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Methodological Approach for a New Economic Geography of the Territorial Cohesion in Europe and Italy

Approccio metodologico per una nuova geografia economica della Coesione Territoriale in Europa e in Italia

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Abstract. In this time, the Territorial Impact Assessment (TIA) is the best process to support the development of global/local sustainable policies. It identifies territorial/spatial problems and objectives (by several *ex ante* and *ex post* steps), the main political/programming scenarios and options measuring impacts on economic, environmental, cultural and social fields. It outlines advantages and disadvantages for each policy option and examines all possible synergies and trade-offs on the base of the territorial context (geographical diversity). In order to study the integration of the Cohesion Policy objectives 2020 and post within the Italian development programs (national and regional), the evaluation of Territorial Cohesion in Italian regions by TIA was applied. The STeMA-TIA model has been devised to support an integrated strategic vision of general, territorialised and sectoral policies at NUT1, 2 and 3 decision-making levels. This assessment tool was created as part of the territorial dimension evaluation of the European Strategies. In the context of ongoing research (PRIN 2015), the method and the *ex ante* application are illustrated in the following in supporting of attended results of first step, which was critically discussed at European level, too.

Keywords: territorial cohesion, Territorial Impact Assessment, STeMA, Europe, Italian regions.

Riassunto. Al momento, il *Territorial Impact Assessment* (TIA) sembra il migliore processo a sostegno dello sviluppo di politiche globali e locali sostenibili, poiché capace di individuare problemi e obiettivi territoriali/spaziali (attraverso diverse fasi *ex ante* ed *ex post*), scenari politici/programmatici e misure di impatto economico, ambientale, culturale e sociale. Delineando vantaggi e svantaggi per ciascuna opzione politica, TIA esamina tutte le possibili sinergie e alternative sulla base del contesto territoriale (diversità geografica). Al fine di studiare l'integrazione degli obiettivi della Politica di Coesione 2020 e post nei programmi di sviluppo italiani (nazionali e regionali), TIA è stata applicata alla valutazione della Coesione Territoriale nelle regioni italiane, attraverso il metodo STeMA, concepito per sostenere una visione strategica integrata di politiche generali, territorializzate e settoriali a livello decisionale NUT1, 2 e 3. Questo strumento è stato concepito come parte integrante della valutazione della dimensione territoriale delle strategie europee. Nell'ambito della ricerca in corso (PRIN

Project 73. PI Maria PREZIOSO – 20155NXJ8T – SH3 “Territorial Impact Assessment della coesione territoriale delle regioni italiane. Modello, su base place evidence, per la valutazione di policy rivolte allo sviluppo della green economy in aree interne e periferie metropolitane”), viene illustrato di seguito il metodo e l'applicazione *ex ante* seguiti per ottenere la prima parte dei risultati attesi, discussi anche a livello europeo.

Parole chiave: coesione territoriale, *Territorial Impact Assessment*, STeMA, Europa, regioni italiane.

1. Introduction

The paper aims to introduce a Territorial Impact Assessment (TIA) methodological approach able to accompany the investigation and the applied measure of Territorial Cohesion (TC) in Italian regions (see other contributions in this special issue). The approach proposing in the following is especially adapted for meeting some policy questions: i) if the initial level of TC influences the national and regional capacity building in designing appropriate Operative Programs making closer European Strategies to local policy needs; ii) if TC is increased by the national and regional capacity in reaching local needs considering geographical specificities; iii) if taking inspiration from Italian regions' TC as case study, it is possible to advance a feasible option to reconsider the spending in regional smart, sustainable and inclusive growth in order to propose a new Europeanised method to make competitiveness in Italy.

After a brief reference to the policy discussion orienting the search of a TIA model of TC, the STeMA methodological approach¹ will introduce along with the proposal of Systemic Territorial Functional Typologies (STFTs) useful to territorialise data and justify since it is preferable for the purpose. Discussion of application and results by the Italian experience, at NUTS 2 and 3 scale, seems to be the correct basis to match local needs by cohesive solutions. Final remarks suggest TC as “the sentinel” able to re-address the initial declared ROPs targets, in order to give an appropriate answer to local policy needs, maintaining the coherence with the European and national ones.

2. The rationale orienting the research

As the ‘spatial’ Impact Assessment (IA), the Territorial Impact Assessment (TIA) is a process aimed at

structuring and supporting the policies’ development. It identifies and assesses the problems at stake and all objectives pursued. It identifies the main options to achieve objectives and it analyses their impacts in economic, environmental and social fields. It is therefore strategically related to the evaluation of the Europe 2020 Strategy pillars. It outlines advantages and disadvantages of each option and it examines possible synergies and trade-offs.

With respect to IA, TIA plays a major central place in the debate about how the European right policy responds to the questions of citizens and citizenships:

We should make policy choices that ensure that our various objectives are mutually reinforcing. Actions that promote competitiveness, growth and jobs, as well as economic and social cohesion and a healthy environment reinforce each other. These are all essential components of the overarching objective of sustainable development, on which we must deliver. EC 2005, “The Commission’s Strategic Objectives 2005-2009.

Proposals must be prepared on the basis of an effective analysis of whether it is appropriate to intervene at EU level and whether regulatory intervention is needed. If so, the analysis must also assess the potential economic, social and environmental impact. EC 2001, “White Paper on European Governance.

The assessing of impacts of directives, policies, recommendations and orientations on states and regions has produced a lot of scientific, technical and ‘grey’ literature, inside the contribution of geography stands out at 6th place (*network analysis*, Caschili et al. 2014) for its originality, complexity and innovation². The TIA evolution and results have endowed decision-making processes by typological place evidence, critical analysis and territorialized data (EC 2005; Prezioso 2006a, 2019a). Since the use of Cohesion Policy (CP) funds aims to reinforce the Territorial Cohesion (TC), the growth of which represents the main challenge for Europe 2020 and beyond Brexit, but especially the basis for re-building Union (2027-30) on geographical diversity.

Taking in mind that IA and TIA *accompany the policy maker in the choice, but do not replace it*, it is shared opinion that a ‘good’ IA/TIA needs a powerful data support (analytic and cartographic) and qualitative-quantitative models. This is in order to associate judgments, in response to the questions to which evaluation is required, including the development and comparison of policy options (Prezioso 2018, 30).

¹ Version 3.1 re-designed in support to the PRIN objective.

² TIA studies follow the ones on environment, spatial and urban planning, education and politic sciences.

Through this knowledge, the assessment of impacts, direct and indirect, produced by policies related to Cohesion, are the tangible evidence of the development of methodologies from an initial process to overcome the gap between science and politic. They clarify the extent to which integrated European strategies to increase the TC are being implemented, improve the quality of the proposals, of projects and investments by making them flexible and appropriate to the geographical diversity of European territories within a uniform framework and common guidelines.

TIA is related to economic geographical dimensions (as investments, spending, capacity building, better regulation, cross border cooperation, smart, sustainable and inclusive growth, etc.) able to both ever localise TC and design its increase. By TIA, scientific and institutional inputs relating to places and people permit the adaptation of the Cohesion Policy to the national/regional sustainability and their development goals to the EU Strategies. TIA can help countries, regions and local systems to establish a coherent relationship between localised supply and demand of development, opening the need for a legislative review/integration in Europe³ and Italy⁴. Academic and practical exercises – mainly related to policy planning – marked the transition from IA to TIA favouring the emergence of some new policy domains from 2014: *Circular economy* (TIA *ex ante*); *Port reception facilities* (TIA *ex post*), *Birds and Habitats Directives*, *Urban Energy performance of Buildings Directive*, etc.

From 2015, the Bureau of the Committee of Regions – CoR, the European Commission, the European Parliament, the European Economic and Social Committee and other European institutions are strongly engaged to prove that TIA is able to make better regulation packages and sector policy quality⁵ of countries and regions: the

Territorial Impact Assessment is interpreted as an ex ante mechanism that can be used to identify such impacts at national, regional and local levels in Member States to help identify potential policy conflicts or inconsistencies. It can also identify the differential nature of potential impacts between different places and in this sense it can provide a means of considering the spatial dimension of EU policy impacts (Fisher et al. 2013, 3).

³ Probably, a European Directive on TIA will be launched in the new programming period 2021-2027.

⁴ Italian President of Ministers Council Act, 15th of September 2017, n° 169 “Regolamento recante disciplina sull’analisi dell’impatto della regolamentazione, la verifica dell’impatto della regolamentazione e la consultazione” (17G00182)

⁵ E.g. About the Cohesion Policy, in 2013 DG Regio provided an operational guideline on the “territorial cohesion” devoted to “the evaluation of regional and local impact in matter of EU legislation”.

Experts’ working groups are processing pilot studies about e.g. the *impact assessment on urban areas and local authorities*, asking for the TIA systematic application in *towns, cities and larger functional urban areas*, in order to reach three territorial scopes: *balanced development, integration and governance* in the evolutive framework of the Cohesion Policy.

As Evers et al. noted (2011), the need to ensure a consistent territorial approach in the spatial planning process, made the TIA a “novel” that is placed in the experience (informal approach) of the *European Spatial Development Perspective* (ESDP 1998-1999). Same principles inspired TIA and ESDP (*development of a balanced polycentric urban system and a new urban-rural relationship, securing parity of access to infrastructure and knowledge and sustainable development, prudent management and protection of nature and cultural heritage*) in the perspective that “in the future, Territorial Impact Assessment should be the basic prerequisite” of the ESDP (ESPON 3.1 2004, p. 428).

Different approaches in methodology related TIA and TC at the beginning within sectoral policies (Hague 2001; Prezioso 2005; 2006a; 2006b; 2008; 2012; Radej 2008; Evers et al. 2009; Camagni 2010), which close relationship makes its appearance by the applied research on the “Territorial dimension of the Lisbon-Gothenburg Strategy” (Prezioso 2006a). Results show, for the first time, the *ex ante* capacity of European regions and provinces to be competitive in sustainability acting on the TC basis. The TIA application in Italy as a time series process (Prezioso 2006a, 2011a, 2019a) confirmed that it is possible to construct and make possible *ex post* policy scenarios from an economic geographic perspective. As Farinos (2013) said, TIA is a true tool of power “if it considers the plan no longer detached from policies and their evolution, beyond the relevance of scale”.

Until 2016, applied researches (Camagni, Prezioso and Schön in ESPON 2013 and 2020), scientific papers (Fisher et al. 2013), and think tankers reports (Böhme et al. 2015) focused the debate on place evidence, indicators and policy choice by a TIA related to structural investment and a new ESDP vision in order to go over the post-factual time reinforcing the link between Cohesion Policy and TC. To this scope, a shared concept of territorial impact is adopted in all TIA models:

A ‘territorial impact’ is essentially considered to be any impact on a given geographically defined territory, whether on spatial usage, governance, or on wider economic, social or environmental aspects, which results from the introduction or transposition of an EU directive or policy (Fisher et al. 2013, 3).

3. New approaches to TC evaluation based on place evidence

In the EU framework, theoretical and applied results propose STeMA-TIA as a support to an integrated strategic vision of the territorialised general and sectoral policy at all decision levels. This assessment method and the related GIS tool were created at the beginning of the century in the context of the ESDP and cooperative territorial dimension of the European Strategies, proving in time their flexible potential to match research and policy, in order to support cohesive, competitive and sustainable policy capability. STeMA-TIA structural flexibility (Prezioso 2019b) transforms itself in a “coordination mechanism” (Eser, Böhme 2015) never forget the “access to specific analysis and information that can be used to improve the territorial dimension” (CoR 2014, 3).

The 10 principles (hypothesis) inspiring the STeMA TIA have been shared and transferred in the research, as well as the original qualitative-quantitative methodological approach built on 9 logical steps working by interactive coaxial matrices (indicators-policies-effects) producing *ex ante* and *ex post* results and mapping.

Its concrete applications in relation to Territorial Cohesion has got off the ground with a robust experiential background⁶.

The strength of STeMA lies in its flexibility and ability to both make right the dialogue between research and policy, and combine different indicators related to economic, social, environmental, cultural, organizational and financial dimensions, that assess territorialized impacts in relation to 7 original Systemic Territorial Functional Typologies (STFTs) (Prezioso 2019a). Previous research (Prezioso 2006a, 2011a) highlighted the link between STFTs and TIA springs from theoretical and applied studies, including the relevant literature on territorial cohesion. These typologies assume that a geographical economic region represents the quality, efficiency and identity of its territorial systems, as well as its interrelations. The capacity of a region to combine existing resources and valorise its efficiency, reflects the initial (*ex ante*) milieu; in other words, a region can create socio-territorial and governance models thanks

to shared principles. A region has a potential that can positively influence its GDP and wealth. The STFTs can help to define each region's uniqueness and strengthen the territorial capital of an area. They may also be used to evaluate the Territorial Cohesion level at the starting time of the policy (the time 0 – t0), thus influencing the spending capability and making it possible to match local needs and political goals.

The building STFTs is supported from a massive and consolidated scientific literature from last century (Chicago School) today. It contributed to build Functional Areas (urban, urban rural, rural, metropolitan, etc.) useful for planning and programming, following approaches: administrative, morphological, functional (OECD 2009); clustered, spatial, statistic (economists and statisticians); multidimensional (planners); systemic (geographers, CEMAT 2017)⁷. From 2002 to today, ESPON applied research launched the first application to characterisation of the EU regional and sub-regional Functional Urban-Rural Areas (ESPON 2004, 2005 and 2007); it published two Technical Reports (ESPON 2011 and 2014), launched some research projects (as TeMO, ITAN, STAR, TerrEVI, POLYCE, METROBORDER, studied Functional Macro-Regions (e.g. Danubian, Baltic, Great Region, Alps, etc.). ESPON2020 focuses on five Functional Typologies in Cross Border Cooperation (ESPON 2017a), tackling common challenges by regional investments. In addition, it takes into account: 4 typologies of territories with geographical diversity and 4 typologies of Inner Periphery (ESPON 2017).

In this framework, STeMA-TIA adopts them as territorial reference in applying a quali-quantitative evaluation method and a process of prioritisation of indicators as ‘dominant’ and ‘secondary’ in the phase of “pair to pair comparison”. Development and application related with the *ex ante* measure of Territorial Cohesion at national-regional level towards the green economy (Prezioso 2018) are shown by the papers following, that applied STeMA-TIA in the framework of research at conceptualization of TC and regional level.

3.1 Methodology in brief

By giving evidence to Territorial Cohesion within green economy policies at the national, regional and sub-regional level – able to support the elaboration of the post-2020 Italian address too -, STeMA-TIA meas-

⁶ In addition to the already quoted sources, the application of STeMA-TIA can be found in projects such as: the CADSES project POLY.DEV (Italy, Slovenia, Slovakia, Bulgaria and Greece); the *NewCiMed* project under the ENPI CBC Med Programme (Italy, Spain, Greece, Tunisia, Jordan and Lebanon); Observation and Territorial activities of the Centre of Excellence–Technological District of Cultural Heritage of the Lazio Region; the planning activities across the metropolitan city of Rome; the green economy development (Prezioso, Coronato, D’Orazio 2016); the spending review of Italian regions (Prezioso 2019a), analysis of National and Regional Operative Plans 2020.

⁷ For all, the whole of indicators designing them is very similar: daily commuting flow, population density, GDP, productivity, goods, services, capitals, resources, knowledge, environment, social regulation, values, lifestyles and identities, etc.

ures is able to: i) identify and select effects of policies, programs and planning on territorial status quo illustrated by appropriate indicators; ii) measure the degree of risk of overtaking the carrying capacity threshold and the improvement in performance, sustainability and competitiveness; iii) build scenarios of funds allocation and management, according to indications provided by the Territorial Capability Framework, introducing a common support within the framework of the European Sustainable Development Strategy.

This approach is particularly important since it really aims to carry on a smart, sustainable and inclusive socioeconomic territorial growth. Of course, it requires institutions and policy makers to accept sustainability and related goals as a political permanent stance, as a principle for the period 2020 and over and as an orientation for local/global European competitiveness (Prezioso 2006a; 2008; 2008a).

The sustainable development became part of the territorial and economic planning: it induced a gradual evolution within the selection of measures different from the monetary one; sustainability supported methods, process, selection of specific indicators for the phenomena evaluation and management, also using units of measure different from the price, the principle indicator of the market esteem and spending.

STeMA-TIA 3.0 version makes more comparable indicators with different features and sources (metadata) as well as several updated tools, including the ones used to assess European strategies within several programs and planning periods (e.g. R&D, Global/Local Interaction, Quality, Resources and Funds, Smart Growth, Sustainable Growth, Inclusive Growth, ROP budgets and spending of Cohesion Policy funds).

By the PRIN research, STeMA-TIA is analysing and measuring TC and the territorialised impact on it of Europe Strategy *four* major policies (smart, sustainable and inclusive policy pillars). These policies enter in STeMA model in order to compose its main descriptive and analytical fields (determinants) at the European NUTS 2 and 3 level, which are: smart growth, sustainable growth inclusive growth and funds (Fig. 1).

A number of 74 new indicators (by related metadata) are at the basis of the Italian results and challenges evaluation towards the 2021-2027 programming period. The four composite determinants (Carbonaro 2011) already assumed the role of the Strategy key-messages. *Territorial cohesion* is introduced as “a sentinel” able to indicate ways of integrating the targets of the 2020 Strategy and the ones of the European Strategic Integrated Funds (ESIF).

The STeMA-TIA methodology has been designed in order to create an alternative model to the existing the-

ories based on approaches (neutral) that do not consider how diversified a space can be and only look at how economical investment can be made (Prezioso 1995; 2010; 2019b). The STeMA-TIA is made of 10 hypotheses (Prezioso 2018) that can be easily conveyed to end-users. As simple as it may appear, STeMA-TIA has been devised via complex procedures that have allowed it to be operationally applied along its related STeMA-TIA GIS tool.

The process and the logical trees of indicators used to produce the *ex ante* determinants' value are explained in the 'Appendix' at the end of the paper.

4. The application to TC research to measure the distance from the 2020 targets achievable through the Policy of Territorial Cohesion

In the context of the TC assessment, the research shared and took in mind both the *first simplifying hypothesis* of STeMA postulates: a *territory* is to be seen as an 'artificial system' that includes biotic and abiotic composing elements; a system including systems and subsystems such as society, politics, environment and economy; and that TC is ever located and it is diversified on the basis of geographical diversity⁸.

In the STeMA assessment process (based on 10 simplified hypothesis), politics, society, environment, culture and economy has been assumed at the beginning all part of one single system (1 hypothesis), which is the territory itself. In this line, the research considered that a territorial system can be investigated individually (TC regional value *ex ante*) or in relation to the system of policies that govern it (impact on regional TC – *ex post* value). It means that – since a territorial system is unique and differs from all the others ('hypothesis of geographic diversity') – the territory can change the policies employed to be assessed choosing the appropriate ones within a common list, which remains as unchanged, since policies are the reason why a territory is under scrutiny in the first place.

In order to assess a territorial system, researchers agreed that it is important to understand what process links all the elements that shape it (e.g. by using the TIA logical tree and attempting to determine an *ex ante* or preliminary value). In addition, it needs to measure the status or the critical value of every element (i.e. indicators and indexes) that are representative of its weight and quality.

Research agreed that t_0 is used to define the historical moment in which the TIA process starts (i.e. *ex*

⁸ A complete description of the method is in Prezioso 2018 and 2019b.

ante); the territory at NUTS 2 and 3 has been investigated by considering it as being partially balanced at that time. Furthermore, its characterising features were the result of existing (historical and political) processes that have determined the *initial configuration* of the system, which was measured (by quantitative indicators) and assessed even when policies have not been implemented. The name of this initial configuration is called *Initial Territorial Value* (ITV).

Every system has been broken down into sublevels (cf. at NUTS 2, 3 and sub.) and analysed according the criteria mentioned above. Every sublevel corresponds to a geographic scale and it was examined as per detailed indicators and indexes that can be compared to other indicators.

Every system or subsystem has been subject to internal and external inputs that have been introduced by policies seeking change. In applying the STeMA-TIA procedure (*ex post* evaluation), the system changes its initial balanced position but may remain into the limits of sustainability that the indicators have set to face the changes enacted by the applied policy. By doing so, indicators become active ‘receptors’ of impact⁹. During the analytical phase of how the policy/policies under scrutiny has been received, the impact may be defined as positive (+), neutral (0) or negative (-). A neutral, or negative response in terms of the impact of the policy can limit the acceptable potential of the way how the system can develop, both in terms of time and ways this will be done (‘sustainability paradox’).

The acceptable developing potential is called *the threshold of sustainability* of a territorial system (*the ninth simplifying hypothesis*), and it stems from the initial *sustainability* (or sensitivity) of the system. The name of the final configuration is Final Territorial Value (FTV) and it simulates the existing scenario during a given t^1 and TIA procedure.

The term *carrying capacity* (∂) is used to define the difference between the initial balance of the system (ITV) and the final tolerance threshold (FTV), or sustainability of the territorial system (*the tenth simplifying hypothesis*). This capacity describes how the offer meets the demand, as established by a given policy, because it implies that a new partial balance is likely to result from the continuous growth and improvement of the territory. This is possible also if the most appropriate policies are chosen to this end.

⁹ The term ‘impact’ here is used to describe the moment when a given aspect is modified, due to the contact between an indicator/receptor and a policy action.

Starting an operational procedure (i.e. the 9 steps described in Fig. 1), some preliminary additional researches were developed, as in the following:

1. creating functional and well-defined typologies (at the regional and sub-regional level, etc.) that help shaping a Territorial Reference Framework, which can in turn be used to georeference all estimated indicators. 7 Systemic Regional Functional Typologies were developed (as better explained below). These typologies can trigger the STeMA-TIA procedure to offer a broad territorial assessment, rather than just a partial one;
2. analysing every ‘closed circle’ determining system (e.g. the 2020 main aims, meaning smart, sustainable and inclusive growth, as well as the spending of the cohesion policy related to its objectives), which are in turn divided into typologies, sectors, categories and indicators. All determining systems are included into the Territorial Reference Framework as if they were trees, whose roots are represented by their basic indicators. After indexing these indicators (via a cross-check approach including indicators, categories, typologies etc.), it has been possible to obtain a spatial and territorial VTI_d for each system determinant.

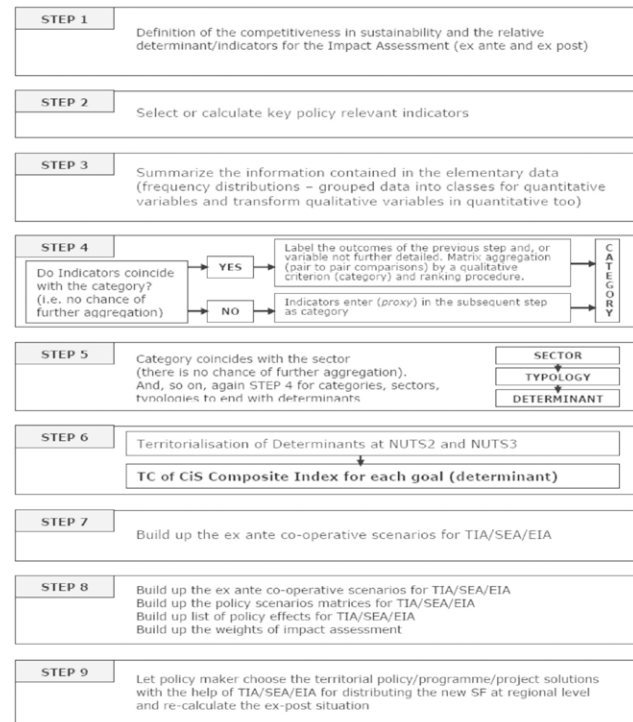


Figure 1. Logical Framework of the STeMA-TIA decision-making process as applied to the analysis of sustainable competitiveness in cohesive regional and provincial contexts. Source: Prezioso 2006a, 55-57, revisited by Author in 2018.

Each determinant interacted with other determinants (in an open circle) so as to obtain the total IVT (or complex synthetic index) of a given territory (which is also its *ex ante* sensibility). The final IVT was determined by a combination of state and process;

3. creating a Planning and Policy Framework that could include the offers and actions deriving from the objectives of which TIA process has been initiated (e.g. a new governing procedure, the Europe 2020 strategy or any post 2020 action, regional spending, availability of funds for future investments, etc.);
4. drafting a reference list of the objectives for which a given policy has been devised. All the policies, actions and effects used to this end have been bound to the objectives to be reached by applying a given policy; they are freely chosen by the policy- or decision-makers from a Pre-set number of such policies to be found in an already established Framework.

STeMA-TIA has been designed to firstly deal with a territory and its closed circle indicators in relation to each policy domain under scrutiny (e.g. Europe 2020 Strategy, Cohesion Policy, spending review, etc.).

The frameworks described above has been used to create a three-way coaxial matrix, which is normally used during the STeMA-TIA procedure regarding the determinant used to evaluate the FTV and the coherence between offer and demand. The territory is examined in its initial state (i.e. ITV), which establishes quality, severity and weight for each element and process.

Using *ad hoc* mapping procedures that are directly linked to the process, makes the results of the analyses readily detectable. A selection of mapping is included in the papers following. This ensures that such results are transparent and objective, as expressively recommended by the EU.

It is worth to remember that TIA aims to support policy and decision-makers, in calculating territorial quality for every policy solution (supply), in relation to the weight and state of its elements and the process as it occurs. All these factors emerge during the *ex ante* or ITV stage; such increments are determined according to the TC quality value of the system and the correspondent indicators in terms of state and process (i.e. logical tree of correlations); the level of gravity of impacts related to policy choice; and the importance of each impact in relation to the carrying capacity of the system to meet expectations.

The weight of the impact was calculated by considering the relationship between the effects and the actions of the policy; it is expressed as a percentage and depends on the severity of each impact level in relation to each action of a policy. The severity of each impact is the criteria that helps to assess the increasing or decreasing level of the ITV.

The severity of an impact may result at different levels, which are determined according to the many possible combinations of the relevance of a policy¹⁰ and in relation to pre-established criteria. Using a policy within a given territorial domain involves changing its status as a system (∂), which is its FTV. The comparison of *ex ante* values and the territorial variation(s) that resulted from the application of a given policy allows to determine the latter's appropriateness. If the use of a policy demonstrated to be inappropriate, this methodology helps to put forward alternatives to enhance the quality of the territory under review and its policy needs.

Multiple scenarios of public choice can be simulated to determine the most balanced preliminary option(s) in relation to the initial territorial value or sensitivity¹¹. This is done using a macro and micro analysis according to which, starting from indicators, each factor interacts with a coherent other (e.g. internet users on total population). Interaction is considered in detail so as to include all those criteria and aspects that help to choose and implement the better policy in a given situation (e.g. within Smart Growth Policies).

Among the many procedures available to establish the 'weighted positioning' of a determinant, STeMA-TIA favoured the *pairwise comparison* approach. This has been done also by establishing how decision-making processes have been enacted and what interaction matrices have been used to this aim. The many indicators that resulted from this comparison, have been progressively transformed into detailed indexes. The matrixes that stemmed from the pairwise comparison, offer a qualitative value, starting from the quantitative value of each indicator (i.e. I_1 is a dominant while I_2 is a secondary indicator). This procedure returns a synthetic/composite index I_x (Fig. 2).

In which:

$$Aa > Ab > \dots > Ba > Bb > \dots > Dd$$

And the (I_x) values are organised to return the following results:

$$I_x = Aa, Ab = \text{high value} = A$$

$$I_x = Ac, Ad, Ba, Bb, Bc = \text{medium high value} = B$$

¹⁰ Cf. for instance 3, 2, 1 and 0 in the developed matrices.

¹¹ "Sensitivity" in STeMA-TIA process describes the initial territorial value in order to calculate how single territories or regions are able to absorb impact transforming it in added value. It takes into account research on the concept of Resilience when calculating unstable equilibrium, Chaos Theory to determine the sensitivity of a system to initial conditions, Fractal Theory (Mandelbrot 1975) and the analysis of similar phenomena at different levels. Sensitivity is also known as the capacity of a system to maintain/reacquire balanced positions.

$I_1 \backslash I_2$	a	b	c	d
A	Aa (1)	Ab (1)	Ac (2)	Ad (2)
B	Ba (2)	Bb (2)	Bc (2)	Bd (3)
C	Ca (3)	Cb (3)	Cc (3)	Cd (3)
D	Da (3)	Db (4)	Dc (4)	Dd (4)

Figure 2. A qualitative interaction matrix resulting from the pairwise comparison of two indicators. Source: Prezioso 2011a, 57.

$I_x = Bd, Ca, Cb, Cc, Cd, Da = \text{medium low value} = C$
 $I_x = Db, Dc, Dd = \text{low value} = D$

The pairwise comparison matrix is the result of a judgement that assessed importance in the relationship among the determinants a macro policy refers to. In addition, it also assesses the typologies, categories sectors and indicators that are part of this macro policy from a (geographic) standpoint.

When applied, policy actions have real and direct impacts on the territory; hence, their comparison with territorialised indicators helps to determine *theoretical impacts*. Each determinant is assessed in terms of its related initial indicators and *the order* each impact has been produced; this impact will be measured according to a *high, medium, low* or *nil* level on the Bereano's (1972) tree of effects.

At this stage, the analytical level required is particularly high; hence, STeMA-TIA includes monitoring procedure used for designing *three-way coaxial correlation matrices* to determine the indicators/receptors-effects-actions correlations of a policy. Figure 3 includes the correlation scheme for all the processes carried out via the STeMA-TIA methodology.

Description:

- A = list of actions that correlates to one or more policies. A = 1,...,h,...,l. This list includes all the actions that a policy maker can use in relation to EU strategies such as Europe 2020 or the EU *Cohesion Policy*.
- B = the role that each single action has for each effect (i.e. each action may have a different weight and some actions many not have any effect at all).
- C = list of effects of a *policy*. This list includes all the effects that relate to the objectives of a given policy (i.e. determinants). It varies for each objective/determinant.
- D = the impact of each effect on the indicators.
- E = weighted list of indicators. This list includes all the indicators used to calculate the *ex ante* objectives/

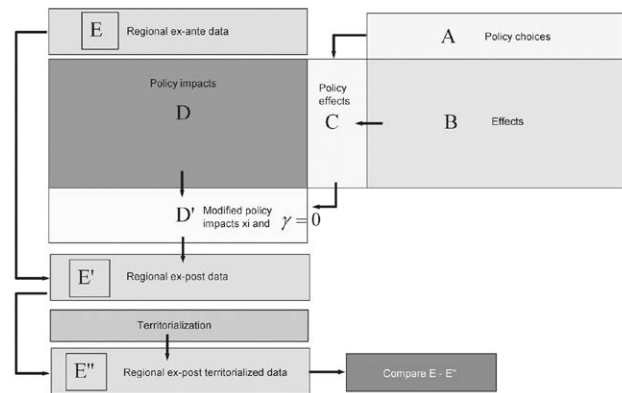


Figure 3. Correlation matrix the STeMA-TIA model, 1.0 version. Source: Prezioso 2006a, 61.

determinants (E – *status quo* of time t_0) and their *ex post* values, before (E' is time t_1) and after territorialisation (E'' at time t_1).

This makes possible to determine a maximum d above which an indicator will not absorb a given policy during t_1 . Many simulations carried out on the Lisbon/Gothenburg Territorial Strategy and Europe 2020 Strategy have confirmed that during a TIA, the induced incremental percentage of the policy under review is directly proportional to the Q level. This happens because the indicator of an initial high quality, which is virtually at its optimal state to receive a policy and apply it, can react better than an indicator whose quality is very low.

It goes without saying that such a huge number of indicators as variables cannot be handled without the STeMA TIA-GIS tool; however, it is also essential to consider the data resulting from territorial place evidence as it helps to define territorial sensitivity; it also allows to programme policy adaptive choices that meet the existing technical, socioeconomic, cultural and environmental parameters.

The use of systemic functional typologies (for different scales: regional, sub-regional and local) is therefore an essential part of the STeMA-TIA methodology. These functions can offer *ex ante* and *ex post* territorialised information in relation to several assessment scales.

On the basis of solid previous experiences, the STeMA TIA method (2006a, 2011a, 2011b) has built 7 Systemic Territorial Functional Typologies (STFTs) (Prezioso 2018 and 2019a), which can be used to evaluate those policy actions related to geographical diversity. These STFTs are proposed solutions for territorialised SFRTs (Systemic Functional Regional Typologies) that can be adopted in the TIA process and applied to several policy sectors and strategies.

Recently, the STFTs have been upgraded (Prezioso 2019a, p. 50): they now combine 4 typologies of territories featuring geographical diversity (ESPON 2016), 4 typologies of Inner Periphery and 5 SFTs (ESPON, 2017 and 2017a) and 7 STeMA typologies (Prezioso 2011b):

1. *MEGA and metropolitan systems with high urban influence and transnational/national functions that can facilitate cooperation between cities (or city parts) at regional, national and transnational levels.*
2. *High urban influence systems with transnational/national specialised functions that can facilitate urban–rural cooperation between authorities in interconnected areas at regional, national and transnational levels.*
3. *High urban influence systems without specialised functions and with few transnational/national functions that can facilitate urban–rural cooperation between authorities in interconnected areas at regional, national and transnational levels.*
4. *High urban influence systems without specialised functions and transnational/national functions, thus not able to facilitate urban–rural cooperation between authorities in interconnected areas at regional, national and transnational levels.*
5. *Low urban influence systems with regional/local specialised functions that can facilitate urban–rural cooperation between authorities in interconnected areas at regional, national and transnational levels.*
6. *Low urban influence systems with regional/local functions that can facilitate urban–rural cooperation between interconnected areas at regional and local levels.*
7. *Low urban influence systems without specialised functions and transnational/national functions, thus not able to facilitate urban–rural cooperation between authorities in interconnected areas at regional, national and transnational levels.*

The link between STFTs and TIA comes from theoretical and applied studies, which include the relevant literature on territorial cohesion and can help to develop its relationship with models of territorial organization.

These typologies assume that a geographic economic region represents the quality, efficiency and identity of its territorial systems, as well as their interrelations. The capacity of a region to combine existing resources and to valorise its efficiency, reflects the initial (*ex ante*) milieu; in other words, it can create socio-territorial and governance models thanks to shared principles. A region has a potential that can positively influence its income, GDP and wealth. The STFTs can help to define each region's uniqueness and strengthen the territorial capital of an area. They may also be the result of an evaluation of Ter-

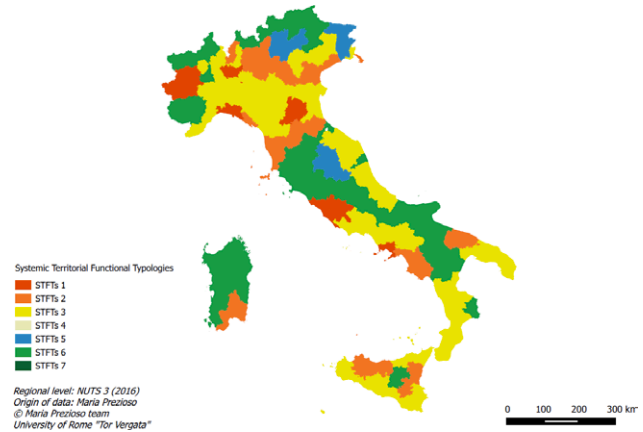


Figure 4. Systemic Territorial Functional Typologies in Italy. Source: Prezioso 2019b.

ritorial Cohesion level at t_0 . They influence the spending capability, thus also allowing to match local needs and political goals.

The STeMA-TIA method addresses policy/decision making within STFTs on different geographical scales.

5. Discussion of results

The paper aimed how a TIA method, developed by the STeMA methodological approach, can support the PRIN research objective, which is investigating and measuring TC in Italy. The scope was also to prove if the adopted method is really able to help regional business to change its productive behavior toward a new 'competitiveness capability' based on smart, sustainable and inclusive issues. This was done in light of European strategic parameters with regards to the contribution of Economic Geography to the development of new territorial more than spatial cohesive productive models, in respect of the Millennium Goals aims.

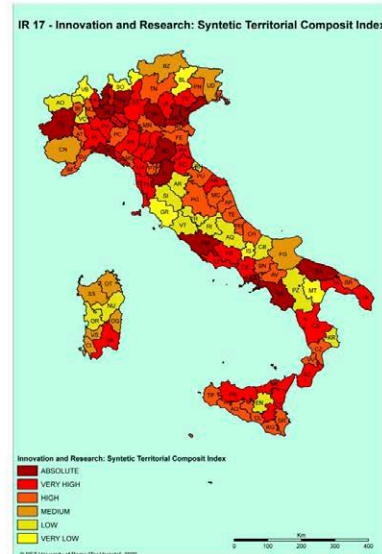
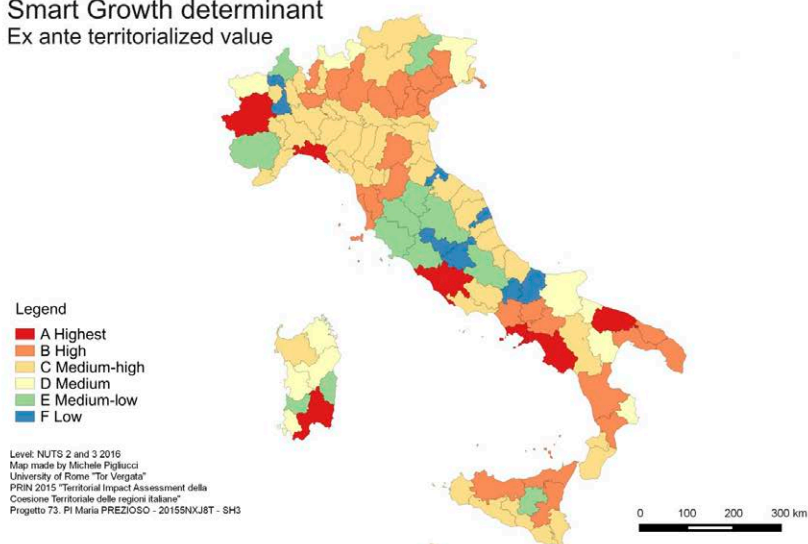
Policy questions have been addressed building a theoretical framework of PRIN working groups, in order to enable calculating: i) the initial level of TC and its influence at national and regional level; ii) the institutional capacity building in designing appropriate NOPs and ROPs making closer European Strategies to local policy needs; iii) the TC increase by the national and regional capacity in reaching local needs considering geographical specificities (STFTs); iv) how Italian regions' TC as case study can advance a feasible option to reconsider the spending in regional smart, sustainable and inclusive growth in order to propose a new Europeanised method to make competitiveness in Italy.

Estimation of TC by STeMA-TIA confirms it as “the sentinel” able re-addressing the policy/decision making to be closer to local policy needs and coherent with the European and national Europe 2030 perspective. The approach guarantees the conversion of endogenous productive resources in social, economic and territorial development opportunities demanded through the development of regional behavior patterns, in order to obtain income and societal wellbeing growth and employment inclusion.

The method is also coherent with the declared New Territorial Agenda 2030 scopes, that implements this new approach in Europe, directing the regions’ strategy and goals to reach both the capability to be competitive in sustainability, and more co-operation and cohesion (economic, social, territorial and environmental) (EC *VII Cohesion Report* 2017).

Finally, some words have to be dedicated to the results of the assessment process (see other papers in

Smart Growth determinant
Ex ante territorialized value



Sustainable Growth determinant
Ex ante territorialized value

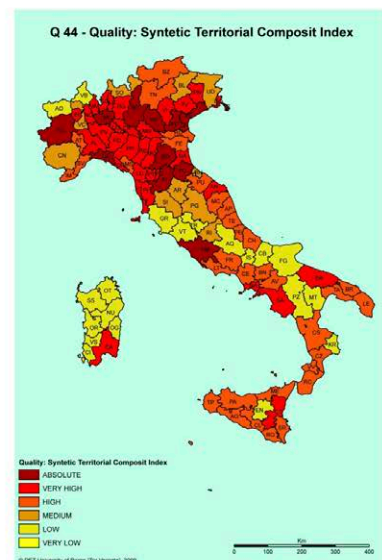
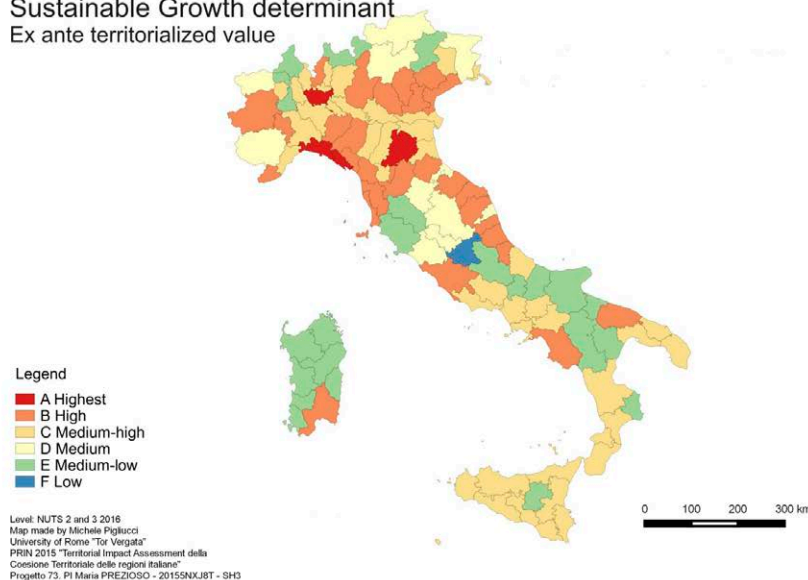


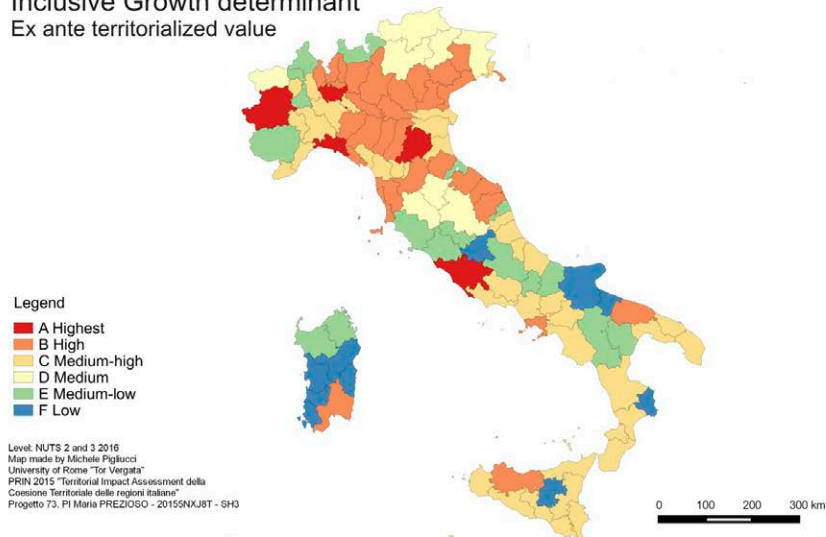
Figure 5A. Italy comparative *ex ante* analysis: mapping by time series at 2011 and 2018. Source: author's elaboration. Regional Level: NUTS 3 (2016). Origin of data: Maria Prezioso © Maria Prezioso Team

this special issue) of the territorial cohesive behavior of Italian regions and the sustainable development in competitiveness; and to how decision makers can simulate an *ex ante* and *ex post* productive scenarios to reduce negative effects of regional business policy choice for a specific scope, on the base of territorial differences and their potential. In order to obtain these new economic and external advantages, some appropriated actions and recommendations are suggested in main fields of the *ex*

ante place evidence, at 2018 and in comparison, with 2011 (Fig. 5) about the:

- smart growth: Milan and some Lombard provinces decline in significance, as well as Veneto ones, Po Valley, and Bologna and Florence. The South looks to be resilient;
- sustainability, Veneto provinces (North-East), Turin, Florence, Rome and Catania loose positions, as well as the seismic/risk areas;

Inclusive Growth determinant Ex ante territorialized value



Resources and Funds determinant Ex ante territorialized value

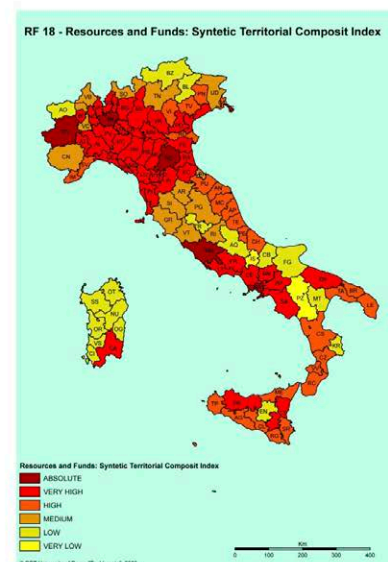
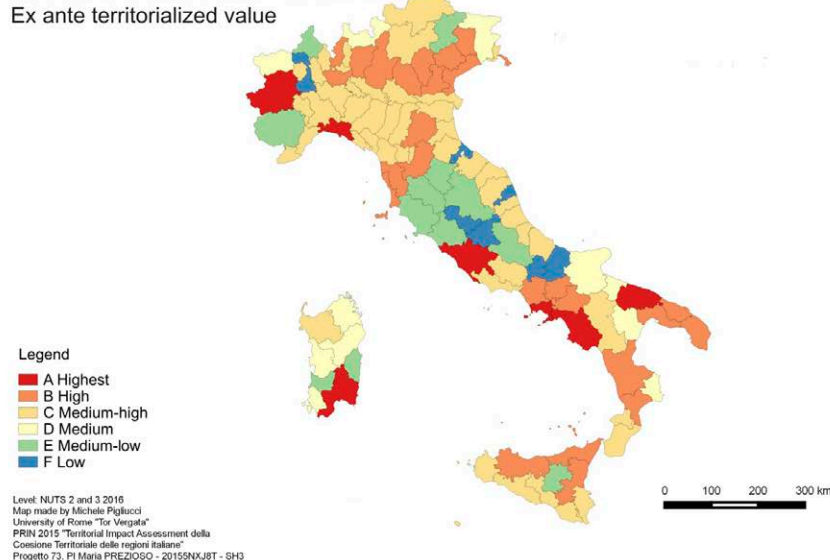


Figure 5B. Italy comparative *ex ante* analysis: mapping by time series at 2011 and 2018. Source: author's elaboration. Regional Level: NUTS 3 (2016). Origin of data: Maria Prezioso © Maria Prezioso Team

- funds and spending, the change is significant: Milan and Po Valley, Bologna and its Region and seismic areas decline in significance; South Metropolitan cities/areas rise (Sicily loose positions);
- inclusive growth, a timing series comparison is not possible.

In addition, general remarks come from the first step of the research on going. Among them, it emerged that the TIA of reached TC cannot be deemed enough in order to support the EU pre-conditionality required to Italy for entering in post 2020 with balanced position. In fact, if TC helps to satisfy policy needs, the introduction of new conceptual terms and methods to design development, is crucial to create new balanced and “domestic” solutions by the Europeanisation of the planning practice.

This research is developing as the right instrument to catch this scope bridging the gap between science and policy in the practice.

This means by the research results, that Italian regions could find the way to participate:

- in the implementation of the next Territorial Agenda 2020;
- in applying the Urban Agenda,
- using the measure of the TC progress as an important instrument to make policy/decision institutions responsible by strategic integrated choices of investment for the future and for the discussion about the proposed architecture of the new Cohesion Policy, that especially highlights the Northern capabilities more than the Southern ones (ESPON 2020, 2017a).

Adopting the proposed approach in policy making could really be a political and economic progress for Italy, removing some obstacles and barriers to the development:

- low capability in an efficient spending of Regional Operational Programs (ROPs);
- difficulty in the policy elaboration process to catch real needs;
- difficulty in the selection of appropriate beneficiaries of local investments;
- limited involvement of territorial stakeholders and citizens;
- use of unsuitable (no place-based) expenditure monitoring system;
- lack of well-suited territorial assessment tools and other EU instruments,

and transforming Italian localisms into European typologies of geographical diversity towards Green Economy (final scope of the PRIN research). It also means to develop a Geography of Cohesion useful to policy/decision makers, stakeholders, practitioners, civil servants, citizens.

6. Conclusion

As in the past (Prezioso 2006a, 2011a), the ambition of this kind of research is that Economic Geography contributes to elaborate frontier theories and models, that include sustainable and competitive policy goals, transforming them in practical appropriate place-based actions of policy making. The new researches in the TC field (Prezioso 2018), overtaking the concept of geographical space (understood as indifferent and homogeneous place), introduce territory (understood as a relationships’ system between environmental, social and economic components) as both fundamental indicators and variable for each policy, localisation and planning choice. That has permitted to up-load old and traditional models (see macroeconomic ones), adding new parameters to the governance’s rules in the territorial behavior inspiring policy makers.

In order to orient concretely the reader in this multidisciplinary and integrated question, some territorialised performance of determinants are showed as examples (Annex), constructed regarding specific European territorial typologies and using qualitative-quantitative statistical indicators. The innovative methodology that has generated these evidences: STeMA (Sustainable Territorial economic/environmental Management Approach) and its governance process with regard to the territorial and productive dimensions, take account the process of the organization and coordination of stakeholders and business actors to develop a sustainable production.

In order to better understand new aims of the national, regional and sub-regional programming processes, the reader has shortly been introduced to the study of: territorial assessment, its formula, and its transformation in place and time. In this approach, very important is the relation between TC and territorial capital that includes socio-economic, cultural, historical and environmental heritage as specific and characteristic components of places.

Since the development process of Territorial Cohesion within the European policy post 2020 is at a crucial turning point, it would yet seem necessary identifying tools, guidelines, objectives and key words inspiring policy makers in increasing a “territorialized” vision by geographical diversity, promoting investments strongly anchored to territorial policy needs.

In Italy, Territorial Cohesion and the need to “measure” its impact on development through SRFs, are still far from having obtained a full political-institutional consensus in the policy making practice. Consequently, how an increased TC can originate complexes of innova-

tive investments on the basis of geographical differences, remains as a question to be related to the regional capacity to make policy choices based on the awareness of its potential territorial capital, both anthropic and natural.

The principles that inspire the strengthening of TC through the adoption of new assessment formulas, are not absolute and *a priori* in the PRIN research that inspired this special issue. Nevertheless, a strong asymmetry distinguishes the political approach from the operational one and from scientific orientation in the so-called public policy, which is the subject of PRIN and its relation to the European TC policy.

As for Italy, the strategy supported through the National and Regional Operational Programs integrated in the framework programme of European Commission (NOPs and ROPs) should be consistent under a TIA evaluation. It is the PRIN scope, bridging the gap between policy and science. It will assess by the final stage of Research (2020), taking into account the highly diversified context that can be found on the regional, provincial and municipal scale; as well as the new polarising trends emerging from the *ex ante* analysis, to whose results this special issue is dedicated by applying the STeMA-TIA process.

References

- Bereano, A. (1972). *A proposed Methodology for Assessing Alternative Technologies*. New York, Cornell University.
- Böhme, K., Holstein, F., Toptsidou, M. (2015). *Report on the Assessment of Territorial Cohesion and the Territorial Agenda 2020 of the European Union*. Luxembourg, Spatial Foresight GmbH.
- Camagni, R. (2010). Territorial Cohesion: A Theoretical and Operational Definition, in the European Union. *Scienze Regionali*, 9 (1), 115-118.
- Carbonaro, I. (2011). A System of Measure for Provincial Performance through Indicators and Composite Indexes. In Prezioso, M. (ed.). *Competitiveness in Sustainability: The Territorial Dimension in the Implementation of Lisbon/Gothenburg Processes in Italian Regions and Provinces*. Bologna, Pàtron, 53-62.
- Caschili, S., De Montis, A., Ganciu, A., Ledda, A., Barra, A. (2014). The Strategic Environment Assessment Bibliographic Network: A Quantitative Literature Review Analysis. *Environmental Impact Assessment Review*, 47, 14-28.
- CEMAT (2017). *Functional Areas in Member States of the Council of Europe*, 17th Conference, Bucharest. <https://www.coe.int/en/web/conference-ministers-spatial-planning/17th-cemat>.
- CoR – Committee of European Regions (2014). *Territorial Impact Assessment in the CoR Political Process*. 150th Meeting of the Bureau of the Committee of Regions, ITEM 7, 29 January, Bruxelles.
- EC (European Commission) (2001). *European Governance. A White Paper*. http://aei.pitt.edu/1188/1/european_governance_wp_COM_2001_428.pdf.
- EC (European Commission) (2005). *Impact Assessment Guidelines*. SEC 791, Bruxelles. <https://ec.europa.eu/transparency/regdoc/rep/2/2005/EN/SEC-2005-791-2-EN-MAIN-PART-1.PDF>
- EC (European Commission) (2011). *Territorial Agenda of the European Union 2020, Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions*. http://ec.europa.eu/regional_policy/en/information/publications/communications/2011/territorial-agenda-of-the-european-union-2020
- EC (European Commission) (2015). *Territorial Agenda 2020 Put in Practice – Enhancing the Efficiency and Effectiveness of Cohesion Policy by a Place-Based Approach*. http://ec.europa.eu/regional_policy/it/information/publications/studies/2015/territorial-agenda-2020-put-in-practice-enhancing-the-efficiency-and-effectiveness-of-cohesion-policy-by-a-place-based-approach.
- Eser, T.W., Böhme K. (2015). Coordination Mechanisms for Territorial Cohesion – Cases of Europe and Luxembourg. In Helmut K. (ed.). *Koordination raumwirksamer Politik: Mehr Effizienz und Wirksamkeit von Politik durch abgestimmte Arbeitsteilung*, Hannover, Verlag der ARL – Akademie für Raumforschung und Landesplanung, 67-90.
- ESPON (2004). *Integrated Tools for European Spatial Development*, 3.1 project Final Report. https://www.espon.eu/sites/default/files/attachments/tor_3.1.pdf
- ESPON (2011). *The Functional Urban Areas Database*. https://www.espon.eu/sites/default/files/attachments/3.7_TR-FUAs.pdf
- ESPON (2013). *GEOSPECS - Inner Peripheries: a Socio-Economic Territorial Specificity*. <https://research.wur.nl/en/publications/inner-peripheries-a-socio-economic-territorial-specificity-final>
- ESPON (2014). *Functional Urban Areas (FUA) and European Harmonisation*. https://www.espon.eu/sites/default/files/attachments/M4D-DFR_TR-FUA-construction_20140630.pdf

- ESPON2013 (2009-2014). *TeMO, ITAN, STAR, STAR, TerrEVI, POLYCE, METROBORDER projects*. <https://www.espon.eu/programme/projects/project-overview>
- ESPON2020 (2016). *Territories with Geographical Specificities* -BRIDGE, Inception report. <https://www.espon.eu/geographical-specificities>.
- ESPON2020 (2017). *Inner Peripheries: National Territories Facing Challenges of Access to basic Services of General Interest* -PROFECY, Final Report. <https://www.espon.eu/inner-peripheries>
- ESPON2020 (2017a). *European Territorial Review: Territorial Cooperation for the Future of Europe*. https://territorial-review.espon.eu/doc/ESPON_Territorial_Review.pdf
- Evers, D., Tennekes, J., Borsboon, J., Van Den Heiligenberg, H., Thissen, M. (2009). *A Territorial Impact Assessment of Territorial Cohesion for the Netherlands*. The Hague, Netherlands Environmental Assessment Agency.
- Farinós Dasi, J. (2013). Territorial Cooperation as a Means of Achieving Territorial Integration? From Local Place-based to European Union Territorial Cohesion. In Gorzelak, G. & Zawalińska, K. (eds.). *European Territories: From Co-operation to Integration*. Warsaw, ESPON & EUROREG, 42-53.
- Fisher, T.B., Gore, T., Golobic, M., Marot, N. (2013). Territorial Impact Assessment – a New Policy Assessment Tool to Support Territorial Cohesion. In IAIA13 Conference, *Proceedings, 33rd Annual Meeting of the International Association for Impact Assessment*. 13–16 May, Calgary.
- Hague, C. (2001). Territorial Impacts and Spatial Planning. In European Council of Town Planners & Committee of Spatial Development. *Proceedings of the One-day conference on Territorial Impact Assessment*. 26 October, Louvain-la-Neuve. https://agrireregionieuropa.univpm.it/sites/are.econ.univpm.it/files/FinestraPAC/Editoriale_16/Rapporto_OCSE.pdf.
- Mandelbrot, B.B. (1975). *Les objets fractals: forme, hasard et dimension*. Paris, Flammarion.
- OECD (Organisation for Economic Co-operation and Development) (2009). *Rural Policy Review: Italy*. https://read.oecd-ilibrary.org/urban-rural-and-regional-development/oecd-rural-policy-reviews-italy-2009_9789264056237-en#page1
- Prezioso, M., Ottaviani, V. (2009). New Methodological Rules in Order to Measure the Sustainable Territorial Development. In *PISTA 2009 Politics and Information Systems, Technologies and Applications*, 10-13 July, Orlando.
- Prezioso, M. (1995). *La base geoeconomica della Valutazione di Impatto Ambientale*. Pisa, Pacini.
- Prezioso, M. (2005). STeM Approach – towards a Common and Cohesive European Policy. In Boscaino, P. (ed.). *Present and Future of ESDP, Proceedings of International Conference*. Città di Castello, Alinea, 79-92.
- Prezioso, M. (2006b). La dimensione territoriale della Strategia di Lisbona e Göteborg: l'approccio concettuale e metodologico. *Bollettino della Società Geografica Italiana*, serie 12, 11, 9-34.
- Prezioso, M. (2008). Cohesion Policy: Methodology and Indicators towards Common Approach. *Romanian Journal of Regional Science*, 2, 1-32.
- Prezioso, M. (2010). The Sustainable Territorial Environmental/Economic Management Approach to Manage Global Policy Impacts and Effects. In Cancilla, R., Gargano, M. (eds.). *Global Environmental Policies: Impact, Management and Effects*. Hauppauge, Nova Science Publisher, 110-163.
- Prezioso, M. (2011b). STeMA: Proposal for Scientific Approach and Methodology to TIA of Policy. In Farinos Dasi, J. (ed.). *De la Valuacion Ambiental Estrategica a la Evaluacion de Impacto Territorial*, Valencia, Generalitat Valenciana/PUV, 100-130.
- Prezioso, M. (2019a). Measuring the Progress towards Territorial Cohesion: a TIA Application to the Regional Development Programs. In ESPON 2020 Scientific Conference, *Building the Next Generation of Research on Territorial Development*, Scientific Report, 62-68.
- Prezioso, M. (2019b). STeMA: a Sustainable Territorial Economic/Environmental Management Approach. In Medeiros, E. (ed.). *Territorial Impact Assessment – The Handbook*, Berlin, Springer, 62-85.
- Prezioso, M. (ed.) (2006). *Territorial Dimension of the Lisbon-Gothenburg Process*, Rome, Aracne. http://www.espon.eu/main/Menu_Projects/Menu_ESPON2006Projects/Menu_CoordinatingCrossThematicProjects/lisbonstrategy.html
- Prezioso, M. (ed.) (2011a). *Competitiveness in Sustainability: The Territorial Dimension in the Implementation of Lisbon/Gothenburg Processes in Italian Regions and Provinces*. Bologna, Pàtron.
- Prezioso, M. (ed.) (2018). *Quale territoriale impact assessment della coesione territoriale nelle regioni italiane. La concettualizzazione del problema*. Bologna, Pàtron.
- Prezioso, M., Coronato, M., D'Orazio, A. (2016) *Green Economy e capitale territoriale. Dalla ricerca geografico economica, proposta di metodi, indicatori, strumenti*. Bologna, Pàtron.

APPENDIX: The “logical tree” used to assess cohesion policy by STeM Approach

The TIA of TC identifies the territorial weaknesses on which to act to achieve the European policy goals. Territorial cohesion, complementary to competitiveness and sustainability (EC 2011; ESPON2013), plays a leading role in determining regional disparities on which

to act by applying the Europe 2020 Strategy for smart, sustainable and inclusive growth. The territorial Cohesion Policy therefore becomes the major element to face the challenges ongoing (globalization, climate, demography, energy) opening to the green economy in inner areas and metropolitan peripheries, the main territorial typologies of cohesion policy and funds (DPS 2013-2015; PON Metro MIT 2015).

Table A. The complementarity between the thematic objectives of the cohesion policy, the Europe 2020 Strategy and the STeMA policy choice. Source: EC 2015, 34, modified by Prezioso and Coronato

N. OT	Priority of cohesion policy	Thematic objectives of cohesion policy	Europe 2020 Strategy	Europe 2020 flags	STeMA Policy choice
1	Develop an environment favorable to business innovation	Strengthening research, technological development and innovation	Smart Growth	Innovation	• R&D infrastructures • Support to BAT • Development of recycling technologies and products (circular economy)
2		Enhancing access to, and use and quality of, information and communication technologies		Education	• Supply of education • Human capital internationalisation
3		Enhancing the competitiveness of SMEs		Digital society	• Bridging digital divided and digital transition • Technological/innovative dissemination for the enterprises and institutions • Support to transnational cooperative projects • Use/development of environmental friendly technologies • Quality certification and assessment tools
				Transport	• Development of telecommunication networks • Development of energy networks • Increase of physical accessibility
4	Realize high performance infrastructures and ensure efficient management of natural resources	Supporting the shift towards a low-carbon economy	Sustainable Growth	Climate Change	• Energy policies • Flexible Mechanisms • Climate Active adaptation and mitigation
5		Promoting climate change adaptation, risk prevention and management		Energy/ Natural Resources efficiency	• Use of renewable resources • Active Protection of Natural resources • Reduction of Natural Resources consumption (green economy) • Natural hazard prevention
6		Preserving and protecting the environment and promoting resource efficiency		Competitiveness	• Support Local productive identity • Promotion of a global enterprise culture • New business/service instruments • Inflation control • Internationalisation of good and services
7		Promoting sustainable transport and improving network infrastructures		Mobility	• Green and eco-services • Increase of physical accessibility

N. OT	Priority of cohesion policy	Thematic objectives of cohesion policy	Europe 2020 Strategy	Europe 2020 flags	STeMA Policy choice
8	Increase labor market participation, promote social inclusion and improve the quality of human capital	Promoting sustainable and quality employment and supporting labour mobility	Inclusive Growth	Employment	• Homogenisation of enterprise costs • Support enterprise creation • Support worker mobility • Support equal opportunities
9		Promoting social inclusion, combating poverty and any discrimination			• Re-Involvement of ageing people • Support leisure • Social inclusion • Child protection
10		Investing in education, training and lifelong learning		Poverty and exclusion/ Age and Public Health	• Poverty reduction • Policies dissemination for transparency and efficiency of bureaucracy • Cultural integration • Social Programme Financing • Safety • Support Welfare
11		Improving the efficiency of public administration			

Cohesion policy has established 11 thematic objectives to support growth for the 2014-2020 period. These objectives are complementary to the pillars and flags of the Europe 2020 strategy and, in the STeMA model, have been declined in policy choices.

Table A shows the process that transformed the objectives of the cohesion policy, through the pillars and the flags of the Europe 2020 strategy, into policy choices that can be implemented at a territorial level by STeMA.

The complementarity between the Cohesion Policy and the Europe 2020 strategy was divided into Determinants, Sectors and Types, Categories and Indicators so that it could be processed according to the STeMA TIA methodology (fig. 1). Note the Thematic Objectives of cohesion policy in relation to the 3 pillars of the Europe 2020 Strategy (in STeMA: Determinants); its flags (in STeMA: sectors and typologies), their pillars (in STeMA: Categories) and dimensions (in STeMA: Indicators).

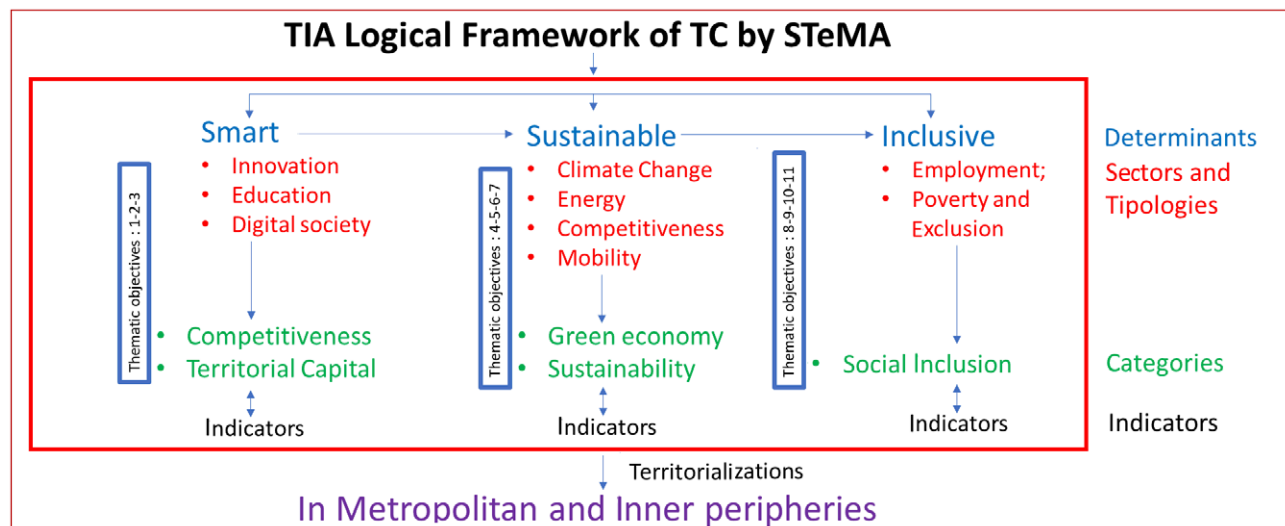


Figure A1. TIA Logical Framework of TC by STeMA Source: Prezioso and Coronato elaboration.

Follows the territorialisation process that transforms the qualitative-quantitative evaluation of spatial analysis (IA) into territorial analysis (TIA) looking at the metropolitan and inner peripheries in research Project.

Having established the policies, strategies and actions / effects generated by the application of the

policy (thematic objective and EU2020 flags), it was necessary to identify the indicators capable of measuring the size of the phenomenon. The process was carried out for each determinant. Tables A2, A3, A4 present the logical trees of the SteMA TIA of territorial cohesion.

Table A2. Logical Tree of Smart Growth. Source: Prezioso and Coronato elaboration.

Smart Growth								
Innovation Vulnerability (IV)							Innovation Status Quo (ISQ)	
Digital Society (DS)			Education					
	Virtual Stakeholders			The Human Capital				
					Human Capital Education			
Internet User	Ultra wide band insight	Internet in the Public body	Structure education to the creation of knowledge	Index of innovative dependency	Population with three years degree	Population in life long learning (PLL)	R&D Infrastructures (RDI)	Telecommunication Development level
UI	II	PAI	PL	IDI	PET	PLL	RDI	TD

Legend

Determinant

Typology

Sector

Category

Indicator

Cross

Acronym

Table A3. Logical tree of Sustainable Growth. Source: Prezioso and Coronato elaboration.

Sustainable Growth																			
Sustainable competitiveness										Climate Change Adaption (CCA)					Infrastructures sustainability				
VESISP					IEIF					RiVuln					Environmental cooperation				
Productive system Identity					Economic interaction					Vulnerability					Waste				
IpSSP					ATI					SAAcPot					Urban and dangerous wastes				
Local Productive system					Territorial Appeal					Air					Recycling				
Productive sustainability					Costs					Water					Hazardous waste				
Productive sustainable identity					PFCL					Risk					Urban Waste				
Economic Structural variables					Credit aptitude					CO2 emission					Environmental general agreement				
Local Units					Capital accumulation intensity					Air					SEA and EIA				
Green job					Fiscal pressure					Water for human use					Multimodal accessibility				
Patents					Hourly labor cost					Risk					Broadband penetration level				
GDP ppt					Bank					Recycling					Energy self-sufficiency index				
Green Added Value					Insurance and financial institutions					Hazardous waste									
Commercial integration					CO2 emission					Urban Waste									
Commercial integrations of goods					Air					Environmental general agreement									
Foreign direct investments					Water for human use					SEA and EIA									
Employed					Risk					Multimodal accessibility									
Capital accumulation intensity					Hazardous waste					Broadband penetration level									
Fiscal pressure					Urban Waste					Energy self-sufficiency index									
Hourly labor cost																			
Bank																			
Insurance and financial institutions																			
CO2 emission																			
Air																			
Water for human use																			
Risk																			
Recycling																			
Hazardous waste																			
Urban Waste																			
Environmental general agreement																			
SEA and EIA																			
Multimodal accessibility																			
Broadband penetration level																			
Energy self-sufficiency index																			

Table A4. Logical tree of Inclusive growth. Source: Prezioso, Coronato and Carbonaro elaboration.

Inclusive Growth																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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