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Rethinking Territorial Capital

Ripensare il capitale territoriale

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Abstract. Territorial capital (TC) is often defined as a set of tangible and intangible values, of an economic, social and environmental nature, capable of determining the development potential of a territory. In this paper, two fundamental categories of TC factors are identified. The first (generative factors) includes human capital and social capital which together significantly influence individual and collective action. The material and immaterial effects induced by this category of TC take the form of structures, infrastructures, productive and governmental structures, artistic expressions, and the cultural heritage and constitute the second category of TC factors (here defined as sedimented factors). Measuring and assessing these two categories, here applied to the case of provinces in Italy, could allow the formulation of key policy suggestions for economic growth and territorial development. The preliminary results provide useful information about the methodological framework adopted and pose new questions for future research developments.

Keywords: territorial capital, meta-level, bottom-up approaches, evaluation, principal component analysis.

Riassunto. In una rilevante letteratura, il capitale territoriale (TC) è definito come un set di valori tangibili e intangibili, di natura economica, sociale e ambientale, in grado di determinare il potenziale di sviluppo di un territorio. Nel paper si identificano due essenziali categorie di fattori del TC. La prima (fattori generativi) include il capitale umano e il capitale sociale che insieme influenzano in maniera significativa l'agire individuale e collettivo. Gli effetti materiali e immateriali da essa indotti prendono la forma di strutture, infrastrutture, assetti produttivi e di governo, espressioni artistiche, *cultural heritage* e costituiscono la seconda categoria di fattori del TC (denominati fattori sedimentati). La loro misura e valutazione, in questa sede applicate al caso delle province italiane, potrebbe consentire la formulazione di importanti suggerimenti di policy per la crescita economica e per lo sviluppo territoriale. I primi risultati forniscono indicazioni importanti circa l'impianto metodologico adottato e pongono nuove questioni per i futuri sviluppi della ricerca.

Parole chiave: capitale territoriale, meta-livello, approcci *bottom-up*, valutazione, analisi delle componenti principali.

1. Introduction: Territorial Capital

Since the 1960s, the understanding of the term “capital” seems to have gone beyond the narrow economic framework of classical and neoclassical approaches. Conceptually revisited it takes into account multiple points of view (Watts 2009, 58): “human capital [...], social capital [...], cultural capital [...], intellectual capital [...], relational capital [...], public capital [...], natural capital [...], and creative capital” (Dąbrowska et al. 2017, 79). By focusing on its “relational” components, the new broader meanings of capital appear are not so far from the Marxist interpretation, according to which capital is the expression of a social relationship that controls the production processes and shapes relationships of domination between classes.

More generally, the term increasingly refers to the complex of “resources for value creation” (Luzi 2015, 41). While it is accepted that the availability and combinations of usable (capital) resources are spatially differentiated, it is only recently that the term capital has been enriched with new variations in meaning, which have brought it closer to relational interpretations and which propose the idea that a weak endowment of certain “resources” could inhibit any ambition for economic growth. From this point of view, the competition between territories and the resulting outcome does not depend so much on the Ricardian theory of the comparative advantages as on Adam Smith’s theory of the absolute advantages, the latter generated by equipment and capacity (Ugolini et al. 2018; Camagni 2002).

In short, the territorial qualities determine not only the speed of economic growth, but also the possibility that it actually occurs. At the end of the 20th century, the gradual but decisive emergence of a “territorial” point of view highlighted the adoption of “bottom-up” development processes to satisfy the fundamental needs of a community (Conti 2012, 119; Dini 2007). Although this change in point of view transferred the responsibility of a possible non-development dangerously and almost exclusively to the “local” scale, it nevertheless generated an unprecedented focus on the territorial qualities and their variety and variability.

At the turn of the 20th and 21st centuries, these new sensitivities manifested themselves in the analyses and strategies of important international institutions and the concept of territorial capital (TC) began to refer to a complex of constraints and specific local opportunities (Amodio et al. 2018; Ugolini et al. 2018): in 2001, the OECD formulated a first articulated definition of territorial capital, which took on many of the assumptions and

conclusions of those approaches that had come “from bottom-up” (De Rubertis 2013a).

In the fundamental works of Camagni (2009), TC is a concept that follows an endogenous approach and refers to a set of territorial values, of tangible and intangible assets, of various nature, considered as being key factors for regional economic growth. In many studies following Camagni’s initial work (e.g. Affuso, Camagni 2010; Brasili 2012; Brasili et al. 2012; Camagni 2009; Capello et al. 2009; Casi, Resmini 2012; Fratesi, Perucca 2014; 2018; Jona 2015), TC is interpreted as a “system of territorial assets of an economic, cultural, social and environmental nature, that determine the development potential of places” (Fratesi, Perucca 2018, 244). These studies are mainly “quantitative” and refer to EU countries (NUTS 3). They posit development reductively as the ability of a region to sustain its economic growth, its ability to react to exogenous shocks (resilience), thereby substantially improving its own competitiveness. Some applications concern individual countries (including Italy: Brasili et al. 2012; Fratesi, Perucca 2014; Mazzola et al. 2018) or large areas (Affuso, Camagni, 2010) and the whole of Europe (Casi, Resmini, 2017); less frequently, other studies have investigated specific thematic areas (businesses in Barzotto et al. 2016;) and sectors (tourism in Romão, Nijkamp 2018), or at a more detailed scale (municipalities in Bučaitė-Vilkė et al. 2019).

In some studies, the concept of TC seems to hark back to Marshallian externalities, the most explicit reference being in Barzotto et al. (2016, 150). In fact, externalities could be nothing more than a particular effect of the wide range of territorial qualities that the TC as a whole describes. As already noted in our previous work (De Rubertis et al. 2018, 2019, from this point of view, territorial capital represents the competitive potential of a region, determining the externality system that “positions” the local economy on the markets, the social capital and local governance (Lacquement, Chevalier 2016). This would seem to be confirmed by the measurement attempts inspired by this approach that actually measure the different economic growth potential of the territories. However, there is no lack of studies that underline the need to combine quantitative approaches, which tend to rely too much on the availability of data, with qualitative analysis which instead produces ad hoc information (Bučaitė-Vilkė et al. 2019; Dąbrowska et al. 2017; Kabai et al. 2017).

In general, approaches are strengthened that consider the endogenous resources to be more and more important in the evolution of economic systems, clearly highlighting a strong path dependence: “past decisions, development processes, traditions or act as preconditions

for the present actions and outcomes” (Romão, Nijkamp 2018, 820). In fact, the connections between TC and regional economic growth have been widely investigated in studies measuring and highlighting the importance of the territorial endowment of social fixed capital (e.g. infrastructures) as well as cultural, social, human capital (Mazzola et al. 2018).

The literature places great emphasis on intangible factors, which appear to be constituted mainly, though not exclusively, by the so called human and social capital. These two dimensions (human and social) are not always positively related (Mohan, Mohan 2002), since human capital represents the individual endowment of “skills and competencies in performing productive tasks”, whereas social capital refers to specific quality of the context and “may be developed as a by-product of other activities in a community” (Mohan, Mohan 2002, 192).

Nevertheless, in this paper, we assume that the simultaneous use of the two concepts (human capital and social capital) allows us to simplify the complexity of the relationship between individual qualities and territorial specificity: human capital defines the domain of individual possibilities, whereas social capital the domain of constraints and opportunities. Essentially, they are two types of capital that condition individual and collective behavior and therefore can be defined as “generative factors” of TC. The actions of individuals and groups have tangible and intangible effects - which take the form of structures, infrastructures, productive and government frameworks, artistic expression, the cultural heritage, all of which represent another important dimension of the TC which we define as “sedimented factors”.

On the basis of an ever-growing literature, in Section 2 we explore the meaning and role of generative and sedimented factors of TC. In Section 3, an additional level of observation is introduced for identifying a measure of the attractivity, defined as the level of appreciation (by residents and visitors) of specific, local endowment of resources. Finally, in Sections 4 and 5, the variables used are presented and the results of some measurement hypotheses are discussed.

2. Generative and sedimented factors of Territorial Capital

2.1. Human capital

“The term human capital [...] was formally introduced in the 1950s and its analytical framework was developed mostly by academicians at the Chicago School

of Economics such as Theodore Schultz and Gary Becker” (Tan 2014, 412). A famous research by Schultz (1961) introduced the idea that knowledge and skills, as characteristics of individuals, can be considered as a kind of capital: “human capital” (HC). Subsequent studies built up a real human capital theory (HCT) (Frasson Vidotto et al. 2017). HCT has its roots in the neoclassical economy: it “is not a mere theory in economics. It is a comprehensive approach to analyze a wide spectrum of human affairs in the light of a particular mindset” (Tan 2014, 411). HCT “suggests that education increases the productivity and earnings of individuals; therefore, education is an investment. In fact, this investment is not only crucial for individuals but it is also the key to the economic growth of a country” (Tan 2014, 412).

However, there are numerous points of view on this topic, often reaching different conclusions that are not always confirmed univocally by empirical evidence. Some research shows that, depending on the contexts and historical periods, an increase in the HC budget does not always correspond to economic growth: in extreme cases, over-education can produce effects that go against those expected. Furthermore, according to some critical approaches, education policies can also present serious risks of manipulation, conditioning and exploitation (Tan, 2014). Despite this, many studies, even very recent ones, still retain that HC is the fundamental basis of economic growth, both in developing countries (Flückiger, Ludwig 2018) and developed ones (among the most recent: van Hemert, Nijkamp 2010; Florida 2002; Lee, Lee 2016), including Italy (Ciccarelli, Fachin 2017; Mazzola et al. 2018), with important effects on policy recommendations (World Bank 2018; EC 2019).

In general, the most frequently cited of HC components in the literature are: “talent, education, experience, knowledge, skills, attitudes, creativity, leadership” (Frasson Vidotto et al. 2017, 319). Two interesting measurement experiences of HC, and of differences on an international scale, are those of the World Bank (HC Index) and of the European Commission (within the broader DESI Index). In the Human Capital Index the following are taken into consideration: “probability of survival to age 5, expected years of schooling, harmonized learning outcome, learning adjusted years of school, adult survival rate, fraction of children under 5 not stunted” (World Bank 2018, 42). In the Digital Economy and Society Index of the European Commission, the importance of technological skills is stressed, therefore it is argued that HC “has two sub-dimensions covering ‘internet user skills’ and ‘advanced skills and development’; essentially indicators “based on the number and complexity of activities involving the use of digital devices and / or the

internet [... and] on ICT specialist employment and ICT graduates” (EC 2019).¹

The emphasis on HC components clearly changes from study to study and, at every scale, from the actual availability of data, but the basis of all the definitions is represented by locally activatable knowledge and skills.

In this paper, supported by the relevant literature, we thus assume that the presence of a human capital suitable for promoting economic growth can be identified through the following dimensions:

- knowledge and competences, measured by the level of education of the resident population (as in all the literature that we reviewed) and by the propensity to continuous training, by employees involved in experimental R&D in the field of natural sciences and engineering, in the field of social and humanistic sciences, and by those involved in scientific and technical professions;
- ability to reproduce knowledge and skills, measured by those involved in the education sector (e.g. Jona 2015).

2.2 Social Capital

In economic geography, many studies refer to the importance of social capital (SC) in the performance of companies and territories, however the empirical evidence confirming this connection is not always completely convincing (Staber 2007). Even the interpretations of the concept are not unique: after the pioneering works in the first decades of the twentieth century, Bourdieu, in a Marxist perspective, defined social capital as “the result of a dynamic and relational process and the consequence of an endless institutional endeavor aimed at creating and maintaining lasting and useful relations able to secure material or symbolic advantages” (Cannone 2009, 43). The subsequent contributions of Coleman and Putnam were far more successful, probably due to their high compatibility with dominant economic approaches (Gidwani 2002; 2009). Coleman, who followed in the wake of Bourdieu (from whom he did not borrow the Marxist perspective), influenced above all by Becker’s research on human capital and, with a focus on the principles of neoclassical economics, studied the effects that education has on SC (Cannone 2009). Putnam turned his attention from the individual level to the regional/national one, linking the quality of the

institutions’ performance with levels of civicness: “different civic characters stem from particular ‘cultural’ traditions fostering or hindering mutual trust, cooperation, and the vibrancy of associational life that he measured with quantitative methodological tools”. Putnam thus sanctioned the variety and variability of the territorial allocation of SC (Cannone 2009, 46- 47).

In its broadest sense, SC can be considered as a set of “norms, values, networks, reciprocity or trust which are held in a community and can lead to positive social and economic outcomes [...] the social capital of a collectivity is the resources embedded in the internal and external social networks which can be potentially accessed or are actually mobilized for actions of members of the collectivity” (Huber 2009, 161, 165). Density and effects of social capital may differ from expectations and are varied and variable (Mohan, Mohan 2002). In addition, in relation to some components of social capital, or social capital as a whole, there is no lack of critical points of views that reduce the importance of “relational proximity as a factor shaping learning and innovation” and therefore of its centrality in growth processes (Murphy 2006, 430): at certain scales and in certain contexts “the crucial factor is political will, beyond trust and cooperation” (Radcliffe 2004, 523).

Many studies have attempted to evaluate the territorial allocation of SC (see Mohan, Mohan 2002) or measure its impact on transaction costs, on the ability to resist crises, and on the capacity for innovation, which are usually deemed as determining factors of competitiveness, and in general on economic growth (Hauser et al. 2007; Gidwani 2002; 2009; Peiró-Palomino 2019).

In this paper, we focus on variables that can reveal the presence of a SC that is favorable to economic initiatives:

- collaborative attitudes between institutions (unions of municipalities), companies (business networks) and citizens (volunteering is the most used in literature; for example, Brasili et al. 2012); in Mazzola et al. 2018, the network relationships among firms in the area, is measured by inward foreign direct investment;
- propensity for “civil” cohabitation, measured by: micro-criminality and waste management methods (whose use is established practice in the literature); female employment (sensitivity with respect to reducing gender differences; Fratesi, Perucca 2014; 2018) and female enterprises.

2.3. Sedimented capital

As discussed, the actions of individuals and groups are largely dependent on the generative factors of TC.

¹ “According to the latest data, Luxembourg, the Netherlands and Sweden are the top performers in terms of Internet user skills, whereas Finland, Sweden and Estonia have the highest scores in advanced skills and development. Bulgaria, Romania, Italy and Greece rank the lowest overall on DESI’s Human Capital dimension” (EC 2019).

Generative factors determine even the perception and the representation of the physical environment and the cultural heritage, and the consequent behaviors. The territory as a whole is perceived, represented, experienced and produced in accordance with the allocation of human and social capital. Individual and collective actions have material and immaterial effects that take the form of organizations, companies, productive systems, infrastructures, government and governance models etc., these are elements that together constitute what we have called sedimented factors of TC. Moreover, in an irreducible complexity, these elements represent the places or the tools for the production, improvement and reproduction of generative capital.

Unlike the generative factors, for which the literature tends to be in agreement with regard to the indexes to be used in reference to human and social capital, the sedimented factors, in the terms we have defined them, could potentially include all the other dimensions and measures attributed in the literature to TC.

In this paper, we focus on those factors which, in addition to defining with their presence and quality the characteristics of a territory (such as modes of production, cultural heritage etc., in terms of being the sedimented effects of the generative factors), also seem to affect the production and reproduction of generative factors. Therefore, the selected indicators concern the allocation of:

- places where knowledge is produced and reproduced, measured by the presence of universities, schools, research infrastructures, science parks, etc. (in most of the literature such indicators are used as estimates of HC);
- places where goods and services are produced, measured by the density of companies (in Brasili et al. 2012, this is used as one of the measures of productive capital);
- instruments for protecting and exploiting locally sedimented knowledge and skills, measured as trademarks, patents, protected designations of origin, cultural heritage (archaeological sites, cathedrals, castles, convents, monasteries, documentation centers, etc., both public and private); in Brasili et al. 2012, patents are used as a measure of cognitive capital;
- availability / accessibility of goods and services, measured by: presence of places of care and facilities for the health of the population, the availability of and accessibility to services, environmental awareness (in an ecological sense, pollution detected and availability of protected areas; see Brasili et al. 2012).

3. Attractivity and recognition

3.1. Attractivity

Attractivity is a second level for observing TC and entails moving from census to an assessment of regional allocations. In this case we try to estimate the extent to which the local and non-local populations appreciate all the elements of that territorial capital, in the combination in which they are found locally. We define this factor (or determinant) as “attractivity”. In reality, this factor could be interpreted as the weight that can be attributed to the generative and sedimented factors of TC.

In terms of policy suggestions, what has been discussed so far allows us to formulate intervention strategies based on endogenous and top-down approaches: the objectives of economic growth are the same for all territories, policy makers can take action on the elements of TC that appear to be insufficient or lacking, in order to improve the performance and attractiveness of the territory.

The level of the acknowledgement and appreciation of territorial qualities can be measured in terms of the level of attractiveness, i.e. the success achieved by what the territory is able to offer. In this context, useful indicators could be:

- exports, as a measure of how much local production methods and products are appreciated externally; merchandise that is identical in terms of products may have a different appeal due to the way it was made (e.g. with measures that protect the environment or human health);
- tourism and hospital migration, as a measure of the appreciation of environmental, social and cultural, health qualities;
- the migration balance, and the birth rate as a measure of the overall appreciation of the territory and the quality of life it offers.

3.2 Recognition in bottom-up approaches

Sedimented capital and its level of appreciation (attractivity) are no more than the testimony of how citizens have interpreted and experienced their own territory, and it does not reveal the citizens' ambitions and expectations. Although making a census of territorial assets and designing connections has a certain utility (Dematteis 1995), it very much constrains to the observer's point of view the spatial representations and - in development discourses - the territorial futures (De Rubertis 2013a). In fact, the key to the interpretation adopted so far, which is all centered on economic

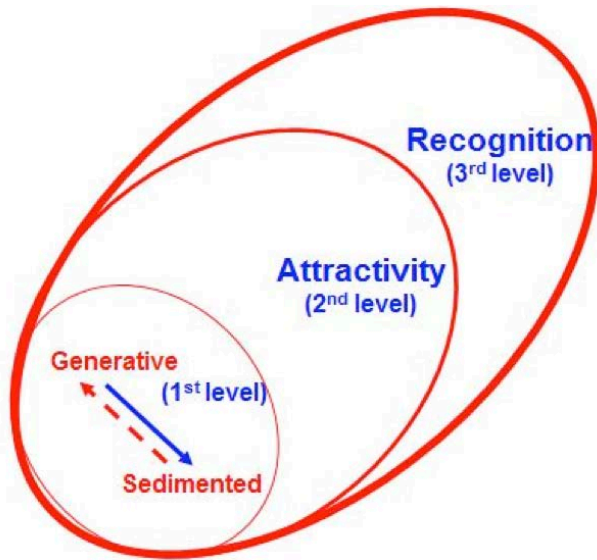


Figure 1. Levels of TC. Source: authors' elaboration.

growth, says little about the broader development objectives of the territories. In order to investigate this last aspect, besides knowing how much the TC identified is actually appreciated within and outside the reference territories, it is necessary to understand how the identified factors are recognized by the territory as its capital. If a bottom-up approach is required, the proposed measurements are insufficient or even inadequate to guarantee results.

A bottom-up approach would require that the development objectives are the real expression of local needs. Therefore, by adopting a development perspective, TC is not what we measure as relevant to the objectives of mere economic growth, but it is the set of resources that the population perceives / represents as useful tools for satisfying their own needs and ambitions (De Rubertis et al. 2018, 2019).

In short, it is necessary to introduce a third level of reading of TC, a meta-level that redefines the components on the basis of the assessments of the local population: the development objectives are those shared locally and each TC measurement must be adapted to the territorial varieties. Targeted studies can suggest which factors and which indicators are relevant and new elements that were previously ignored could be detected, while others, previously considered relevant, could be completely obsolete.

In our investigations, which are still ongoing, a key role is played by the meta-level of recognition (fig. 1) which will be used to redefine the TC as a function of the development goals identified in the territories under

investigation. Here, we present the results of a long process of selection and measurement of the indicators relating to the generative and sedimented factors of TC in provinces in Italy and in the evaluation of its level of attractivity.

4. Methodology: the variables used to measure TC

Identifying the variables that can best express a measure of the TC allocation is a non-trivial operation and is characterized by a certain degree of arbitrariness, one reason being with respect to the dimensions illustrated in the preceding sections, the most suitable data are not always actually available. We thus focused on the scale that offers the widest range of statistics (the data at a provincial level), selecting those that best approximate the phenomenon to be represented. As regards the generative factors, the data series and the sources used are detailed in Tables 1 and 2.

The endowment of human capital is expressed by the level of education of the resident population and by the number of employees in the education sector (ISTAT 2011a; 2019b; MIUR 2019a), as measures, respectively, of local knowledge and skills (professional and of border) and the ability to produce and reproduce them.

Social capital endowment (Table 2) is detected by measuring the propensity for institutions to collaborate with each other (unions of municipalities; see Labianca, 2014), companies (network contracts; Retimpresa, 2019; Infocamere, 2019a) and citizens (associations and voluntary organizations). The propensity for civil cohabitation is expressed by: the microcriminality rate (ISTAT 2019c) and by the rate of waste differentiation (ISPRA 2019a,

Table 1. Human capital: variables. Source: authors' elaboration.

Factor	Variable
Knowledge and skills	Population with secondary education, tertiary diploma, university degrees, ISTAT 2011a
	Population with at least a school-leaving diploma and participation in continuing education (25-64 years), ISTAT 2019a
	Graduates (by residence), MIUR 2019a
	R&D employees in social sciences and humanities, natural sciences and engineering, Other professional activities, technical scientific and others, CCIAA Lecce 2018
Ability to reproduce knowledge and skills	Education operators, CCIAA 2018

Table 2. Social capital: variables. Source: authors' elaboration.

Factor	Variable
Collaborative attitudes	Unions of Municipalities (UMs) and common membership in UMs / total, Comuniverso 2019 Participation in network contracts (number of companies), Infocamere 2019b Activities of economic organizations, employers and professionals (number), CCIAA Lecce 2018 Non-profit institutions (number) and volunteers, ISTAT 2011b Non-profit organizations (10,000 inhab.), ISTAT 2019a
Attitudes of civil coexistence	Unemployment rate (females), ISTAT 2019c Female companies / total, CCIAA 2018 Microcriminality, ISTAT 2019c Separate collection of urban waste, ISPRA 2019b

2019b) as a general attitude towards the community; by the unemployment rate (ISTAT 2019c) and the rate of female entrepreneurship, as an attitude towards particular categories of potentially disadvantaged population.

As regards the complex sedimented factors more numerous than the previous ones, the selected measures concern the allocation of (Table 3):

- knowledge production and reproduction facilities, calculated as the sum of universities, spin-offs, science and technology parks and research infrastructures (regarding research infrastructures, see MIUR 2017; 2018) and of secondary schools;
- structures of production of goods and services (companies), expressed both by their number and by their organization (legal nature);
- tools to protect and enhance local knowledge and skills, measured by the patent intensity index (Istat 2019c), the number of registered trademarks and patents, quality and certified productions (on the basis of production areas) and by all "institutes and places of culture" (Gazzetta Ufficiale 2004) regardless of the type of ownership.

In addition, the following are measured: the equipment and accessibility to health protection services, accessibility to intangible networks - broadband coverage (Istat 2019c) and tangible ones - distance from the main logistic nodes (*Ibidem*) and urban proximity services. The environmental qualities, which are also the result of the sedimentation of long-term choices and actions, are expressed by the presence of protected areas (Istat 2018) (as the number of municipalities with at least one protected area), the level of pollution exceeding specifications for air quality tolerability thresholds

Table 3. Sedimented Capital: variables. Source: authors' elaboration.

Factor	Variable
Knowledge production and reproduction facilities	Universities and research infrastructures, MIUR 2019b; MIUR 2018; APSTI 2019; Spin-off Italia 2019 Secondary education institutions, MIUR, 2019c; Comuni e Città, 2019
Companies providing goods and services	Companies (number) and capital companies/total, CCIAA Lecce 2018
Tools to protect and enhance local knowledge and skills	Patent intensity index (average 2010-2012), ISTAT 2019c Patents and trademarks, Ministero dello Sviluppo Economico, 2019 Certified and quality productions (DOP, IGP and STG) (number), MIPAAF 2019 Cultural places (number), MIBACT 2019
Availability / accessibility of goods and services	Centers and health protection facilities (beds), Ministero della Salute 2019 Ultra wideband penetration and accessibility index (minutes), ISTAT, 2019c Local services (ATECO 2007: G, H, K, L, M, N, P, Q, R, S) / population, CCIAA 2018
Environmental qualities	Life expectancy, ISTAT, 2019e Air quality PM10 (number of control units > 35 days of 50 µg / m ³ / total), ISPRA, 2019b Protected areas (protection sites and the Natura 2000 network), ISTAT 2018

(ISPRA 2019a) and, broadly speaking, are believed to be synthetically represented also by life expectancy at birth (Istat 2019g).

Finally, with regard to attractiveness, the level of external and internal appreciation of territorial qualities is measured by: exports, as a sign of appreciation of local modes of production; tourist arrivals, as a sign of appreciation of local specificities; hospital emigration rate (for details see ISTAT, 2019d), as a sign of the attractiveness of health services; birth rate and total migratory balance (ISTAT 2019g), which reveal the level of satisfaction of the quality of life (Table 4).

Principal component analysis (PCA) was used to identify the TC factors. PCA is the most popular multivariate statistical technique and is widely used in all scientific disciplines. This technique is a scientifically robust and is also among the oldest, although its modern implementation was carried out and coined as such by Hotelling. By extracting the most important information and expressing them as a set of new orthogonal variables called principal components, PCA is used to analyze a data table representing the observations described by different depend-

Table 4. Attractivity: variables. Source: Authors' elaboration.

Factor	Variable
Manufacturing methods, local productions	Exports of products and services (value), ISTAT 2019c
Environmental, social, cultural and health qualities	Tourist flows, ISTAT 2019f
	Hospital emigration, ISTAT 2019d
Quality of life	Birth rate (rate) and total migration balance, ISTAT 2019e

ent variables, which are generally related (Abdi, Williams, 2010). Using PCA the weight of each of our selected variables was calculated, in an attempt to find those that seem to be decisive in the local density of TC. In Figures 2, 3 and 4, the values of the main components of the TC factors are summed so as to obtain an indication of the allocation/concentration of TC of each province.

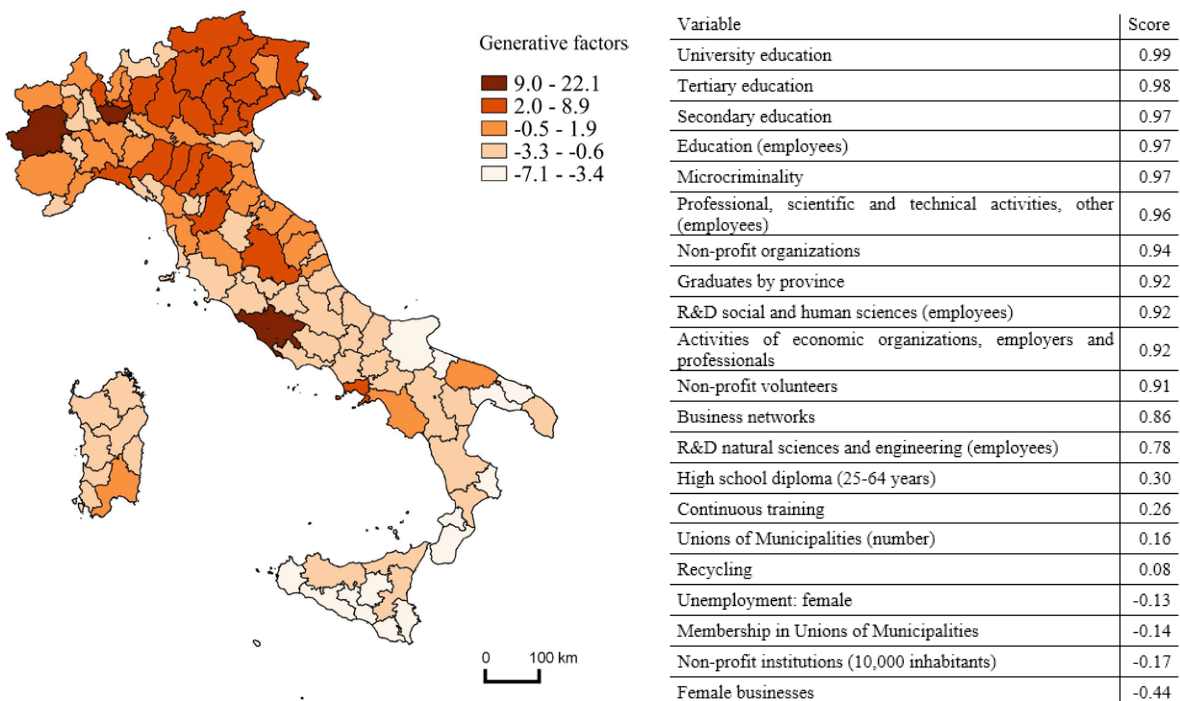
5. Results and discussion

The various territorial capital components were analysed to understand their role and spatial manifestation.

This preliminary framework analysis revealed a different endowment of resources considered crucial for territorial development some of which, deemed significant and explained in this phase of the research, will be included and studied more in depth in the following phases throughout the application of STeMA model (Prezioso 2011; 2018).

Looking at the first map (fig. 2), the PCA for generative factors shows a distribution of the phenomenon that seems to follow the traditional distinction between the north, center and south of the country. In fact, dense areas with variable intensity emerge in the north, particularly in the eastern part, involving the provinces from Trentino Alto Adige, Friuli Venezia Giulia, Veneto and Emilia Romagna and developing continuously, following a well-defined eastward trajectory, including the provinces of Bergamo, Brescia, Milan, Monza and Brianza, and Varese, all in the region of Lombardy. The area thus described, in which Milan and Turin stand out, seems to stretch weakly towards Tuscany, involving the province of Florence.

The situation changes moving from the center to the south of Italy. The distribution is patchy, a sign of a lower supply of generative factors, with some exceptions represented by the provinces of Rome, Naples, Salerno and Bari, which appear isolated from the regional con-

**Figure 2.** Generative factors: PCA results (NUTS 3). Source: authors' elaboration.

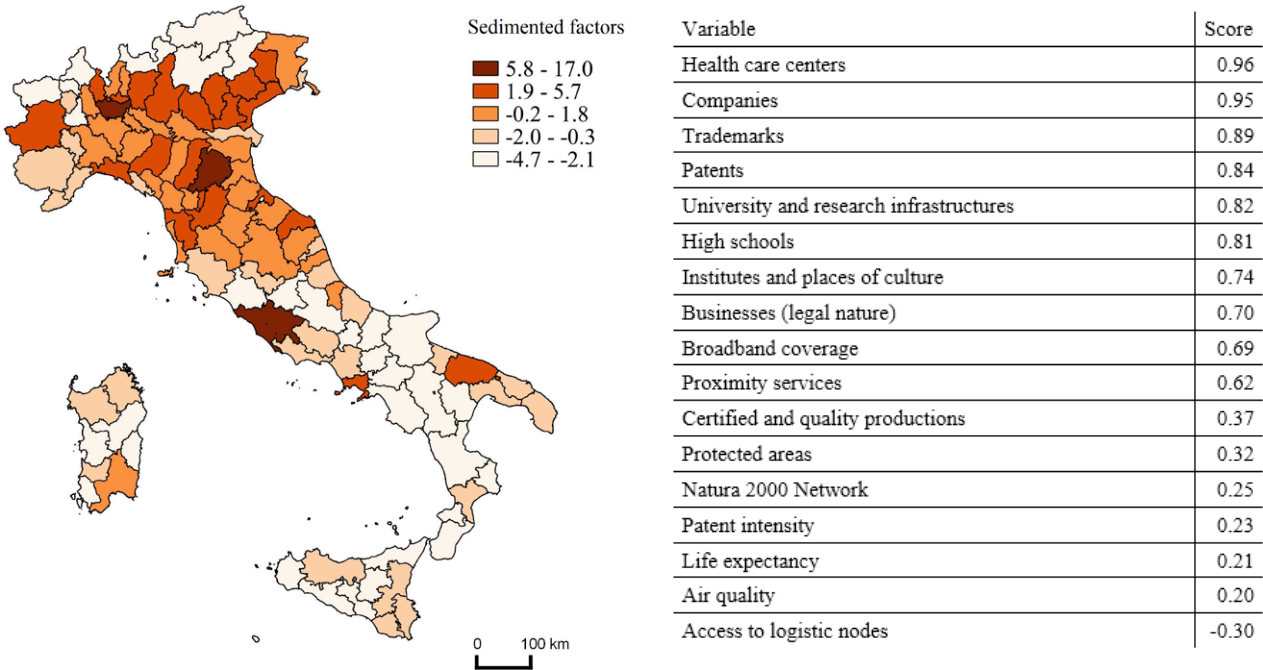


Figure 3. Sedimented factors: PCA results (NUTS 3). Source: authors' elaboration.

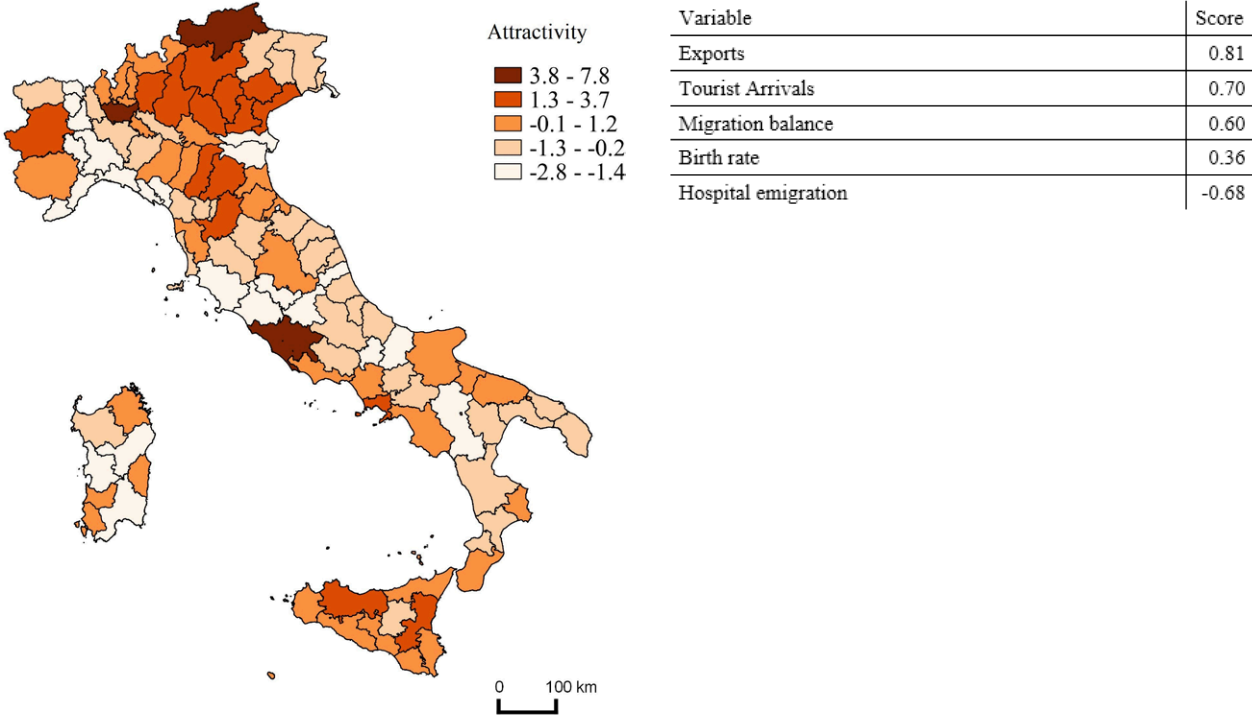


Figure 4. Attractivity factors: PCA results (NUTS 3). Source: authors' elaboration.

text. This distribution is also observed for the other sedimented and attractivity factors (Fig. 3, 4). Here the phenomenon seems to follow broadly the same trend as the generative factors, drawing also in this case significant densification areas, in particular in the north and part of the center, while significantly reducing in intensity moving towards the South.

A better understanding of the phenomenon is offered through an analysis of latent variables, the incidence of the variables considered in the determination, explanation of the main component is also reported for each category of factors (fig. 2, 3, 4).

On the basis of the generative factors, the result obtained gives an idea of the role played by human capital. The most relevant variables are in fact the expression of local knowledge and skills, specifically the level of education of the population and the ability to reproduce them. Equally decisive are the professional, technical and specialist skills present in the territory as well as specific qualities of social capital, such as the propensity to civil cohabitation and the attitudes of collaboration (there are several variables with high values) (fig. 2). The variables that best explain the sedimented factor seem to be a direct expression of the qualities of human and social capital described. They are the availability and accessibility of services for the protection of health, facilities for the production of goods and services, tools for the enhancement and protection of local knowledge and skills (note the presence of several variables with high values), knowledge production and reproduction facilities (fig. 3). On the other hand, in terms of attractivity, the variables that are the expression of external appreciation have a clearer impact, in particular linked to local production methods and know-how and general quality in terms of tourism. The attractivity of the local area is also important in terms of the quality of life it offers (fig. 4). This result seems to confirm what emerged in the analysis of the factors listed previously. Not only the spatial difference in the distribution of strategic and key resources is important, but as demonstrated, which of them are relevant. This is clear by observing the scores obtained in relation to the various components. In particular, they concern the quality of human capital for the generative component both human and social, and for the sedimented component, knowledge production and reproduction facilities, such as tools, structures and infrastructures strongly linked to the quality of human capital present in the territories, such as those specialized in research activities. These variables will be discussed further in the analysis of policy impacts, through the STeMA model (Prezioso 2011, 2018).

6. Conclusions

On the basis of our previous work (De Rubertis et al. 2019), we have proposed a re-elaboration of the concept of TC. In this paper, the most typical lists of its constituent elements (tangible / intangible, public / private assets, etc.) have been reclassified into two broad categories of factors: “generative” and “sedimented”. We have assumed that generative factors play a primary role in determining the choices and actions of the individual actors, and that sedimented factors represent the effects accumulated by the territory in the mid-long term. This approach thus highlights the important role of human capital and social capital in territorial transformation processes, as suggested by the most influential literature. The measurement hypotheses still need to be improved and validated. However, already at the current state, they return an image of Italy in which it is possible to find the fractures traditionally recognized in the country, both for “generative” and “sedimented” factors.

The third factor, which we define as “attractivity”, focuses on the evaluation of territorial endowments, adding a further dimension to TC. In this case the difference is clearer than the other approaches found in the literature: variables that some authors consider measures of the TC endowment (e.g. flows of people and goods), in this research, have been considered as a measure of its appreciation. From this point of view, it is not surprising (and seems promising) that there is considerable overlap between the attractiveness map of the Italian provinces and the map of their supply of generative factors.

Our research is still ongoing, requires important methodological refinements. Firstly, the selection of the variables needs to be optimized in order to identify those that can best represent the phenomenon studied.

The ambitious goal is to identify and estimate the long-term dependence of sedimented factors from generative factors.

In terms of policy, achieving this result would mean being able to define which interventions to carry out on the generative factors in order to obtain the sedimented effects desired. Alternatively, it would be possible to take action on the sedimented factors in order to strengthen the generative capital of a territory. In addition, the outcome of the process could be measured by variations in “attractivity”. Clearly, attractivity has a relative significance: the importance of each individual component in the TC could vary from territory to territory, depending on the development objectives locally pursued. From this point of view, knowing the local representation of TC is extremely important: for bottom-up approaches

it would help to define policy objectives; for the top-down approaches it would be useful to orient the generative factors towards the production of effects consistent with the objectives defined by the policies; for “mixed” approaches it would address the generative component towards “universal” and “indispensable” goals (e.g. those guaranteed by the constitution) and to model the policies locally based on the territorial needs that are considered “negotiable”.

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