledge gaps in the reviewed Indicator Grid.

2.3 The hybrid methodology for the SNAI Grid review

The hybrid methodology addresses the Grid's most relevant limit, which is the high number of indicators. This methodology finds its logical basis in the law of briefness that, when applied to data science, results in parsimonious models, allowing a significant explanatory power of a dataset by using the minimum number of variables (Daganzo et al. 2012). Indeed, it is geared toward reducing redundancy and keeping only the relevant variables in the Indicator set through a methodological path structured into three phases (Figure 2) (Rossitti et al. 2021):

1. The first qualitative phase is based on a critical analysis of the indicator set. This preliminary step has a dual purpose. On the one hand, it aims at discarding indicators referring to the inner area territorial scale, thus allowing to turn the Grid into a tool applicable at the municipality scale. Indeed, the Grid application to the municipality scale can help understand power balances among municipalities, thus providing an in-depth knowledge of its dynamics. On the other hand, it is oriented to reduce the Grid's redundancy, intended as the presence of more than one indicator providing the same piece of information (Huang et al. 2015). More in detail, this task mainly addresses temporal redundancy and, thus, rejects indicators occurring twice with different time horizons when their simultaneous presence doesn't pitch in understanding the ongoing territorial dynamics (Table 2). Thanks to this first phase, the number of indicators in the Grid drops from 161 to 112.
2. A second qualitative phase, grounding on the statistical analysis of the selected indicators. This step allows highlighting relationships among variables that hint at

Table 3: Correlation matrix for the selected indicators in the Cultural Heritage and Tourism section

	e.6	e.7	e.8	e.10	e.11	e.13	e.14	e.16	e.17	e.18	e.19	e.20	e.21
e.6	1.00												
e.7	0.40	1.00											
e.8	0.48	0.85	1.00										
e.10	0.16	-0.04	0.21	1.00									
e.11	0.06	-0.02	0.19	0.93	1.00								
e.13	-0.01	0.10	0.27	0.59	0.77	1.00							
e.14	-0.17	0.06	0.12	0.01	0.01	-0.02	1.00						
e.16	-0.09	0.05	0.16	0.51	0.71	0.94	-0.02	1.00					
e.17	-0.20	0.00	0.06	0.01	0.02	-0.01	0.83	-0.01	1.00				
e.18	-0.21	0.24	0.18	0.08	0.17	0.18	-0.19	0.10	-0.07	1.00			
e.19	0.21	-0.24	-0.18	-0.08	-0.17	-0.18	0.19	-0.10	0.07	-1.000	1.00		
e.20	-0.30	0.19	0.12	0.08	0.17	0.23	-0.15	0.15	-0.06	0.97	-0.95	1.00	
e.21	0.30	-0.19	-0.12	-0.08	-0.17	-0.23	0.15	-0.15	0.06	-0.97	0.95	-1.00	1.00

Table 4: Selected indicators after the review of the Cultural Heritage and Tourism section of the SNAI Indicator Grid

E. CULTURAL HERITAGE AND TOURISM			
e.6	Number of state and non-state cultural sites in 2015	e.8	Number of visitors per 1000 inhabitants in 2015
e.10	Accommodation rate – bed places for 1000 inhabitants in 2016	e.11	Tourism rate – number of presences per 1000 inhabitants in 2016

possible causal or other nature associations. More in detail, a Pearson correlation analysis is performed among each couple of variables within each Grid category (Table 3) (Archdeacon 1994). The correlation analysis rests on the numerical data, referred to the 72 project inner areas, provided for each indicator by the Technical Committee for Inner Areas and updated in 2017 (Agenzia per la Coesione Territoriale 2017).

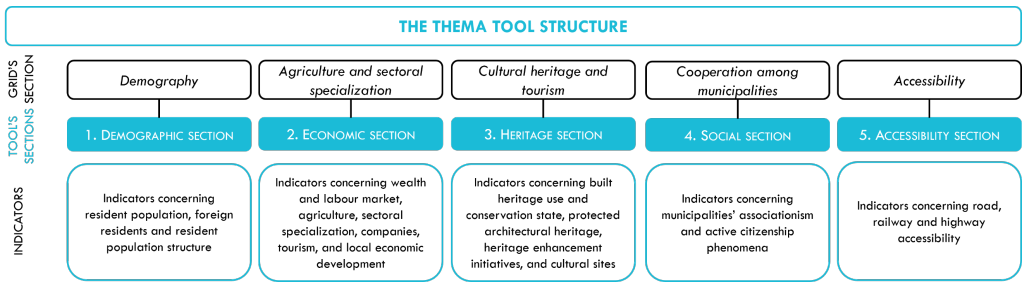
3. The third and last phase moves from the results of the correlation analysis to a refined list of indicators. Since high correlation values among variables hint at causal or other nature associations, a critical interpretation of these associations is necessary (Table 4). After evaluating each relationship, it is possible to discard 'overlapping' indicators ultimately providing the same information eventually, or to combine them into fewer composite indicators by resorting to a Principal Component Analysis (PCA) (Hair et al. 2006).
   Through this last phase, the number of selected indicators in the Grid decreases from 161 to 62.

2.4 The literature review process

Applying the hybrid methodology to the SNAI Indicators Grid allows its significant review with a reduction of the number of indicators from 161 to 62 without losing its information and complexity level. Furthermore, it enables to deal with some of the Grid's detected issues for its application as a decision-support tool at the municipality level:

- the large number of indicators is dramatically reduced (from 161 to 62), thus turning the Grid into a handier indicator set;
- all the indicators can be defined at the municipality scale, thus allowing the Grid's application at the municipality level and a better understanding of the ongoing dynamics among municipalities within an inner area.

However, some issues still exist, whose solution is crucial for the Grid application as an effective decision-support tool. Indeed, the Grid still requires collecting much information that, together with the difficulties in accessing some required data, discourages its extensive use as practical support for knowledge and decisions and its application to



Source: Authors' elaboration

Figure 3: THEMA tool's structure

different territorial realities. Furthermore, some sections in the Grid, such as the Cultural Heritage and Tourism and the Cooperation among municipalities, include indicators unable to describe territorial dynamics' complexity.

In this light, the research addresses these remaining shortcomings towards framing a handy and effective tool. First, to overcome the high amount of information needed, it proposes an 'optimized' version of the Grid, including only the relevant sections for the addressed decisional issue. Thus, considering the research's objective to support local development strategies in inner areas, focusing on their cultural heritage, universally acknowledged as a key source for sustainable development (Fusco Girard, Gravagnuolo 2017), the tool structure is limited to five sections:

- The Demographic section, since the main SNAI objective is to tackle abandonment processes and hinder depopulation (Tantillo 2015);
- The Economic section, since economic dynamics cannot be dismissed in any local development issue (Jay et al. 2020);
- The Heritage section, finding its reason for considering cultural heritage as leverage for local development processes (Capello et al. 2020);
- The Social section, advocated by the acknowledged importance of social involvement for strategies aiming at tackling depopulation and for heritage issues (Bartocci, Picciaia 2020);
- The Accessibility section, since accessibility stands as a fundamental requirement for each territorial transformation process (Chacon-Hurtado et al. 2020)

Furthermore, to address the need to fill gaps in the indicator set, thus providing a complete picture of the municipalities' conditions and power balances, the research delves into a literature review process to identify accurate indicators for the THEMA tool's purposes. This literature review process examines European and national Indicators databases, official websites, and documents, providing indicators or relevant information to define indicators for the public policies' domain. Table 5 displays the different reference sources for each section of the THEMA tool.

Thanks to this process, it is possible to obtain a comprehensive decision-support tool (Figure 3) whose indicators, defined for the different sections, provide a multi-dimensional picture of the conditions and ongoing dynamics of different municipalities within an inner area (Table 6). Indeed, besides updating some existing indicators in the Grid with the most recent available values, the data sources consultation process enriches the THEMA tool with valuable references for gaining comprehensive knowledge and grounding decision. More in detail:

- The Demographic section in the tool keeps the selected indicators in the Demography section from the SNAI Grid and completes them with the Ageing index as a dynamic and synthetic indicator of the population's structure;
- The Economic section also keeps the well-structured indicators set in the reviewed Agriculture and sectoral specialization section of the SNAI Grid. However, the existing set is integrated with other variables, capturing relevant phenomena. Firstly, it includes tourism indicators belonging to the Cultural heritage and Tourism

Table 5: List of consulted sources for the definition of additional relevant indicators in each section

Tool's Section	Sources
Demographic	ISTAT – Population and Household Census
Economic	MEF (Finance Department) – Open data ISTAT – Agricultural Census ISTAT – Atlante Statistico dei Comuni (ASC) ASIA Register of Companies CERVED Register of Companies Region official documents SNAI official documents
Heritage	ISTAT – Population and Households Census ISTAT – 8milaCensus MIBACT Registers https://borghipiubelliditalia.it/ https://www.borghiautenticiditalia.it/ http://www.borghinrete.it/ http://www.borghidellamemoria.it/ https://www.eventiesagre.it ISTAT – Atlante Statistico dei Comuni (ASC)
Social	SNAI official documents Regional Register of Third Sector entities
Accessibility	Google maps Transport companies' websites

section in the SNAI Grid. Secondly, it is enriched with several indicators capturing municipalities' involvement in local economic development processes;

- The Heritage section markedly distances itself from the structure of the Grid's Cultural Heritage and Tourism section, which meets a vision of cultural heritage as a mere touristic attraction. Indeed, the Heritage section includes indicators concerning built heritage use and conservation state, protected architectural heritage, cultural sites, and the presence of heritage enhancement initiatives. Thus, through the THEMA tool's lens, it is possible to obtain a broader picture of the heritage dimension.
- The Social Section resumes some indicators concerning municipalities' associationism, already present in the Cooperation among municipalities section of the SNAI Grid and adapts them to the municipality scale definition. Furthermore, it includes other indicators capturing active citizenship realities, which are essential for place-based local development strategies.
- The Accessibility Section takes the existing indicators in the homonymous section from the SNAI Grid and adapts them to the need to be defined at the municipality scale and easily updated.

Table 6: Complete list of indicators for each section in the THEMA tool

1. DEMOGRAPHIC SECTION			
1.1 Resident population			
POP_VAR_71-01	Percentage variation in the resident population 1971-2001	POP_VAR_01-11	Percentage variation in the resident population 2001-2011
POP_VAR_11-20	Percentage variation in the resident population 2011-2020		
1.2 Resident foreigners			

continued below

Table 6: Complete list of indicators for each section in the THEMA tool (continued)

FOR_VAR_01-11	Percentage variation in the resident foreigners 2001-2011	FOR_VAR_11-20	Percentage variation in the resident foreigners 2011-2020
FOR_PER_20	Percentage of resident foreigners in 2020		
1.3 Resident population structure			
AGE_20	Aging index in 2020		
2. ECONOMIC SECTION			
2.1 Wealth and labor market			
PCI_18	Per capita income in 2018	EMP_18	Employment rate in 2018
2.2 Agriculture			
UUA_VAR_82-10	Percentage variation in the Utilized Agricultural Area 1982-2010	FARX1000_10	Number of farms per 1000 inhabitants in 2010
FAR_VAR_82-10	Percentage variation in the number of farms per 1000 inhabit. 1982-2010	AGR_IMP_10	Importance of the agricultural sector in 2010
2.3 Sectoral specialization			
SP_IND_E&W_1	Specialization index for the 'Energy, Water and Gas' sector in 2017	SP_IND_MAN_17	Specialization index for the 'Manufacturing' sector in 2017
SP_IND_CON_17	Specialization index for the 'Construction' sector in 2017	SP_IND_T&T_17	Specialization index for the 'Trade and Transport' sector in 2017
SP_IND_SER_17	Specialization index for the 'Other services' sector in 2017		
2.4 Companies			
COMX1000_20	Number of active companies per 1000 inhabitants in 2020	COM_GRO_20	Companies stock growth rate in 2020
COM_VAR_15-20	Percentage variation in the active companies 2015-2020		
2.5 Tourism			
ACC_RA_19	Accommodation rate in 2019		
2.6 Local economic development			
QU_PRO_16	Producers and processors of DOP/IGP/STG quality products in 2016	FOOD_DEV	Local development based on food and high-quality agriculture
INDU_DEV	Local development based on productive specialization	TOUR_DEV	Local development based on tourism
RES_DEV	Local development based on the attraction of new residents		
3. HERITAGE SECTION			
3.1 Built heritage			
DIS_RATE_11	Building disuse rate in 2011	HIS_RATE_11	Rate of residential building up to 1945
BAD_INC_11	Incidence of residential building in bad conservation state in 2011		
3.2 Protected architectural heritage			
PRO_ARC_HER	Protected architectural heritage		
3.3 Heritage enhancement			
VIL_ENH	Historical villages enhancement initiatives	EX_REG_EVE	Events of extra-regional importance in 2019
LOC_EVE	Events of local importance in 2019		
3.4 Cultural sites			
VISX1000_18	Number of visitors per 1000 inhabitants in 2018		

continued below

Table 6: Complete list of indicators for each section in the THEMA tool (continued)

4. SOCIAL SECTION			
4.1 Municipalities' associationism			
UNI_MUN	Municipality's membership in a Union of Municipalities	MCOM_MUN	Municipality's membership in a Mountain Community
LAG_MUN	Municipality's membership in a LAG (Local Action Group)		
4.2 Active citizenship			
APS_20	Social promotion associations	ODV_20	Voluntary organizations
OTH_20	Other local associations	SCOP_20	Social cooperatives
5. ACCESSIBILITY SECTION			
5.1 Road accessibility			
CEN_DIS	Average distance from the nearest centers in minutes	CEN_LPT	Road LPT (Local Public Transports) offer to connect with the local centers
5.2 Railway accessibility			
RAIL_DIS	Average distance from the nearest railway station in minutes		
5.3 Highway accessibility			
HIGH_DIS	Average distance from the nearest highway tool booth in minutes		

Colourcodes:

Indicators already present in the SNAI Grid	Indicators already present in the SNAI Grid with a different year/time span of reference	Indicators selected after the literature review process

3 The THEMA tool implementation in Tammaro-Titerno inner area in Campania Region

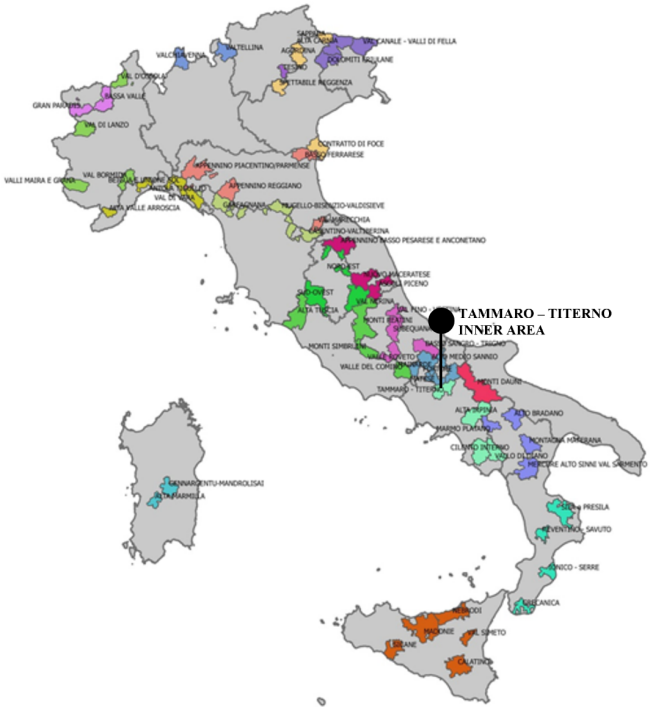
Once the THEMA tool's structure is defined, implementing it in a case study is crucial to understand its potentialities, limits, and room for improvement. For this reason, the tool is tested on one of the 72 SNAI inner areas: Tammaro–Titerno inner area in the Campania Region (Figure 4).

This area, located in the north-eastern part of Benevento Province, includes 24 municipalities. It is affected by demographic shrinking and marginalization dynamics common to all Italian inner areas. One of the main criticalities is accessibility: a mountain ridge stands as a natural barrier, dividing the area into poorly connected parts, the Tammaro and the Titerno (Figure 5).

Furthermore, the analysis of Tammaro-Titerno's inner area Framework Program Agreement returns a low incidence of funding devoted to cultural heritage interventions on the total funding for local development initiatives (4,93%) (Agenzia per la Coesione Territoriale 2021b).

However, it shows a solid agricultural vocation, a good associationism tradition, and an array of distinctive heritage elements, from the tangible to the intangible dimension, making it prone to undergo heritage-led local development processes (Associazione Sannio Smart Land 2020).

The tool's implementation to Tammaro-Titerno inner area requires calculating the different indicators' values assigned to each municipality within the area. These values represent useful references to understand the municipalities' conditions concerning specific phenomena and the existing power balances within them. In this sense, a significant advantage can stem from integrating the indicators set in a GIS environment (Figure 6), thus allowing an easier comprehension of data based on a graphical representation of the indicators' values (Duhr, Muller 2012, Oppio et al. 2021).



Source: Cnai's elaboration on ISTAT administrative boundaries data, 2015

Figure 4: Tammaro-Titerno inner area in Campania Region

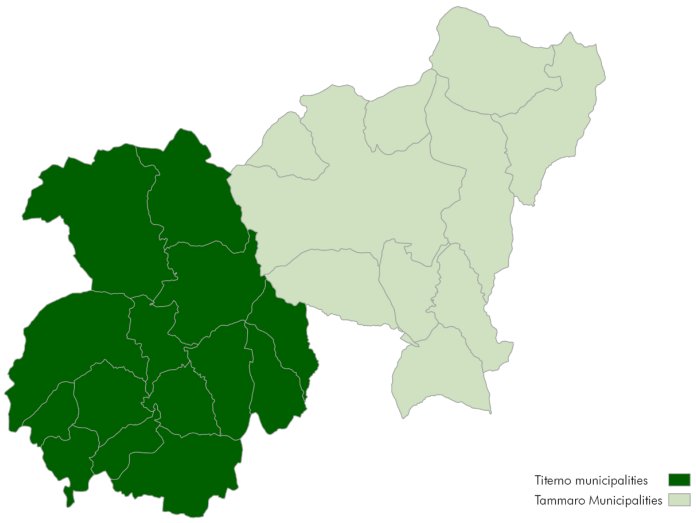
The indicators' values, calculated for each municipality, also allow investigation of some ongoing dynamics in the area through the graphical representation and qualitative interpretation of the relationships among variables (Figure 7).

Furthermore, the multi-dimensional nature of the decision-support tool fits the integration with an MCDA methodology aimed at drawing out a ranking of municipalities according to their need or potentialities in the different considered dimensions (Kiker et al. 2005, Falcao et al. 2021). In this light, among the different MCDA methodologies, the research applies the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) directly in a GIS environment thanks to the QGIS plugin VectorMCDA (Massei 2018). The TOPSIS is a MCDA ranking method that has received much interest and application in decision-making related to different fields (Behzadian et al. 2012). It allows ranking alternatives by privileging the ones having the shortest distance from the positive ideal solution and the farthest distance from the negative ideal solution (Yoon, Hwang 1995).

Concerning the practical application of the TOPSIS methodology to the case study, it requires the definition of the ideal point and the worst point for each indicator in the decision-support tool. More in detail, the two points are defined by referring to the values provided by scientific literature or to the average Italian performance for the considered indicators. When, for an indicator, the reference to these values is not meaningful, the ideal and the worst points are placed equal respectively to the best and the worst score within the ones given to Tammaro-Titerno municipalities for that indicator. Table 7 shows an example of the definition of the ideal and worst points, propaedeutic to the TOPSIS application, regarding the indicators belonging to the Heritage section: the consequent value functions are shown in Figure 8.

After this step and essential for score standardization, the municipalities' scores within each tool's section are aggregated through an indifferent system of weights, thus providing the municipalities' overall performance for any of the five dimensions (Figure 9).

Finally, the five overall scores related to the five sections in the tool are aggregated in a unique score, expressing the municipalities' inclination to undergo heritage-led local



Source: Authors' elaboration on ISTAT administrative boundaries data, 2021

Figure 5: The distinction between Tammaro and Titerno municipalities

development processes (Figure 10).

4 Results

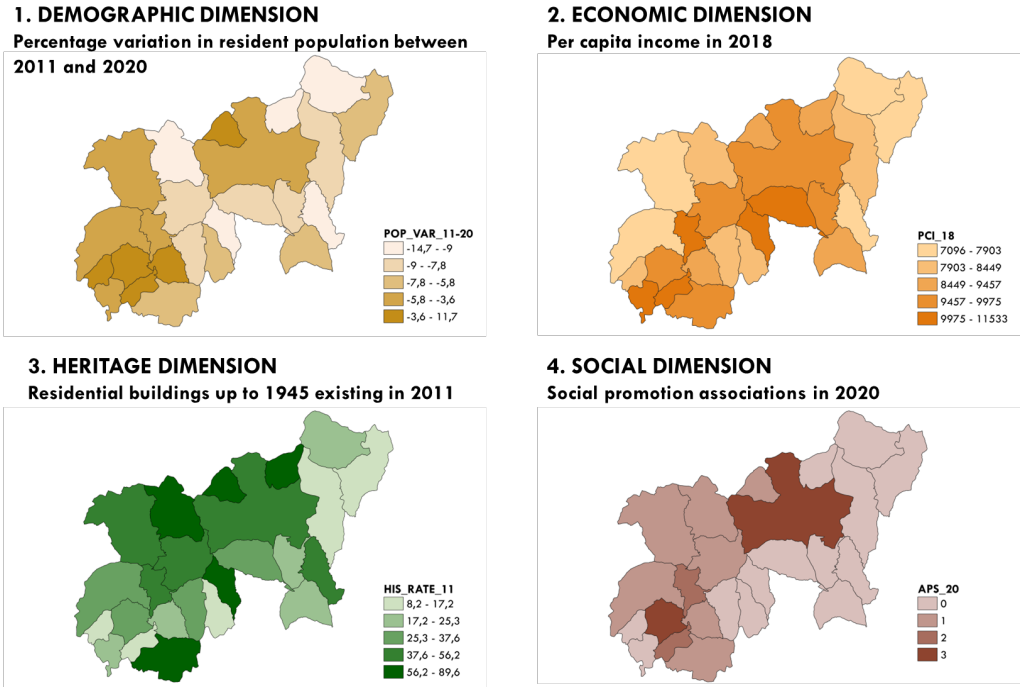
The tool's application to the Tammaro-Titerno inner area highlights its potentialities, limits, and room for improvement in supporting heritage-based development strategies for marginal areas. The value maps produced for each indicator allow understanding of the municipalities' minor or major inclination to transformation, according to the dimensions considered. Concerning Tammaro-Titerno inner area, the value maps with municipalities' overall score for each dimension (Figure 9) hint that Titerno municipalities show a higher disposition to transformation, according to most of the considered development dimensions. Furthermore, Telese Terme stands as an outlier since it seems not to be affected by the ongoing marginalization dynamics in the area.

The qualitative and graphical interpretation of the relationships among the selected variables reveals some interesting phenomena in the area (Figure 7). For instance, it is possible to state that:

- the increase in the foreign population doesn't seem to hinder the buildings' disuse rate;
- there seems to be a positive relationship between the number of third sector entities and the increase in foreign population;
- the resident population decline appears to affect the buildings' conservation state;
- the existing relationship between agricultural quality products and the number of local events per municipality makes the areas' strong agricultural vocation evident.

The tool's integration with a MCDA methodology allows to draw out a ranking of municipalities (Figure 10), according to their need or potentialities in the considered dimensions, that can be used as good support for grounding decisions. For instance, it can serve the choice of a pilot cluster of Tammaro-Titerno municipalities to implement heritage-based development strategies by leveraging their inclination to transformation and considering their proximity in light of a systemic and integrated approach to local development (Figure 11) (Salvia, Quaranta 2017).

Finally, the decision-support tool proposes complimentary reading keys to the one proposed by SNAI, based on the accessibility indicator, in understanding the municipalities' marginalization conditions. Indeed, such multi-dimensional reading provides a more detailed and comprehensive definition of the marginalization phenomena than the



Source: Authors' elaboration on ISTAT administrative boundaries data, 2021

Figure 6: Value maps for different indicators belonging to four sections (demographic, economic, heritage, and social) of the decision-support tool

one based only on the accessibility indicator. This reading's importance is evident by comparing the classification of Tammaro-Titerno municipalities provided by SNAI with the ones grounded on the overall performances obtained for each dimension of the tool through the MCDA methodology (Figure 9). Classifications are defined on a five-point scale (from 1 for the worst performances to 5 for the best ones) by grouping municipalities in five quantiles according to the overall score obtained for each dimension.

Table 8, displaying the comparison among these different classifications, clearly shows the limits of a definition of marginalization merely based on accessibility. Indeed, there are some municipalities (i.e. Cerreto Sannita, Morcone, San Lorenzello), classified as peripheral by SNAI, performing better than others classified as intermediate (i.e. Amorosi, Pontelandolfo, Puglianello). The broader perspective towards marginality shows that these intermediate municipalities in accessibility terms are affected by more severe marginality phenomena in economic, social, and heritage terms. Furthermore, even focusing on the accessibility definition, its extension to other factors than only the distance from the closest center, as the offer of local public transport, determines some differences with the classification provided by SNAI. Furthermore, declining the marginalization notion to the different relevant dimensions for local development allows for defining systemic policies by addressing each municipality's specific need.

5 Discussion and conclusions

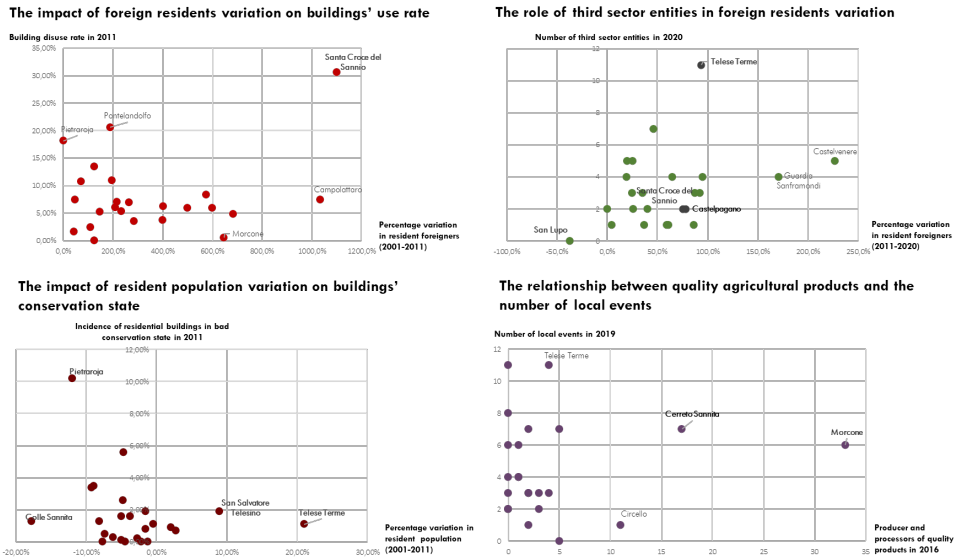
The paper proposes a tool to support SNAI in designing and implementing heritage-based local development strategies to address marginal areas' real needs. The analysis of the tool's application to a case study, represented by the Tammaro-Titerno inner area, clearly reveals its potential for SNAI implementation. Indeed, the THEMA tool, also through the integration with proper methodologies such as MCDA, can help SNAI decision-makers in public and private spheres in:

Table 7: Ideal and worst point definition method for the indicators belonging to the Heritage section

Id	Indicator	Ideal and worst point definition method	Ideal	Worst
DIS_RATE_11	Building disuse rate in 2011	Reference to the best and worst scores gained by Tammaro-Titerno municipalities	0%	30,6%
HIS_RATE_11	Rate of residential building up to 1945	Reference to the average Italian performance for the ideal point. The worst point is placed equal to zero.	25,9%	0%
BAD_INC_11	Incidence of residential building in bad conservation state in 2011	Reference to the best and worst scores gained by Tammaro-Titerno municipalities	0%	10,2%
PRO_ARC_HER	Protected architectural heritage	Reference to the best and worst scores gained by Tammaro-Titerno municipalities	18	0
VIL_ENH	Historical villages enhancement initiatives	The nature of the indicator (binary) automatically determines the ideal and worst points	1	0
EX_REG_EVE	Events of extra-regional importance in 2019	Reference to the best and worst scores gained by Tammaro-Titerno municipalities	2	0
LOC_EVE	Events of local importance in 2019	Reference to the best and worst scores gained by Tammaro-Titerno municipalities	11	0
VISX1000_18	Number of visitors per 1000 inhabitants in 2018	Reference to the cumulative Italian performance for the ideal point. The worst point is placed equal to zero.	2150	0

Table 8: Comparison between the SNAI classification of Tammaro-Titerno municipalities and the classifications based on the overall performances obtained from the THEMA tool

Municipality	SNAI classif.	Demographic	Economic	Heritage	Social	Accessibility
Amorosi	Intermediate	4	1	2	1	4
Campolattaro	Intermediate	4	1	2	2	5
Castelpagano	Peripheral	2	2	1	2	1
Castelvenere	Intermediate	5	5	3	4	2
Cerreto Sannita	Peripheral	4	4	5	4	2
Circello	Peripheral	2	3	1	3	2
Colle Sannita	Peripheral	2	2	2	3	1
Cusano Mutri	Peripheral	4	1	4	4	1
Faicchio	Intermediate	3	3	4	4	2
Fragneto l'Abate	Intermediate	1	2	4	1	5
Fragneto Monforte	Intermediate	4	5	3	1	5
Guardia Sanframondi	Intermediate	3	4	5	4	3
Morcone	Peripheral	2	4	5	5	3
Pietraroja	Peripheral	1	5	1	5	1
Pontelandolfo	Intermediate	1	4	1	2	4
Puglianello	Intermediate	5	1	2	1	3
San Lorenzello	Peripheral	3	5	5	5	1
San Lorenzo Maggiore	Intermediate	5	2	1	2	5
San Lupo	Intermediate	1	5	3	3	5
San Salvatore Telesino	Intermediate	5	4	3	5	4
Santa Croce del Sannio	Peripheral	3	3	2	2	2
Sassinoro	Peripheral	1	1	4	3	4
Solopaca	Intermediate	2	3	5	1	3
Telese Terme	Intermediate	5	2	4	5	4



Source: Authors' elaboration

Figure 7: Graphical representation of some relationships among the selected variables in the decision sup-port tool

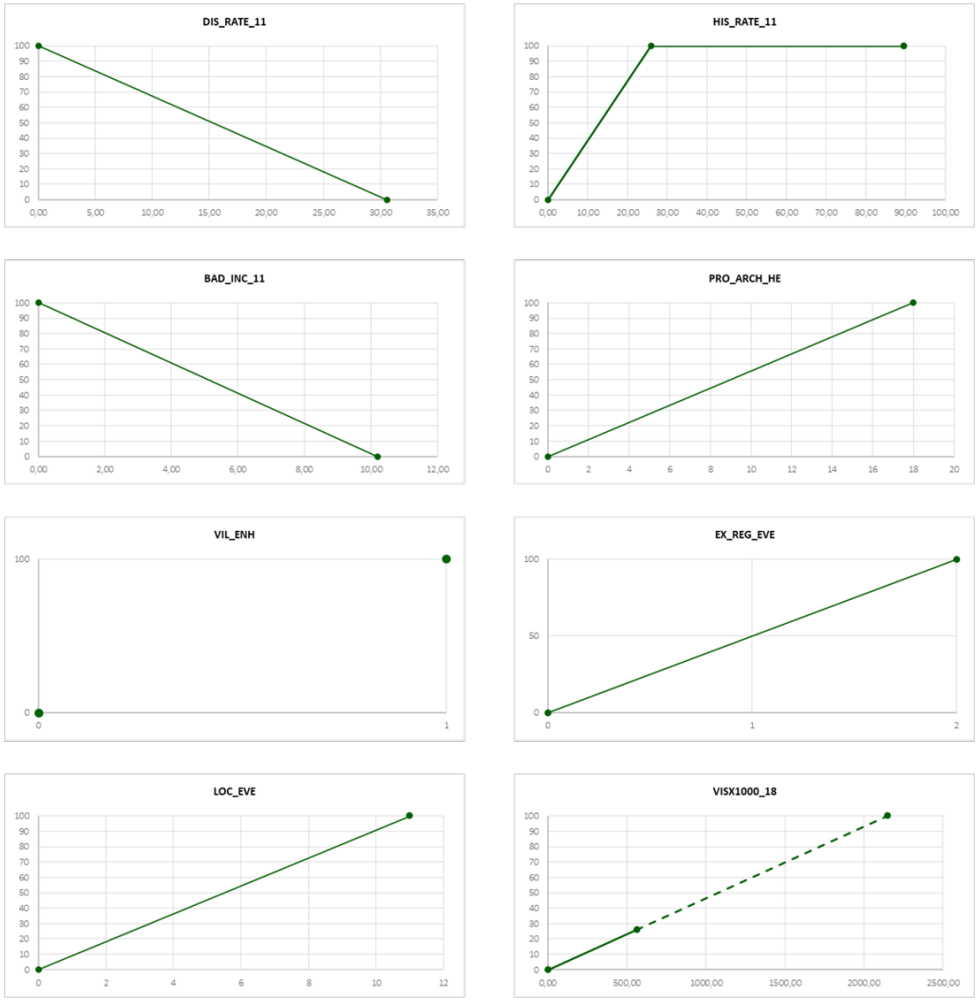
- Gaining a comprehensive and multi-dimensional knowledge of territorial dynamics and power balances thanks to the values defined for each indicator in the tool and available for each municipality. Value maps, in this sense, can offer valid support for the detected phenomena comprehension and communication;
- Defining interventions and allocating resources according to the municipalities' actual needs in the considered dimensions;
- Setting goals to be reached related to local development, in terms of performance, to monitor the effectiveness of the implemented policies;
- Prioritizing actions within a project inner area or selecting additional territories for SNAI relaunch.

More in detail, in the public sphere, the tool can address local and regional administrators' needs to properly manage limited financial resources by grounding investment decisions on a solid knowledge of territorial dynamics. For national administrators, if applied to the whole national context, it can stand as a powerful instrument for the planning agenda. Instead, the tool can support private actors in assessing different territorial investment opportunities.

Furthermore, regarding the possible role for SNAI project areas selection, the THEMA tool offers complementary reading to the one proposed by SNAI, based on the accessibility indicator, to understand the municipalities' marginalization conditions. Indeed, the proposed multi-dimensional reading provides a more detailed and comprehensive definition of the marginalization phenomena than the one based only on the accessibility indicator. This declination of the marginalization notion to the different relevant dimensions for local development allows for defining systemic policies by addressing each municipality's specific need.

Thanks to its objective and transparent framework, the decision-support tool can play a significant role in SNAI implementation through its application to the different inner areas. However, in exporting the tool to other territorial contexts, the need for a place-based perspective on local development (Barca et al. 2012) requires adapting its structure to the inner area under study by eventually discarding not representative indicators or including new ones, able to capture its specificities.

The importance of adopting a place-based approach to marginal areas' local development (Cotella et al. 2021) opens some considerations on the limits of the THEMA tool application and how to overcome them.

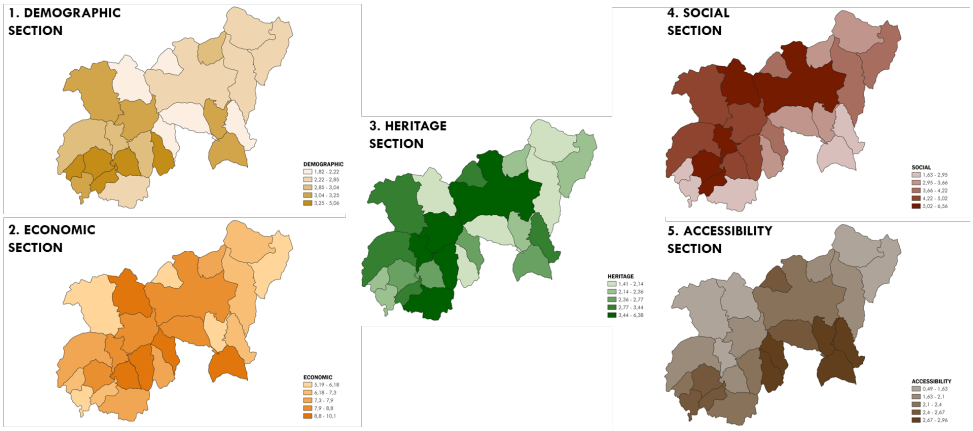


Source: Authors' elaboration

Figure 8: Value functions for the standardization of the scores, related to the Heritage indicators, stemming from the ideal and worst point definition

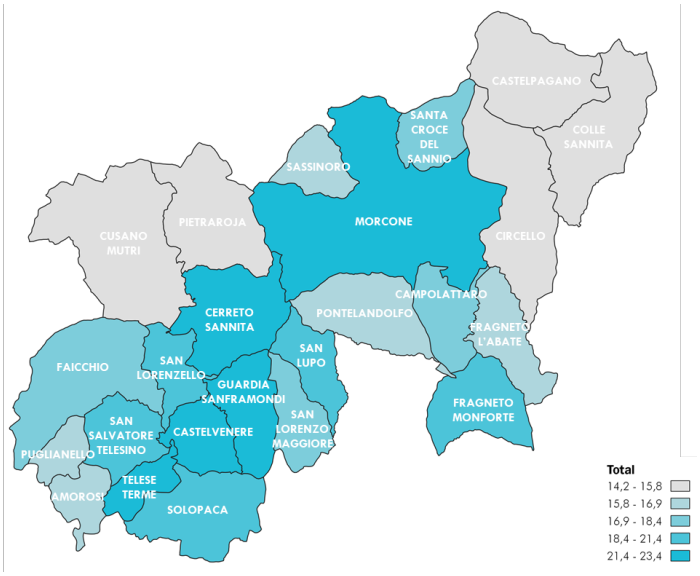
Indeed, territorial dynamics can fully be captured only through direct contact with the territorial context under study and its community. In this sense, the decision-support tool cannot stand as the exclusive basis for decisions. Its data must be integrated with the values stemming from the interaction with local communities, their system of preferences, and expectations (Oppio et al. 2021). In practical terms, this integration can be pursued by involving key local stakeholders in applying participatory weighting methodologies for the MCDA implementation, such as the Swing, the SMARTER, or the SRF (Edwards, Hutton Barron 1994, Figueira, Roy 2002, Dell'Ovo et al. 2021), or placing the results of the tool's application at the core of an informed dialogue with them based on participatory tools like focus groups, semi-structured interviews, questionnaires, and workshops.

Another challenge towards the tool implementation as adequate support in the decision arena is related to its practical use by local technicians or private. However, this limit can be overcome by developing a user-friendly online platform to be consulted and by setting specific training programs for local technicians to access data for updating it and interpreting its results.



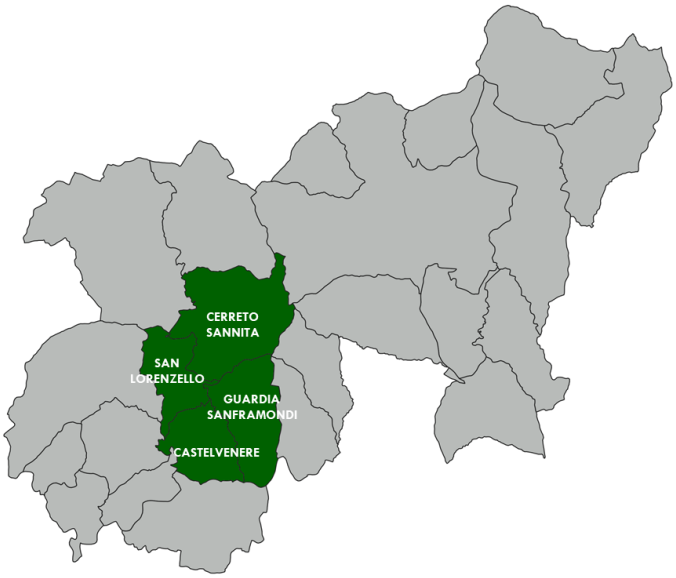
Source: Authors' elaboration on ISTAT administrative boundaries data, 2021

Figure 9: Value maps with municipalities' overall score for any of the five dimensions considered in the decision-support tool



Source: Authors' elaboration on ISTAT administrative boundaries data, 2021

Figure 10: Tammaro-Titerno municipalities' overall ranking according to their inclination to undergo heritage-led local development processes



Source: Authors' elaboration on ISTAT administrative boundaries data, 2021

Figure 11: A pilot cluster of municipalities for the implementation of heritage-based development strategies

References

Agenzia per la Coesione Territoriale (2017) Accordo di programma quadro regione Campania "AREA INTERNA – Alta Irpinia". https://www.agenziacoesione.gov.it/-wp-content/uploads/2020/10/APQ-Alta-Irpinia.pdf

Agenzia per la Coesione Territoriale (2019) Accordo di programma quadro regione Campania "AREA INTERNA – Vallo di Diano". https://www.agenziacoesione.gov.it/-wp-content/uploads/2020/10/Apq-Vallo-di-Diano.pdf

Agenzia per la Coesione Territoriale (2021a) Accordo di programma quadro regione Campania "AREA INTERNA – Cilento Interno". https://www.agenziacoesione.gov.-it/wp-content/uploads/2022/01/CILENTO-INTERNO.pdf

Agenzia per la Coesione Territoriale (2021b) Accordo di programma quadro regione Campania "AREA INTERNA – Tammaro-Titerno". https://www.agenziacoesione.-gov.it/wp-content/uploads/2021/11/APQ-Tammaro-Titerno.pdf

Archdeacon TJ (1994) *Correlation and Regression Analysis: A Historian's Guide*. University of Wisconsin Press, Madison

Associazione Sannio Smart Land (2020) Strategia d'area. Area pilota tammaro-titerno. https://www.agenziacoesione.gov.it/wp-content/uploads/2020/11/TAMMA-RO-TITERNO_Documento_di_strategia.pdf

Atkinson R, Pacchi C (2020) In search of territorial cohesion: An elusive and imagined notion. *Social inclusion* 8: 265–276. CrossRef

Barca F, Casavola P, Lucatelli S (2014) Strategia nazionale per le aree interne. definizioni, obiettivi e strumenti di governance. Materiali uval 31. https://www.miur.gov.it/documents/20182/890263/strategia_nazionale_aree_interne.pdf/d10fc111-65c0-4acd-b253-63efae626b19

Barca F, McCann P, Rodriguez-Pose A (2012) The case for regional development intervention: Place-based versus place-neutral approaches. *Journal of Regional Science* 52: 134–152. CrossRef

Bartocci L, Picciaia F (2020) Looking for new paths to realize cross-sector collaboration for urban regeneration: The case of castel del Giudice (Italy). *Sustainability* 12: 1–15. CrossRef

Behzadian M, Khanmohammadi Otaghsara S, Yazdani M, J I (2012) A state-of-the-art survey of TOPSIS application. *Expert Systems with Applications* 39: 13051–13069. CrossRef

Bruni F (2021) Re-evaluating the distance: Virus as a "great urban planner" in the rediscovery of inner areas at risk of depopulation. *Sustainable Mediterranean Construction* 5: 41–43

Calvaresi C (2015) Le aree interne, un problema di policy. *Territorio* 74: 87–90. CrossRef

Camagni R, Borri D, Ferliano F (2009) Per un concetto di capitale territoriale. In: Borri D, Ferliano F (eds), *Crescita e sviluppo regionale: strumenti, sistemiazioni*. FrancoAngeli, Milano

Capello R, Cerisola S, Perucca G (2020) Cultural heritage, creativity, and local development: A scientific research program. In: Della Torre S, Cattaneo S, Lenzi C, Zanelli A (eds), *Regeneration of the Built Environment from a Circular Economy Perspective*. Springer, Cham. CrossRef

Carlucci C, Lucatelli S (2016) La strategia aree interne 2014-2020: Dati e indicatori pertinenti. In: Iaco D (ed), *Statistiche Per le Politiche di Sviluppo a Supporto dei Decisori Pubblici*. Proceedings of the Conference Statistiche Per le Politiche di Sviluppo a Supporto Dei Decisori Pubblici, Roma, Italy, 7 July 2015, ISTAT, Roma

Chacon-Hurtado D, Kumar I, Gkritza K, Fricker JD, Beaulieu LJ (2020) The role of transportation accessibility in regional economic resilience. *Journal of Transport Geography* 84: 102695. CrossRef

Cotella G, Vitale Brovarone E (2020) The italian national strategy for inner areas: A place-based approach to regional development. In: Banski J (ed), *Dilemmas of Regional and Local Development*. Routledge, Abingdon-on-Thames. CrossRef

Cotella G, Vitale Brovarone E, Voghera A (2021) Italy testing the place-based approach: River agreements and national strategy for inner areas. *Smart Innovation, Systems and Technologies* 178: 113–124. CrossRef

Daganzo CF, Gayah VV, Gonzales EJ (2012) The potential of parsimonious models for understanding large scale transportation systems and answering big picture questions. *EURO Journal on Transportation and Logistics* 1: 47–65. CrossRef

Dell'Ovo M, Dell'Anna F, Simonelli R, Sdino L (2021). Enhancing the cultural heritage through adaptive reuse. A multicriteria approach to evaluate the Castello Visconteo in Cusago (Italy). CrossRef

DPS – Dipartimento per lo Sviluppo e la Coesione Economica (2014) Le aree interne: Di quali territori parliamo? Nota esplicativa sul metodo di classificazione delle aree. http://www301.regione.toscana.it/bancadati/atti/Contenuto.xml?.id=5081285&-nomeFile=Delibera_n.32_del_20-01-2014-Allegato-A

Duhr S, Muller A (2012) The role of spatial data and spatial information in strategic spatial planning. *Regional Studies* 46: 423–428. CrossRef

Edwards W, Hutton Barron F (1994) SMARTS and SMARTER: Improved simple methods for multiattribute utility measurement. *Organizational Behavior and Human Decision Processes* 60: 306–325. CrossRef

Falcao A, Machete R, Castilho Gomes M, Goncalves A (2021) Spatial multi-criteria decision analysis for rehabilitation priority ranking: A collaborative application to heritage workforce housing. *International Journal of Architectural Heritage* 15: 790–860. CrossRef

Figueira JR, Roy B (2002) Determining the weights of criteria in the ELECTRE type methods with a revised Simos' procedure. *European Journal of Operational Research* 139: 317–326. CrossRef

Foster G (2020) Circular economy strategies for adaptive reuse of cultural heritage buildings to reduce environmental impacts. *Resources, Conservation and Recycling* 152: 104507. CrossRef

Fusco Girard L, Gravagnuolo A (2017) Circular economy and cultural heritage/landscape regeneration. Circular business, financing and governance model for a competitive Europe. *Bollettino del Centro Calza Bini* 17: 35–52. CrossRef

Gatzweiler F, Baumuller H (2014) Marginality – a framework for analyzing causal complexities of poverty. In: von Braun J, Gatzweiler F (eds), *Marginality. Addressing the Nexus of Poverty, Exclusion and Ecology*. Springer, New York. CrossRef

Gatzweiler F, Baumuller H, von Braun J, Ladeburger C (2011) Marginality: addressing the root cause of extremy poverty. ZEF working paper 77, center for development research, university of Bonn, Bonn

Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL (2006) *Multivariate Data Analysis* (6th ed.). Pearson Prentice Hall, Upper Saddle River

Huang Z, Chen J, Yisong L (2015) Minimizing data redundancy for high reliable cloud storage systems. *Computer Networks* 81: 164–177. CrossRef

Jay J, Katsos JE, Daher M (2020) Local business, local peace? intergroup and economic dynamics. *Journal of Business Ethics* 173: 835–854. CrossRef

Kiker GA, Bridges TS, Varghese A, Seager PT, Linkov I (2005) Application of multicriteria decision analysis in environmental decision making. *Integrated environmental assessment and management* 1: 95–108. CrossRef

Lucatelli S (2015) La strategia nazionale, il riconoscimento delle aree interne. *Territorio* 74: 80–86. CrossRef

Lucatelli S (2020) Riflessioni sulle aree interne, all'indomani del Covid-19. In: Fenu N (ed), *Aree Interne e Covid*. LetteraVentidue, Siracusa

Martinelli L (2020) *L'Italia è bella dentro. Storie di resilienza, innovazione e ritorno nelle aree interne*. Altreconomia, Milano

Massei G (2018) VectorMCDA for QGIS user manual (ver 0.5). Researchgate. CrossRef

Oppio A, Forestiero L, Sciacchitano L, Dell'Ovo M (2021) How to assess urban quality: A spatial multicriteria decision analysis approach. *Valori e valutazioni* 28: 21–30

Pinto MR, Viola S, Fabbricatti K, Pacifico MG (2020) Adaptive reuse process of the historic urban landscape post-Covid-19. The potential of the inner areas for a "new normal". *Vitruvio* 5: 87–105. CrossRef

Rossitti M, Dell'Ovo M, Oppio A, Torrieri F (2021) The Italian national strategy for inner areas (Snai): A critical analysis of the indicator grid. 13: 6927. CrossRef

Rossitti M, Torrieri F (2021) Circular economy as 'catalyst' for resilience in inner areas. *Sustainable Mediterranean Construction* 5: 64–67

Salvia R, Quaranta G (2017) Place-based rural development and resilience: A lesson from a small community. *Sustainability* 9: 889. CrossRef

Sharifi A, Khavarian-Garmsir AR (2020) The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design and management. *Science of the Total Environment* 749: 142391. CrossRef

Tantillo F (2015) La co-progettazione locale e la strategia d'area: il metodo di lavoro e le missioni di campo. *Territorio* 74: 97–101. CrossRef

Yoon KP, Hwang CL (1995) *Multiple attribute decision making*. Sage Publication, Thousand Oaks. CrossRef