European Regional Science Association
51st European Congress
Barcelona, Spain
30 Aug – 3 Sep 2011

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BUILDING SYNTHETIC INDICATORS FOR ASPECTS OF TERRITORIAL CAPITAL

Abstract

Empirical analyses highlight local structural features (territorial capital) as constraints on regional growth and interregional convergence processes, but scant attention is devoted to traditional localised resources and specifically the natural and cultural heritage. However, no heritage provides value by itself: only the application of know-how embodied in human capital achieves this. Specifically, natural and cultural heritage becomes economically relevant through human capital acting through tourist, recreational and cultural activities. Also because of its service exporting nature, tourism is believed to contribute to economic growth and job creation similarly to manufacturing; nevertheless, theoretical and empirical literature concerned manufacturing and rarely studied tourism or extended results to it. Besides, tourism is the market activity most favouring policentricity in Europe: apparently tourism brings territorial cohesion and equity, although its most dynamic component (culture, events) favours metropolitan locations. However, heritage valorisation responding to tourist service demand may have adverse effects on development (congestion) and significant impacts on environmental quality and on resource consumption (heritage dissipation); these partly offsets strictly economic benefits and over time they weaken the destination's pull, hence its value and its population's welfare.

Our goal is to discuss and analyse the role of territorial capital, and specifically of intangibles such as the natural and cultural capital, in regional growth processes and in local response processes to exogenous crises. To this end we aim at achieving the following objectives: i) developing the theoretical framework of territorial capital, highlighting the role of immobile resources in local economic growth and in its spatial differentials, and the role of human capital in resource valorisation; ii) building a national database of territorial capital in Italian provinces, containing synthetic endowment indicators for natural and cultural heritage, human capital, and structure and distribution of the tourism and leisure industries.

Our methodology includes the application of multivariate, and later on econometric, analyses, with the relevant state-of-the-art techniques. We use already available European and national databases, making recourse to ad hoc integrations if and when needed. The study area is Italy; the optimal tier is NUTS3, i.e. provinces, in Italy. The time reference is the period from the early 1990s to the latest available year, to ensure a structural long-term approach.

JEL classification: R11
Keywords: Territorial capital, localised resources, economic growth, multivariate techniques

1. Introduction

This paper aims at briefly discussing and analysing the role of intangible components of territorial capital in regional long run and short run performance, focusing on natural, cultural and human capital.

Slowdown of growth rates and lack of regional convergence have been observed for years in Europe, except for transition countries. Regional growth is the result of a process made up by many elements: local, whether the area has got local resources (territorial capital); fixed public and private capital; human, social, cultural and natural resources; specific manufacturing vocations; agglomeration economies, source of local growing yields; organization of the internal territorial system. Their importance is recognized in economics both at the theoretical (Lucas, 1988); Aghion & Howitt, 1996; Becattini, 1979; Camagni, 1995) and the empirical level, either in a production function approach or in a growth convergence approach.

Empirical investigations show the local structural elements (territorial capital) as constraints which condition the process of regional growth and interregional convergence, but poor attention is devoted to typically local resources, i.e. to the local natural and cultural heritage. However, no capital adds value by itself, unless this capacity is put to use; thus, heritage does not increase value added by itself: only people allow adding income by translating this heritage into export capacity and therefore in growth (GDP) and development (quality of life).

In particular, cultural and natural heritage increase their economic importance thanks to the human capital working in tourism and cultural-recreational activities, one of the most dynamic industries (World Tourism Organisation, 2006, 2009), mainly in Europe (European Commission, 2003; Eurostat, 2006, 2008; Eurofutures, 2007). In Italy, on the other hand, tourism is losing market shares due to the fragmented supply and the poor ability "to make business" (Confindustria - Italian Manufacturers' Association, 2007; Birtwistle, 1996). The delay in the tourism industry contributes to Italy's low rate in economic growth. As an export service sector, tourism contributes to creating income, economic growth and job opportunities just like manufacturing. According to the literature, however, the theoretical and empirical contributions, both on the sector and on the territory, have paid attention to manufacturing (Card & Lemieux, 2001; Checchi, 2004; Helpman, Melitz, & Yeaple, 2004; Falzoni & Grasseni, 2007) and rarely to tourism, nor have extended results to the latter (Bentley, 1996) (Buhalis, 1998; Lee & Kang, 1998; Barros & Santos, 2007; Beech, Salvanes, & Van Reenen, 2007; (Skaple, 2007).

The competitiveness of European tourism supply can't be based for the future on price but on quality and therefore on the skilled human capital originating it: these can transform opportunities into supply. In this way they will meet the variety and the variability of demand: for example it seems that urban and metropolitan tourism might be the most dynamic sector, and therefore allow a significant margin of recovery from the current crisis.

Moreover, tourism is the market activity that better supports policentricity in Europe. It seems to bring a higher level of territorial fairness and cohesion (Requena & Aviles, 1993; (Dallari, 2004) in favour of the Mediterranean and of the Alps (Nordregio, 2005), and some peripheral and rural areas (Christaller, 1963; Costa, 1985; Grolleau, 1993; (European Observatory Leader, 1999). Several demand trends strengthen this cohesion effect (Royal Haskoning, 2006; (Eurofutures, 2007) which is an important evaluation criterion (Brent, 1996; Jehiel, 1991; Newbery, 1998; Bateman, Lovett, & Brainard, 2003; European Commission, 2003; European Commission, 2005).

As a response to the demand for tourism and recreational services and the related demand for services and transport infrastructures, heritage valorisation may have significant negative effects on development (congestion). Negative effects can also affect environmental quality and the consumption of natural and cultural resources (heritage dissipation), albeit limitedly when compared to mining and manufacturing. They partly offset economic benefits and over time they weaken attraction and the destination's value, and

therefore their inhabitants' wealth. For this reason, in evaluations other measures of quality of life (UNDP, 1990) based on sustainability are added to productivity and occupation (the two GDP components).
Finally, several recent investigations (among which the MASST project) have shown that territories do not grow in isolation because they have either positive or negative contacts with other areas (Jehiel, 1991). There is however no evidence about the possible interactions related to the area produced by the improvement of the cultural and natural heritage.
Our exploratory paper is organised in the following way: an initial section briefly describe the original data on 103 provinces, providing 38 proxy indicators of which major univariate statistical and correlations are explored; a first main section reduces the indicators into 11 synthetic indicators (components), by means of a factor analysis; a second main section reduces the provinces into 13 ideal types, by means of cluster analysis; a final section compares and interprets results, also with reference to the mid-1990s economic position.

2. Indicators and proxies for territorial capital elements

2.1.Data and Sources

For database building, data collection has taken place according to a few technical specifications and other statistical ones. First we had to limit the information set to variables available from provinces, homogeneously measured all over the country. As an additional selection criterion we extracted data provided by certified institutional sources - which ensure an adequate level of reliability and statistical quality. Data taken into consideration refer to the 103 Italian provinces (NUTS 3) and the data tracking frequency is annual. Ateco 2002, and not the most recent Ateco 2007, is the scheme adopted to codify and identify the activities with respect to the sectors. This choice was suggested by the nature of the data used, which mostly concern the time before 2007 and therefore were codified according to the Ateco 2002 classification.
We used data on population and on land area in the 103 Italian provinces as denominators to build most indicators shown in the next section. The data source is ISTAT, on an annual frequency and provincial detail. We gathered other raw absolute values used for building the indicators in six groups:

1. *Natural heritage:* area of Special Protection Areas (SPA), the surface of the Sites of Community Importance (SCI), mountainous area, length of coast and land use in agricultural (LUA). The data on SPAs and SCIs are on regional basis and refer to the years 2000 and 2003-2006. Data on the mountain area concern only the year 2005, the length of the coast is the year 2006, while the LUA is available for the years 1990 and 2000 (census years). These three last variables are available at provincial level. Raw data from Istat - SASI, Istat - SAM and the Ministry of Environment.
2. *Historical, artistic and cultural heritage*: number of museums, monuments and archaeological areas, number of theatre performances, of public libraries in the libraries. Data sources are: ISTAT, Statistical Atlas of Spatial Infrastructures (SASI), ISTAT, Statistical Atlas of Municipalities (SAM) and the Ministry of Cultural Heritage. The reference time span for museums, monuments and archaeological areas is 1996 – 2007, while that for theatre performances and public libraries in libraries is 1996 - 2005. Other data refer to the number of local units and employees of local units in “showing, entertainment and recreational activities" (Ateco 92.3) and "library, archives, museums and other cultural activities"(Ateco 92.5). Data refer to the years 1981, 1991 and 2001 (years of the Italian Industry and Services Census).
3. *Tourism industry*: number of hotels and number of complementary exercises with pertinent number of beds. The number is on provincial for the period between 1996 and 2006. Data source are Istat - SASI

and Istat - SAM. We have also examined data about the number of local units and number of employees in local units with activities of hotel accommodation in the areas Ateco 55.1 and 55.3[1]. Data are available for census years 1971, 1981, 1991 and 2001 and for two intra-census years - 1996 and 2004. Data source are Istat - SAM and Istat - Asia (Asia is the Statistical Register of firms local units).

4. *Education:* divided into upper secondary and university education. Raw data for upper secondary education are the number of students entering in the first year and in the fifth year of the high schools, public and not, and to population[2] aged between 15 and 19 years. All these three variables are from Istat – SASI. The time span includes the years 1996 - 1998 and 2004 - 2005. The university education is analysed taking into consideration the number of students matriculated to the degree courses[3], the number of students graduated and the resident population aged 20 - 24. As well as for the high school, these data are from ISTAT – TSAI, too and the time span is 1996 - 2006. Also data on the resident population aged 20-24 are from ISTAT – TSAI and the reference time span goes from 1996 to 2006.
5. *Professional skills*: Data about the jobs complete this group of variables and are taken by the Population Census of 1991. In particular, the variable taken into consideration regards the active resident population divided according to their jobs[4] and of which only these groups are considered: 1) Legislators, managers, entrepreneurs; 2) Intellectual jobs, science experts and skilled personnel ; 3) Technical jobs; 5.2) jobs in the tourism and hotel businesses; 6.2 and 6.3) Artisans and engineering workers and similar. Artisans and workers of the precision mechanics, of the artistic handicrafts for printing and similar; 6.5) Artisans and workers of food, wood, skin clothing textile, leather manufacturing and similar.
6. *Labour market*: number of employees, labour force, people looking for employment and population aged 15 and over, divided for gender[5]. Data are those given in the Continuous Labour Force Survey led by ISTAT for the time span 1992 - 2007.

For the analysis undertaken in this paper, we also used the series of gross domestic product on the 103 Italian provinces (NUTS 3). Eurostat is the source of data for the period between 1992 and 2010.

2.2.Natural, Cultural and Human Capital: Basic Indicators

The concept of territorial capital is both relational and functional and includes very different things, which have in common some essential features: to be stably incorporated places (to be "property "); to be difficult to find elsewhere with the same qualities (be specific), not to be reproducible at will in the short term (to be "heritage"). They come under the following headings: environmental conditions and natural resources (renewable or not); "ownership "of historical material and immaterial (not reproducible as such, but increased over time), fixed capital accumulated in infrastructure and equipment (augmentable,

[1] Ateco 2002 Code: H - Activities of restaurant (55.3) and accommodation (55.1).

[2] Data about the population aged between 15 and 19 years are from ISTAT- SASI and are the resident population aged between 15 and 19 (unit) for the time span 1996-2006. Data 1996-2001 show the set longitudinally reconstructed per gender and each year of birth in the last two Population Censuses.

[3] Data on the graduates starting from 2001 include graduates in Bachelor's Degree (three years), Master's Degree (previous regulation), Master's Degree. Data from university are divided per province and Master's Degree.

[4] Job classification is per group of competence, i.e.: 1) Legislators, managers, entrepreneurs; 2) Intellectual jobs, science experts and skilled personnel ; 3) Technical jobs; 4) Clerks 5) Jobs in the tourism and hotel activities; 6.) Artisans, skilled personnel and farmers. 7) Plant managers and semi-skilled personnel working on fixed or mobile machinery 8) Unskilled jobs 9) Army Forces.

[5] As described Istat, employed include people aged 15 and over who during the reference week have carried out at least one hour of work. The labor force includes the employed and those seeking work (unemployed). People seeking employment include unemployed people aged between 15 and 74, who have at least one activity of job search during the month before the interview and are willing to work within two weeks after the interview or are starting to work in three months after the date of the interview or are willing to work within two weeks after the interview, if it were possible to anticipate the beginning of work. Last variable is the population aged 15 and over who represents the active population.

adaptable, but as a whole fixed in the short to medium term), relational goods, partly embedded in the local human capital: intellectual capital, social capital, cultural diversity, institutional capacity (renewable resources and increased, but only produces a medium to long period). In summary, we argue that territorial capital includes all those diverse assets that are or have been accumulated in the area and, if properly exploited, can ensure competitiveness, attractiveness and wealth to the territory.

In the empirical part of this exploratory paper we analyze two intangible elements of territorial capital: the first one is natural-cultural capital combined with the tourism industry and the second one is human capital. We define natural and cultural capital as collective goods (impure public goods) and/or as resources, both being characterised by hard materiality but differentiated in terms of rivalry (medium vs low). At the opposite end, human capital is characterised by high rivalry and soft materiality. The tourism industry and the labour market provide useful indications of the degree to which these forms of territorial capital are put to economic use. To perform our analysis we constructed two sets of basic indicators (For more details on the construction the basic indicators, see Table A.1 in the Appendix).

The first group of economic indicators is based on the historical, artistic and cultural heritage and these indicators will quantify in relative terms the endowment and tangible assets on which a territory can leverage to enhance its attractiveness. The logic adopted was to combine information that quantify the allocation of assets in absolute values (number of monuments, many museums, ...) with information that will approximate the relevance, since they allow to understand the business and employment effects are induced by attractiveness of assets considered. For the natural heritage, information collected include: the amount of the assets of the protected areas (SPAs and SCIs), the size of the mountain area, the length of the coast and the agricultural area (UAA). In the group of indicators related to the tourism industry we have two subfamilies that represent the endowment of accommodation structures (indicators IT01 to IT04) and the tourist entrepreneurship (indicators IT05 to IT08), by which is meant to measure the relative capacity of each territory to attract and develop entrepreneurship in tourism.

For a measurement of human capital we used indicators that are commonly proposed in the literature. Specifically, we decided to measure the resource through indicators on secondary upper school education, university education and the professions. The benchmarks are indicators to assess the level of general education received, a given geographical area, and type of profession. The second group of basic economic indicators related to human capital includes the classic indicators of labour market: employment rate, unemployment rate, participation rate refers to the total active population aged 15-64, participation rate of female, young and of the population over 55 years.

3. Factor Analysis

3.1.Methodology

3.1.1. Introduction to the Method

The technique of composite indicators aims at explaining articulated, complex and even latent phenomena, such as productivity, entrepreneurship, the vocation of an area, its attractiveness, etc. In our case, these information are contained in indicators aimed at measuring often complex economic phenomena, which summarize features and dynamics of the territorial capital elements analyzed in this work.

Factor analysis methodology focuses on finding a synthesis through the construction of composite indicators, obtained by aggregation (step by step) of available information. The building technique of composite indicators involves weighted aggregation of many lower-level indicators linked among them. In other terms, it builds ad hoc composite indicators which summarize in a "single number" all relevant

information that indicators of lower level carry about phenomena that cannot be directly measured (target phenomena). According to this approach, performance measures can be built through selective and weighted aggregation of measurable variables, which are both different among them and linked by the fact each one feeds and significantly determine the same target phenomenon, even with heterogeneous intensity and in heterogeneous casual ways.

The relevant academic literature is wide and suggests (Marcellino, 2006; Stock and Watson, 2006) that the wider the range of the original variables is, the stronger their bond with the target phenomenon is. The stronger the algorithm of weighing and aggregation is, the more effective the indications deriving from the resulting composite indicators are.

The Methodology of the Principal Components Models (PCM) and Factor Analysis Models (FAM) are the turning point for the implementation of a method based on composite indicators. They allow extracting from very wide and relatively homogeneous databases the common latent components to all the available variables. PCM and FAM allow identifying their nature and aggregate them using schemes of optimum weighing in a one synthesis indicator. Specific care is given to the procedure of identification of the weights assigned to each component which culminate in the composite indicator and can be led by the technique of the Factor Models (according to the approach suggested by Stock and Waston, 2005) and Principal Component Models (according to the scheme suggested by Stock and Waston 2002).

In principle, as many factors or components as original variables are extracted, but only a limited number are significant, in that they explain more variance than the average original variable (as signalled by an eigenvalue greater than one). To make interpretation easier, in the final stage factors / components are "rotated" in order to maximise association with specific variables, as expressed by factor loadings.

It is a flexible and rather powerful approach, widely used in both academic and non-academic contexts, for instance, in the short-term indicator building for the business cycle analysis (NBER with Diffusion Index and CBE with Eurocoin indicator) or structural indicators on the quality of life (CENSIS) or for the degree of economic development of a territory (Florida's 3T model). Moreover, like every approach based on statistic/econometric methodologies, it has some limitations. First, its optimal range of applicability is not universal, even if the typical themes which characterize territorial analyses actually represent its usual application fields; secondly, the methodology of economic identification of the common components is critically complex, especially in case the dataset is very wide. In the context of this work, pre-classification of the data in homogeneous groups has supported an easier identification of the composite indicators and the process of elimination of the least significant ones explains the instability of the reference phenomena.

3.1.2. Comparing Alternative Techniques

By extracting orthogonal (i.e. reciprocally independent) components, under condition of joint normal distribution of the original variables, the PCM analysis finds wide application in the contexts in which it is necessary to synthesize in a single indicator the evidence concerning a clearly identifiable phenomenon (target) carried by different variables jointly supplying some relevant contribution to the variability (time or longitudinal) of the target itself. For instance, PCM could allow to obtain a valid synthetic measure of intelligence of a person (target phenomenon) starting from the information contained in several variables which contribute in different proportion to determine his or her intelligence, such as the ability of analysing, the intensity of the memory, etc.

FAMs perform a function similar to PCM but they have two further interesting features: they are usefully applicable to groups of strongly heterogeneous variables for content, tracking and object which are referred to and FAMs allow extracting from such variable hidden information and target phenomenon not clearly identifiable, and usually not directly measurable in nature. Therefore, if the variable observed in the PCM database are the measures required by themselves, and PCM is used to simplify their interpretation,

the variables observed in FAM context are less significant by themselves, while Factors leading the trend become more important. In the context of time series econometrics applied to macroeconomic problems, FAMs are frequently used to obtain synthesis information on the cyclic economy fluctuations from a heterogeneous multitude of variable, often as a forecast, too.
On the technical-methodological level both methodologies produce as main output one or more composite indicators (the so-called Principal Components in the first case, the Factors in the second case) which do or does summarize variables originally contained in the database. The synthetic composite indicators calculated either by PCM or FAM do not depend on measurement units and therefore are useful in the context of analysis of relative type and of benchmarking. In the case of the time series, they are widely used to date and determine business cycles and therefore, to make comparisons between a certain time span and a period chosen as the starting time. In the context of longitudinal analysis they allow to define ranking between units (enterprises, territories, consumers) in comparison to phenomena of interest.

3.1.3. Operational Choices

The general logic for building indicators approximating the elements of the territorial capital analysed here - i.e. human, natural and cultural resources - is divided in various steps.
The first step is responsible for the *definition of the information set*, that is the building of a range of elementary economic indicators (see appendix A). They supply - altogether considered - an exhaustive starting point of the situation for the localized resources, allowing distinguishing between the areas (provinces) which are in relative difficulty and others that are in a good state of health.
The second step is formed by *data alignment*. It aims at making the measurements homogeneous since every indicator has its own measurement standard. Due to this fact, we defined relative sizes only (normalizing with respect to the population, to the number of experts, to the territorial surface and other) or rates of variation.
The third step regards *ponderation*, i.e. the definition of a system of useful weights to aggregate in sequence the individual indicators, ensuring that important information are not lost or misinterpreted. We defined the weight system according to the use of econometric methodologies which give manageability, but also methodological rigour to the final result.
The fourth step is *aggregation*, i.e. the building through weighting aggregation of the basic indicators (built in the first step) on the basis of the weights found in the third step, the building of the *composite indicators* which synthesize in a number all the information carried by each single starting indicator.
The fifth and last step concerns the *normalization*[6] for benchmarking, i.e. the transformation of all the indicators so that values resulting for each indicator can be distributed (not uniformly) in a [0-1] interval. This procedure makes easy and immediate the criss-cross comparisons between provinces and indicators. At last, the *definition of ranking*. The normalization [0-1] is also crucial because it makes immediate the definition of ranking between areas. High performance is associated to the provinces that show values near to 1 for the synthetic indicator. The opposite occurs if the indicator has values near 0.

3.2. Results

As shown in the methodological section, by the logic of the principal components the basic indicators are pooled into higher-level composite indicators. In this step, the 38 basic indicators are aggregated into two

[6] The normalization procedure is carried out according to the following: $Indji = \frac{Valji - MiniValji}{MaxiValji - MiniValji}$, where j=indicator and i=province.

groups, natural-cultural-tourism and human capital in order to produce their synthetic indices. A well-known, if not formally proven, rule of thumb states that the number of significant factors is not more than one third of the original variables.

3.2.1. Natural and cultural synthetic indicators

The first set of basic indicators on the natural and cultural capital and the tourist industry consists of 22 indicators: 9 of cultural assets, 5 of natural heritage and 8 relating the tourist industry.
From this dataset, the principal components analysis extracted seven significant components that explain more than 75% of the total variance. The relatively high number of components indicates the reciprocal independence of the original indicators. As shown in Table 3.1, the first three components each explain more than 10% of total variance, and together just below 50% of total variance: we focus our analysis on them.

Table 3.1: Total Variance Explained by Significant Components

	Weights of the Rotated Factors	
Component	% variance explained	% cumulative variance explained
1	17.31	17.31
2	15.23	32.55
3	13.12	45.67
4	9.25	54.92
5	8.77	63.69
6	6.12	69.82
7	5.86	75.68

Table 3.2 represents the matrix of the rotated components. We notice the following:

- All the basic indicators are clearly located in all significant components, just one of them being associated to more than one component.
- In the first component ("Attraction") variables that have most weight are those relating to the entertainment and culture: number of public libraries, local units of entertainment and culture (for more detail on the basic variables see Section 2). We view this component as a synthetic measure of the endowment of factors of attractiveness of a territory and what we expect is that a greater endowment of factors of attractiveness should lead to better performance of the territory.
- In the second component ("Accommodation") variables that have most weight are those relating to the tourism industry: the number of hotels, beds in hotels and in complementary exercises and local units - hotels. In addition to these variables the length of the coastline has a significant weight and is positively correlated with the receptive structures. We view this component as a measure of the endowment of receptive structures and it is plausible to think that a better / greater endowment of tourist accommodation have a positive influence on tourist flows, should lead to better territorial performance.
- The third component ("Employment") is characterized by variables related to entertainment and restaurants; in particular it is characterized by basic indicators related to entertainment and employees in the tourism. This factor summarizes a latent phenomena which we interpret as a measure of labour demand in tourism and recreation industries (indirectly, of demand for tourism).
- The fourth component ("Sites") is characterized by cultural indicators: number of museums and archaeological areas and the culture industry. This indicator summarizes the endowment of the

cultural heritage of an area and a better endowment should make the area more attractive. The greatest attractiveness should draw more tourist flows and this could lead to better territorial performance.

- The last three components are characterized by different environmental indicators. The fifth component ("Environment") is marked by environmental variables, in particular the length of the coastline and mountain area. The sixth component is described mainly from the surface of Special Protection Areas, while the last component is characterized by the surface of Sites of Community Interest and the number of monuments. Also in this case a greater endowment of natural / culture resources should have a positive impact on the attractiveness of the territory and its performance.

Table 3.2: Rotated Components Matrix (major loadings only)

	Components						
	1	2	3	4	5	6	7
KA01							0.773
KA02						0.809	
KA03					0.853		
KA04		0.444	-0.380				
KA05					0.831		
KC01				0.819			
KC02							0.738
KC03				0.628			
KC04			0.620				
KC05	0.754						
KC06	0.847						
KC07			0.801				
KC08	0.826						
KC09				0.692			
IT01		0.710					
IT02		0.782					
IT03					0.486		
IT04		0.797					
IT05		0.810					
IT06			0.703				
IT07	0.880						
IT08			0.806				

Extraction methods: principal components analysis
Rotation method: Varimax with Kaiser normalisation

To sum up, the first component ("Attraction") is a measure of the endowment of cultural attraction factors. These elements show cultural territorial capital as a portfolio of assets providing attractiveness to the territory.

The second component ("Accommodation") is a measure of the endowment of accommodation structures. This indicator shows activitiy in accommodation and available accommodation capacity. These elements point to the local ability to exploit territorial capital.

The third component ("Employment") is a measure of employment in the tourist industries. This is another indication of the extent to which territorial capital is being exploited.

3.2.2. Human capital synthetic indicators

The second set of basic indicators is related to human capital, analyzed in terms of education, skills and labour market. Basic indicators are 16: 4 concern tertiary and secondary education, 6 concern active population classified by type of profession, and 6 refer to the dynamics of the labour market.
The principal component analysis extracts four significant principal components that explain 77% of total variance (see Table 3.3). The first two components each explain more than 15% of total variance, and together just over 60% of total variance: we focus our analysis on them.

Table 3.3: Total Variance Explained by Significant Components

	Weights of the Rotated Factors	
Component	% variance explained	% cumulative variance explained
1	43.48	43.48
2	17.70	61.19
3	8.21	69.40
4	7.79	77.20

As Table 3.4 shows, all the indicators are clearly behind these components, with only three of them influencing more than one component. The first component ("Professions and Labour Market") is characterized by indicators relating to the profession and the labour market: all of them but two load most highly here, signalling their high correlations. The second component ("Top Education") is characterized by indicators on university education and intellectual professions, so it may be a measure of the quality of education. The third component and the fourth component have only one basic indicator each that weighs 80%. The third component is mainly characterized by the participation rate of over 55 years and the indicator base on tourism professions. The fourth component is described by the education rate and can be seen as a measure of schooling in the provinces. In this context, the higher values of the components indicate a higher level of education and a greater vitality of the labour market. So it is reasonable to think that territories with higher values of indicators are higher performance than others.

Table 3.4: Rotated Components Matrix (major loadings only)

	Components			
	1	2	3	4
KU01		0.696		
KU02		0.854		
KU03				0.836
KU04	0.479	0.448		
KU05	0.809			
KU06		0.848		
KU07	0.678			
KU08	0.500		0.440	
KU09	0.845			
KU10	0.566		0.378	
KL01	0.941			
KL02	0.925			
KL03	0.930			
KL04	0.916			
KL05	0.900			
KL06			0.892	

*Extraction methods: principal components analysis
*Rotation method: Varimax with Kaiser normalisation

3.2.3. Double-entry matrix

The cross-section analysis of the information contained in the components allows us to rebuild the main aspects of the structural nature of the territorial capital that we discussed in this paper.
Inspection of the matrix below (Table 3.5 and 3.6), allows both obtaining evidence on any phenomenon or variable analyzed and understanding, through mixing of different territorialized indicators, the system of structural relationships acting within territorial capital. This analysis was conducted for both the natural and cultural capital and human capital.
The set of values of each component was partitioned into two classes using the median as cut-off, in order to have the same number of provinces for the two classes. The first class (high values) expressed a higher intensity or growth of the component under exam. The second class (lower values) expresses a lower intensity of the phenomenon or a decrease in the latter case of indicators that represent the variation of a phenomenon. In other words, each class is a homogeneous territorial aggregate, that is a cluster of provinces that are facing similar conditions. The lowest value indicates the low intensity of the phenomenon (areas with value indicator / phenomenon approaching 0) while the higher values, identifying the high intensity of the phenomenon (areas with values close to 1).
What emerges from the double-entry matrix allows, first, understanding the geographical aspects of this type of territorial capital, and secondly, overlapping the thematic representations of different variables thus defining a mental map synthesis. The aim being to identify homogeneous clusters of provinces and to highlight local realities that stand out of structured and compact territories. This feedback will enable the continuation of the quest for possible corridors or junctions between the different areas. These are not intended as rigid fields of observation and evaluation, but as aids to bring out the complexity of the system of economic and social issues and relations criss-crossing the national territory.
The matrix (Table 3.5), relating the cultural attractiveness factors (component 1: Attraction) with the ability to accommodate tourist flows (component 2: Accommodation), describes the economic vocation of the territory. Additionally, provinces that devote much care to recreation and tourist industries (component 3: Employment) are highlighted (in bold) in the matrix.
This matrix shows that the more tourist-oriented macro-areas of the country (high Attraction - High Accommodation) are provinces in central and northern Italy, with an exception for Naples. The other provinces of Northern Italy, with the addition of some central provinces and the Islands, are characterized by a good orientation to tourism as regards the endowment of cultural/tourist attraction but have a low endowment of accommodation structures. The provinces that are in the quadrant High Accommodation - Low Attraction are the most geographically varied but are relatively more located in south central Italy (19 out of 31 provinces are located in the south and islands). Areas characterized by a poor orientation to tourism are in the South of Italy and the Islands, with few exceptions in northern and central Italy (Alessandria, Cuneo, Lodi, Ferrara, Arezzo).
This analysis shows that the concentrations of cultural-tourist attractions that characterize the Italian territory are located:
- in the North-West, especially in Lombardy, Piedmont, and Liguria;
- in the North-East, especially in Emilia Romagna, but also in Veneto and Friuli;
- in Central Italy, especially Tuscany and Lazio (and Abruzzo, which is a transition region)
- on the Islands, but only the provinces hosting the major cities.

The areas with a low endowment of factors of attractiveness are located mostly in Central, Southern n and Island provinces, with some enclaves in the North -East and Nord-West.
On the contrary, the concentration of accommodation supply does not allow precise geographical identification.

Finally, the concentration of tourism and recreation employment, contrary to accommodation structures, tend to replicate the distribution of cultural attractions, being high in North-East, North-West, and Central Italy provinces.
All this suggests that a simple partition based on median values of two or three factors is likely to obscure some information relevant to economic welfare and growth.

Table 3.5: Double-entry matrix: cultural, natural, tourism capital

		Component 2: Accommodation	
		High	Low
Component 1: Attraction	High	***Novara*** / ***Como***, Lecco, ***Brescia*** / ***Bolzano*** / ***Verona, Venezia*** / ***Gorizia*****,** ***Trieste*** / ***Imperia***, La Spezia / ***Ravenna, Forlì Cesena, Rimini*** / ***Massa Carrara, Lucca, Pistoia,*** Livorno / Frosinone / Napoli	***Torino, Vercelli,Asti*****,** ***Biella*** / ***Varese, Milano, Bergamo, Pavia*****,** Cremona, Mantova, Lecco / ***Vicenza, Treviso, Padova/ Pordenone*** / ***Genova*** / ***Piacenza, Parma, Reggio Emilia, Modena*****,** ***Bologna*** / ***Firenze*****,** ***Pisa, Prato*** / ***Perugia/ Rieti*****,** ***Roma*** / *Pescara, Chieti* / ***Palermo, Catania*** / Cagliari
	Low	***Verbano Cusio Ossola*** / ***Aosta*** / ***Sondrio*** / *Trento*/ ***Belluno, Rovigo*** / ***Udine*** / ***Savona*** / ***Siena, Grosseto*** / ***Pesaro Urbino*****,** ***Ancona*****,** ***Macerata*****,** ***Ascoli Piceno*** / Viterbo, Latina / ***Teramo*** / Caserta, Salerno / Foggia, Taranto,Brindisi, Lecce / Cosenza, Catanzaro, Reggio Calabria, Crotone, Vibo Valentia / Trapani, Messina, Siracusa	*Alessandria,* Cuneo / ***Lodi*** / ***Ferrara*** / ***Arezzo*** / ***Terni*** / L'Aquila / Campobasso, Isernia / Benevento, Avellino / ***Bari*** / Potenza, ***Matera*** / Agrigento, Caltanissetta, ***Enna, Ragusa*** / ***Sassari*****,*****Nuoro,Oristano***

We performed on human capital the same analysis as for natural and cultural capital. The cross-section analysis of the information provided in the components derived from the basic indicators allows us to rebuild the main aspects of the structural nature of human capital in terms of education and labour market. The matrix below (Table 3.6) shows evidence about the territorial capital phenomena analyzed in the 103 Italian provinces by relating the first component, measuring the vitality and dynamics of the labour market, with the second component, representing the quality of education and understanding.
This matrix shows that the provinces that have a more vibrant labour market are located in the North West and North-East of Italy, especially in Piedmont, Lombardy, Veneto, Friuli, Emilia Romagna and Marche. A good dynamic labour market is also observed in some provinces of Liguria and Tuscany. The provinces of the South and Islands are all includes in the category of weak labour markets, together with some Northern and central provinces on the Tyrrhenian (Western) side of the peninsula. This result is plausible in that the basic variables with a disproportionately large impact on the component (employment rate, unemployment rate, total activity rate, youth and female activity rate) represent a critical element to the labour market of Southern Italy.
The composite indicator defined "Top Education" is mainly characterized by two variables that concern university education (more weight in the component). From the analysis of the matrix it emerges that provinces rich with upper education are distributed throughout the national territory and cannot be grouped in specific geographical areas. Remarkably, this group hosts all those provinces which are the seats of historic universities (and of large cities). In this group there are some exceptions probably due to their proximity to major universities.
Thus, no clear connection shows up between vibrant labour market and excellence in education.

Table 3.6: Double-entry matrix: human capital and labour market

		Component 2: Top Education	
		High	Low
Component 1: Professions and Labour Market	High	Torino / Aosta / Varese, Milano, Pavia, Lodi / Trento / Verona, Venezia, Padova / Udine, Gorizia, Pordenone / Piacenza, Parma, Modena, Bologna, Ferrara, Rimini / Firenze, Siena, Prato / Pesaro Urbino, Ancona, Macerata	Vercelli, Novara, Cuneo, Asti, Alessandria, Biella, Verbano Cusio Ossola / Como, Sondrio, Bergamo, Brescia, Cremona, Mantova, Lecco / Bolzano / Vicenza, Belluno,Treviso, Rovigo / Reggio Emilia, Ravenna, Forlì Cesena / Lucca, Pistoia, Arezzo, Grosseto / Ascoli Piceno
	Low	Trieste / Genova, La Spezia / Pisa / Perugia, Terni / Roma / L'Aquila, Teramo, Pescara, Chieti / Campobasso, Isernia / Napoli, Salerno / Bari, Lecce / Cosenza, Catanzaro, Reggio Calabria,Vibo Valentia / Palermo, Messina, Catania / Cagliari, Sassari	Imperia, Savona / Massa Carrara, Livorno / Viterbo, Rieti, Latina, Frosinone / Caserta, Benevento, Avellino / Foggia, Taranto, Brindisi / Potenza, Matera / Crotone / Trapani, Agrigento, Caltanissetta, Enna, Ragusa, Siracusa / Nuoro, Oristano

3.2.4. Synthetic indicators and economic performance

After analyzing the relationships between the components derived from the factor analysis, we continue the analysis of territorial capital by relating the synthetic indicators with the economic position of provinces. For this analysis we constructed Table 3.7, a double-entry matrix that relates GDP per employed person in the provinces with the composite indicators related both to natural and cultural heritage and tourism and to education- and skill-based human capital and the labour market. We partition provinces into four classes according to productivity (GDP per employed person), based on their position with respect to the median: these are the column headings. We position territorial capital classes based on the synthetic indicators contained in the previous section (see table 3.5 and 3.6) on the rows. For each type of territorial capital we have four choices: high-high, high-low, low-high, low-low. Additionally, in the upper half of the matrix, we highlight (in bold) provinces showing high values of the third component.

The upper half of the matrix shows the relationship between productivity levels and natural and cultural capital endowment, both in itself and as put to income by the tourism industry. The clearest piece of evidence is the strong association between very high productivity and high Attraction, Employment but not necessarily Accommodation components (top left-hand cells). In fact, the Accommodation and Employment components look like partial substitutes in associating with above average productivity (top cells in the second column). Low Attraction seems to be incompatible with very high productivity, and only occasionally is very low productivity associated with high Attraction (there may be data problems, here). Overall, cells on the main diagonal are more populated than cells close to the top right-hand and bottom left-hand corners. This unexpected association has also a geographical dimension, in that Southern and Island provinces are heavily over-represented in bottom right-hand cells.

The lower half of the matrix shows the relationship between productivity level and human capital endowment, including its outcomes on the labour market. The association of the Profession component with productivity is even starker than the previous one, as expected, whereas the Top Education component does not seem to make a difference to the economy. This shows up in geography as well: provinces in the top left corner are located in Northern Italy and provinces in the bottom right corner are mostly of Central, Southern and Island Italy.

Table 3.7: Double-entry matrix: Gross Domestic Product per employed person and synthetic indicators

		Productivity (GDP/N)			
		Very High	High	Low	Very Low
Natural and Cultural Capital	HH	**Brescia / Bolzano / Verona**	**Novara / Como,** Lecco **/ Venezia / Gorizia, Trieste /** Forlì Cesena, Rimini / La Spezia / Livorno / **Frosinone**	**Ravenna / Lucca, Massa Carrara, Pistoia /** Napoli	**Imperia**
	HL	**Torino / Bergamo, Milano, Mantova / Vicenza / Pordenone/ Parma, Reggio Emilia, Modena, Bologna / Firenze / Roma / Chieti**	**Biella / Pavia, Varese, Cremona / Treviso, Padova / Genova / Piacenza / Pisa, Prato / Perugia**	**Vercelli** / **Perugia / Rieti / Pescara / Catania, Palermo /** Cagliari	**Asti**
	LH	**Aosta**	**Sondrio / Trento** / B**elluno, Rovigo / Imperia, Savona / Siena / Ancona** / Viterbo/ Siracusa	**Udine / Grosseto / Pesaro Urbino, Ascoli Piceno, Macerata /** Latina / Caserta / Foggia / Catanzaro, Crotone, Reggio Calabria / Trapani	**Teramo** / Salerno / Taranto, Lecce, Brindisi / Cosenza, Vibo Valentia
	LL		**Cuneo / Lodi / Ferrara / Terni**	**Alessandria** / **Arezzo** / **L'Aquila /** Campobasso / **Bari /** Potenza, **Matera /** Caltanissetta, Ragusa / **Oristano**	Isernia / Benevento, Avellino / Agrigento, **Enna** / **Nuoro**, Sassari
		GDP/N			
		Very High	High	Low	Very Low
Human Capital	HH	Torino / Aosta / Milano / Verona / Pordenone / Parma, Modena, Bologna / Firenze	Varese, Lodi, Pavia / Trento / Venezia, Padova/ Gorizia / Piacenza, Ferrara, Rimini / Prato, Siena / Ancona	Udine / Pesaro Urbino, Macerata	
	HL	Novara, Cuneo , Biella / Bergamo, Brescia, Como, Cremona, Lecco, Sondrio, Mantova /Bolzano / Belluno, Treviso, Vicenza, Rovigo / Reggio Emilia, Forlì Cesena	Novara, Cuneo , Biella / Bergamo, Brescia, Como, Cremona, Lecco, Sondrio, Mantova /Bolzano / Belluno, Treviso, Vicenza, Rovigo / Reggio Emilia, Forlì Cesena	Alessandria, Vercelli, Verbano Cusio Ossola / Ravenna / Arezzo, Lucca, Pistoia / Ascoli Piceno	Asti
	LH	Roma / Chieti	Trieste / Genova, La Spezia / Pisa / Terni	Perugia / L'Aquila, Pescara / Campobasso / Napoli / Bari / Catanzaro, Reggio Calabria / Messina, Palermo, Catania / Cagliari	Teramo / Isernia / Salerno / Lecce / Cosenza, Vibo Valentia / Sassari
	LL		Savona / Livorno / Viterbo, Frosinone / Siracusa	Massa Carrara, Grosseto / Rieti, Latina / Caserta / Foggia / Potenza, Matera / Crotone / Caltanissetta, Ragusa, Trapani / Oristano	Imperia / Benevento, Avellino / Taranto, Brindisi / Agrigento, Enna / Nuoro

4. Cluster Analysis

4.1.Methodology

We analyze Italy's territorial capital structure in order to produce a typology of provinces, which should play the role of stylized facts and therefore be more easily amenable to interpretation. At this stage we are not trying to explain causal relationships but to explore a complex reality, as a premise to formulating and testing theoretically-based hypotheses of causal relationships.

4.1.1. Introduction to the Method

We achieve this typology by means of Cluster Analysis, a data reduction technique originated in the natural sciences but widely employed in the social sciences as well since the mid-1960s (Blashfield Aldenderfer, 1978).

Its general logic, given n observations characterized by p variables, is to assign observations to g homogeneous groups ("clusters"), formed according to characteristics of the observed population, with g being less than n (by at least one order of magnitude, empirically). Traditionally, every variable is given equal weight and overall similarity of two observations is a function of the similarity of their variables. Clusters are composite observations, whose characteristic values are the centroids of the characteristic values of the observations assigned to them. The quality of the resulting partition is approximated by a comparison between variance measures of tightness or cohesion within clusters (to be minimized) and variance measures of separation or isolation between clusters (to be maximized).

The assignment of observations to clusters may be achieved by means of several variants of the technique (different algorithms being frequently related to the operational definition of "cluster"), which were mostly developed in the mid-1960s and originated its diffusion in the various social sciences (e.g. Andrews, 1971 in urban and regional economics), albeit not without misgivings (Bailey, 1983).

Scholars generally recognize critical issues in cluster analysis, but there is little consensus on how to deal with them, because of the involved tradeoffs: standardization solves the issue of wide range disparities but also cancels meaningful differences; using rotated principal components solves the issue of multi-collinearity but also loses unique information contained in excluded components; iterative clustering provides a clear number of clusters while preserving flexible assignment of observations so as to optimise cohesion and isolation but this number is arbitrarily predetermined; and so on (Ketchen & Shook, 1996).

Additionally, the number of possible partitions is enormous, so that most techniques perform a systematic but non-exhaustive search, aiming at a local optimum rather than at the global optimum.

Generally speaking, cluster analysis is not based upon a well-enunciated statistical theory (Blashfield Aldenderfer, 1978) and especially lacks a theory-driven interpretive approach. Unlike methods such as ANOVA or regressions, cluster analysis does not offer a test statistic regarding the support, or lack thereof, a result brings to a hypothesis.

4.1.2. Comparing Alternative Techniques

In order to determine the intrinsic structure of observations when no other information is available, by partitioning them into meaningful subgroups, either hierarchical or iterative strategies are followed.

However, the optimum number of clusters is not an automatic outcome of the technique. Rather, the researcher has to determine it either ex-post, by a semi-arbitrary cut-off rule in the tree resulting from hierarchical clustering methods, or ex-ante, by setting it before applying non-hierarchical (iterative) clustering methods.

Hierarchical cluster analysis builds a tree-like structure of nested partitions either bottom-up (agglomerative hierarchical cluster analysis), starting from individual cases and aggregating them, or top-down (divisive hierarchical cluster analysis), starting from the full sample and partitioning it (Ketchen &

Shook, 1996). Ward's and average linkage methods outperform all others, respectively in samples without and with outliers (Puny & Stewart, 1983). In either case, it is up to the researcher to decide which stage provides the optimal partition, hence the optimal number of clusters. This may be done by visual inspection of the tree structure or by use of quantitative indices (e.g. the Cubic Clustering Criterion) or of other constructs (e.g. Rousseeuw, 1987).

Iterative cluster analysis partitions the set into a pre-specified number of clusters by selecting each cluster's centroid, as defined by values of each one of the characteristic variables identified by k-means or hill-climbing algorithms and assigning observations to them. This composition of clusters changes the centroids, hence prompts the reassignment of observations until a stable partition is achieved. Thus, iterative analysis is more flexible and more optimal than hierarchical analysis (Ketchen & Shook, 1996), but at the price of an arbitrary initial choice of the number of clusters.

According to an extensive review (Puny Stewart, 1983), the best method is iterative (k-means) clustering with non-random initial centroids obtained e.g. by hierarchical (Ward) clustering.

A well-known, albeit formally unsubstantiated, rule of thumb predicts that clusters are ariunf one ninth of the original observations.

4.1.3. Operational Choices

We aim at identifying clusters of provinces with similar territorial capital endowment, separately for natural and cultural capital and for human capital. Types of provinces are composite territorial units, whose characteristic values are the centroids of the characteristic values of the provinces belonging to them.

In a positive logic, taxonomic analysis of provincial territorial capital aims at assessing which principles or models are best able to interpret it, e.g. highlighting the potential for scale economies, localization economies and urbanization economies exploiting those particular types of territorial capital (supply side). Information on the tourist industry and labour market structures allow highlighting where this potential is already exploited (Pompili, 2002).

In a normative logic, taxonomic analysis of provincial territorial capital allows identifying policy priorities by noting the gap between Italy's actual spatial configuration and theoretically optimal configurations, such as a disorderly form, ensuring maximum overall stability across business cycles, and an orderly form, bringing maximum growth via full exploitation of scale and external economies.

Since our analysis had an exploratory character, theory-based variable selection was not strictly required; nevertheless, we kept in mind both the theoretical and the empirical literature on territorial capital. Preliminary data analysis has shown that multi-collinearity is not an issue, except possibly for some of the labour market indicators.

We performed our analysis on variables related to the Italian average value, with the proviso of ad hoc alterations of a handful of outlier values (for a more sophisticated treatment see Pompili, 2002). We considered this an acceptable compromise between weeding out quirky outliers and preserving genuine differences in variability.

For both natural – cultural and human capital, we ran first a hierarchical cluster analysis, which allowed us to identify between 9 and 14 as the likely optimal number of clusters, finally opting for 13 as the likeliest number. Then we ran an iterative cluster analysis which provided us, in both cases, with 13 clusters out of 103 Italian provinces – a 1:8 data reduction ratio (for a more refined approach see Fraley, Raftery, 1998).

For both types of territorial capital, we then conducted two analyses on cluster analysis outcomes, the former about strengths and weaknesses in clusters, the latter on geographical traits.

4.2. Results

As shown in the methodological section, by the logic of clusters the territorial units (the 103 provinces) are pooled into higher-level composite units (the clusters). In this step, the 38 basic indicators are aggregated

into two groups, natural and cultural capital with the tourism industry (22 variables) and human capital with the labour market (16 variables), in order to produce separate cluster sets. The order in which clusters are presented in tables follow an approximate strong-to-weak order..

4.2.1. Clusters from natural and cultural territorial capital and tourist industry

The first set of basic indicators on the natural and cultural capital and the tourist industry consists of 22 indicators: 9 of cultural assets, 5 of natural heritage and 8 relating the tourist industry.

From this dataset, the cluster analysis extracted thirteen clusters of provinces, after nine iterations from 103 territorial units.

Technical-statistical features of clusters are fairly similar in terms of internal cohesion and of reciprocal isolation: the distance of any province from the centroid of its group lies in the 0.0-701.2 range, whereas the distance among centroids of different groups lies in the 315.7-2996.0 ranges (315.7-1296.2 when idiosyncratic clusters are excluded), in fact, excluding the closest two clusters, minimum distance is 640.4, thus implying that clusters are well differentiated and with clearly specific traits.

Table 4.1 reports the territorial capital characteristics of clusters, highlighting indicators with high or low values in the cluster, relative to other clusters.

From 22 variables and 13 clusters, we found 61 cases of strength (five per cluster) and 53 of weakness (four per cluster); even excluding the seven idiosyncratic clusters and the “average” cluster (# 6), there emerged 19 cases of strength (four per group) and 16 cases of weakness (three per group).

Table 4.1: Natural, Cultural, and Tourism Territorial Capital Characteristics of Clusters

Cluster	**High Nature and Culture**	**High Tourism**	**Low Nature and Culture**	**Low Tourism**
2	KC01 KC04 KC05 KC08 KC09	IT07	KA03	
8	KA01 KA04 KC01 KC04 KC05 KC06 KC08	IT04 IT07	KA05	IT01
3	KA02 KA04 KC05 KC06	IT02 IT05 IT07	KA01 KA03 KC07	IT01 IT03 IT08
11	KA02 KC02	IT01 IT02 IT04 IT05 IT08		
4	KA04 KC06 KC07	IT01 IT02 IT04 IT05 IT06 IT07 IT08	KA02 KA03 KC01 KC02 KC03 KC05 KC09	IT03
1	KA01 KA02 KA03 KC04	IT05 IT06 IT08	KA04 KC01 KC03 KC05	
9	KA03	IT01 IT03	KA04 KC03 KC05 KC06 KC08	
13	KC06 KC08	IT02 IT07	KA02 KA03 KA04 KC01 KC03 KC09	IT03 IT04
12	KC03 KC07		KA01 KC02	IT07
10	KA04		KA01 KA03 KC05	IT06 IT08
6				
5	KA04		KC04 KC07	IT01 IT02 IT04 IT05 IT06
7	KA01 KC01 KC02 KC03			IT02 IT03 IT04 IT05

Three clusters (8, 3, and especially 1) are particularly strong on natural capital, three clusters (2 and 8, especially, and 7) are particularly strong on cultural capital, four clusters (3, 11, 4, 1) are particularly strong in the tourist industry. Thus, no cluster is particularly strong on all points but three clusters (8, 3, 1) show strength on two of them; unfortunately, all three of them are idiosyncratic ones.
Conversely, four clusters (3, 4, 13, 10) are particularly weak on natural capital, four clusters (4, 1, 9, 13) are particularly weak on cultural capital, and three clusters (3, 5, 7) are particularly weak in the tourist industry. Thus, no cluster is particularly weak on all points but three clusters (3, 4, 13) show weakness on two of them. Again, all three of them are idiosyncratic ones
In terms of principal components, the first component is strong in four clusters (2, 8, 3, 13) and weak in one cluster (9); the second component was strong in three clusters (3, 11, 4) and weak in two clusters (5, 7); the third component was strong in two clusters (4, 1) and weak in three clusters (3, 10, 5).
Thus, no clear grouping of clusters is feasible as far as natural and cultural capital and the tourism industry are concerned. Additionally, most strong and weak clusters are idiosyncratic ones: therefore, all the more remarkable are strong clusters 2 and 11 and weak clusters 9 and 5. However, it is unusual for clusters to be coherently strong or weak across categories; at one extreme, we note the contradictory situation of cluster 3 (an idiosyncratic cluster containing the province of Naples) even within the same categories.
Frequency variability is high, ranging from seven clusters containing 1 province only (idiosyncratic provinces) to two clusters representing 37 provinces each, the remaining four clusters containing 4 to 7 provinces; thus idiosyncratic groups are decidedly not few.

Table 4.2: Geographical Traits of NCT-TC-based Clusters

Cluster	**Relief**	**Density**	**Region**	**Productivity**
2	Plain	High	North-East – Centre	High
8	Coast	High	North-East	High
3	Coast	High	South	
11	Plain - Coast		North-West – North-East – Centre	
4	Coast	High	North-East	
1	Mountain	Low	North-East	High
9	Mountain	Low	North-West	
13	Plain	High	North-West	High
12		Low	Centre	
10	Coast		Centre	
6		Medium – High	North-West – North-East – Centre	High – Medium
5			South - Islands	Low
7			Centre	

Table 4.2 reports the composition of clusters in terms of other prevailing geographical traits, these being relief morphology, settlement density, macro-regional location, productivity.
The cluster with characteristics generally not too far from the national average (#6) is in fact dominated by medium-to-high density provinces in Northern and Central Italy.
Four clusters (8, 3, 4, 10) include prevailingly coastal provinces, as a fifth one (11) partially does, too; two clusters (1, 9) include prevailingly mountainous provinces: we expect these provinces to show a higher than average endowment of natural capital. Two clusters (2, 13) include flatlands provinces, where we expect a higher than average endowment of cultural capital.
Five clusters (2, 8, 3, 4, 13) mostly include high density provinces, where we expect cultural capital to be more prominent. On the contrary, three clusters (1, 9, 12) mostly include low density provinces, where we expect natural capital to be more prominent.
Southern and Island provinces characterise only two clusters (3, 5), one of which idiosyncratic. All seven clusters focused on another macro-region (13; 8, 4, 1; 12, 10, 7) are idiosyncratic ones, but for one (12). The remaining four clusters (2, 11, 9, 6) span the whole of Northern and Central Italy. Thus, even when considering natural and cultural capital and the tourist industry, the South both stands apart from the rest of the country and is internally more homogeneous than the rest of Italy.
High productivity provinces tend to characterise four clusters (2, 8, 1, 13), where we expect the tourist industry, among others, to be well developed. On the contrary, low productivity provinces are concentrated in one cluster (5).
Table A.2 in the Appendix reports the composition of clusters in terms of provinces.

4.2.2. Clusters from human territorial capital and labour market

In summary, our cluster analysis reduced the number of territorial units from 103 to 13 after six iterations, based on the 16 indicators: 4 on human capital from schooling, 6 on human capital from skills, and 6 on the labour market.
Technical-statistical features of clusters are fairly similar in terms of internal cohesion and of reciprocal isolation: the distance of any province from the centroid of its group lies in the 0.0-171.5 range, whereas the distance among centroids of different groups lies in the 106.7-606.0 ranges (106.7-330.3 when idiosyncratic clusters are excluded), thus implying that clusters are fairly well differentiated and with specific traits.
Table 4.3 reports the territorial capital characteristics of clusters, highlighting indicators with high or low values in the cluster, relative to other clusters.
From 16 variables and 13 clusters, we found 37 cases of strength (three per cluster) and 30 of weakness (two per cluster); even excluding the four idiosyncratic clusters and the “average” cluster (#10), there emerged 19 cases of strength (two per group) and 24 cases of weakness (two per group).
The clearest outcome is a strong dichotomy between six clusters (6, 8, 1, 5, 13, 11) with strengths only, concentrating three quarters of all strong points and 38 provinces, and four clusters (2, 7, but also 3, 4) with weaknesses only, concentrating three quarters of all weak points and 43 provinces. The remaining groups, two of which are idiosyncratic ones, show a balanced scorecard.
One cluster (6) is particularly strong on education, two clusters (6 and 12) are particularly strong on skills, two clusters (6 and 8) are particularly strong in the labour market. Thus, one cluster (#6) is particularly strong on all points but it is an idiosyncratic one (Bologna).
Conversely, three clusters (9, 4, 3) are particularly weak on education, two clusters (2 and 7) are particularly weak on skills, and the same two clusters (2, 7) are particularly weak in the labour market.

In terms of principal components, the first component is strong in two clusters (6, 8) and weak in two clusters (2, 7); the second component was strong in four clusters (6, 5, 13, 12) and weak in three clusters (9, 4, 3).
However, apart from five clusters (6, 8, 1, 2, 7) having coherent strength / weaknesses across human capital and labour market, in the remaining groups strength or weaknesses in human capital do not carry over in the labour market and vice versa, which seems to imply that other structural elements compensate for human capital.

Table 4.3: Human and Labour Territorial Capital Characteristics of Clusters

Cluster	**High Human**	**High Labour**	**Low Human**	**Low Labour**
6	KU01 KU02 KU05 KU06 KU07 KU09	KL01 KL03 KL04		*KL02*
8	KU05 KU09 KU10	KL01 KL04 KL05		*KL02*
1	KU01 KU08	KL01 KL04		
5	KU02 KU06 KU10			
13	KU01 KU06 KU07			
11	KU02 KU10			
12	KU02 KU05 KU06 KU07		KU08 KU09 KU10	
10				KL06
9	KU10	KL06	KU01 KU02	
4	KU08		KU01 KU02	
3	KU03		KU01 KU02 KU10	
2		*KL02*	KU05 KU07 KU08 KU09	KL01 KL03 KL04 KL05
7		*KL02*	KU05 KU06 KU07 KU08 KU10	KL01 KL03 KL04 KL05

Frequency variability is relatively high, ranging from four clusters containing 1 province only (idiosyncratic provinces) to two clusters representing 21-22 provinces. Two more clusters contain 13 provinces each, whereas the remaining five clusters contain 4 to 9 provinces.
Table 4.4 reports the composition of clusters in terms of other prevailing geographical traits (relief morphology, settlement density, macro-regional location, productivity).
The cluster with characteristics generally not too far from the national average (#10) is in fact dominated by provinces of Northern and Central Italy, with no other strong geographical feature.
Four clusters (5, 12, 3) mostly include coastal provinces, which share prominence with mountain provinces in two more clusters (1, 4) – mountainous provinces also feature in another cluster (7). One cluster (8) is dominated by flatlands provinces, which are also strongly present in another one (11).

Three clusters (8, 13, 12) largely include high density provinces, where we would expect a higher than average human capital endowment. On the contrary, two clusters (4, 7) largely include low density provinces.
Southern and Island provinces characterise two clusters (2, 7), again highlighting the well-known separation between the two main parts of Italy as far as labour market performance is concerned (supported by professional skills, though, but not by education). Seven clusters (4; 6, 12; 5, 11, 9, 3) focus on another macro-region, just four of which being idiosyncratic ones. The remaining four clusters either extend over two macro-regions (1, 13) or span the whole of Northern and Central Italy (8, 10). Thus, we can observe, in the case of human capital, other place-specific configurations, beside the usual North – South dichotomy.
High productivity provinces tend to characterise three clusters (6, 13, 12), and possibly two more (4, 3), where we expect the labour market to perform well. On the contrary, low productivity provinces are concentrated in one cluster (7), where we would expect the weakest human capital and labour market.

Table 4.4: Geographical Traits of HL-TC-based Clusters

Cluster	**Relief**	**Density**	**Region**	**Productivity**
6			North-East	High
8	Plain	High	North-West – North-East – Centre	
1	Mountain – Coast	Low – High	North-West – North-East	
5	Coast		Centre	
13		High	North-West – Centre	High
12	Coast	High	North-East	High
11	(plain)		Centre	
10			North-West – North-East – Centre	
9			Centre	
4	Mountain - Coast	Low	North-West	(high)
3	Coast		Centre	(high)
2			South – Islands	
7	(mountain)	Low	South – Islands	Low

Table A.3 in the Appendix reports the composition of clusters in terms of provinces.

4.2.3. Double-entry matrix

The cross-section analysis of the information contained in the clusters allows us to rebuild the main aspects of the geographical nature of the two types of territorial capital that we discussed in this paper. By combining the partitioning obtained from natural and cultural capital with the partitioning derived from human capital in Tables 4.5 and 4.6 we are able to show a pattern of structural relationships.

Table 4.5: Double-entry matrix: natural and cultural capital and human capital (general)

		Human-capital-based Clusters								
		1	13	11	4	3	8	10	2	7
Natural-cultural-capital-based Clusters	2		Roma.	Padova, Firenze.				Gorizia.		
	11	Venezia.			Imperia, Savona		Lucca, Pistoia.	Ravenna.		
	9	Aosta, Trento, Belluno.		Siena, Pesaro Urbino.	Sondrio.			Verbano Cusio Ossola.		
	12	Forlì Cesena.		Macerata.		Grosseto.				Matera, Oristano.
	6		Torino, Genova, Ferrara.	Pavia, Parma, Perugia, Teramo		Massa Carrara.	* * *	* * *	Sassari.	
	5		L'Aquila, Pescara.			La Spezia.		Piacenza, Terni, Frosinone, Chieti.	* * *	* * *

Table 4.6: Double-entry matrix: natural and cultural capital and human capital (focus)

		Human-capital-based Clusters	
		8	10
Natural-cultural-capital - based Clusters	6	Como, Lecco, Mantova, Verona, Vicenza, Treviso, Rovigo, Reggio Emilia, Modena, Prato, Arezzo.	Biella, Vercelli, Novara, Cuneo, Asti, Alessandria, Varese, Bergamo, Brescia, Lodi, Cremona, Pordenone, Udine, Ancona.
	5	Campobasso, Salerno, Bari, Lecce, Cosenza, Catanzaro, Palermo, Messina, Catania, Cagliari.	Rieti, Latina, Isernia, Caserta, Benevento, Avellino, Foggia, Taranto, Brindisi, Potenza, Crotone, Vibo Valentia, Reggio Calabria, Trapani, Agrigento, Caltanissetta, Enna, Ragusa, Siracusa, Nuoro.
		2	7

The four largest groupings in Table 4.5 are expanded in Table 4.6 and contain 55 provinces belonging simultaneously to:

- Cluster 6 for natural and cultural capital (and the tourism industry) and cluster 8 for human capital (and the labour market): 11 North-western, North-Eastern and Central provinces with average endowments of natural and cultural capital and fairly developed tourist industry, but also rich professional skills and strong labour market.
- Cluster 6 for natural and cultural capital (and the tourism industry) and cluster 10 for human capital (and the labour market): 14 North-western, North-Eastern and Central provinces with average endowments of natural and cultural capital, fairly developed tourist industry, average professional skills and reasonably successful labour market.
- Cluster 5 for natural and cultural capital (and the tourism industry) and cluster 2 for human capital (and the labour market): 10 Southern and Island provinces with university towns but poor cultural capital, an underdeveloped tourist industry poor skills, and a weak labour market.
- Cluster 5 for natural and cultural capital (and the tourism industry) and cluster 7 for human capital (and the labour market): 20 Southern and Island provinces without university towns and with poor

cultural capital, an underdeveloped tourist industry poor skills, and a weak labour market – these are the weakest Italian provinces.

Another 38 provinces belong to 22 different combinations shown in Table 4.5, the most populated being:

- Cluster 9 for natural and cultural capital (and the tourism industry) and cluster 1 for human capital (and the labour market): 3 mountain provinces with weak cultural capital but fairly strong tourism, some education and a good labour market.
- Cluster 6 for natural and cultural capital (and the tourism industry) and cluster 13 for human capital (and the labour market): 3 metropolitan provinces with average endowments of natural and cultural capital, fairly developed tourist industry, fairly good education and skills but only a reasonably successful labour market.
- Cluster 6 for natural and cultural capital (and the tourism industry) and cluster 11 for human capital (and the labour market): 4 provinces with average endowments of natural and cultural capital, fairly developed tourist industry, fairly good education and skills but only a reasonably successful labour market.
- Cluster 5 for natural and cultural capital (and the tourism industry) and cluster 10 for human capital (and the labour market): 4 provinces with poor cultural capital, an underdeveloped tourist industry but no particular weakness on education and skills and a reasonably successful labour market.

Only 7 of these 38 provinces belong to the South and islands, 4 of which are the four component provinces of Abruzzi, a region traditionally classified in the South but increasingly indicating its re-positioning within Central Italy.

Finally, 10 provinces, not shown in the tables, belong to an idiosyncratic cluster either for natural and cultural capital (Napoli, Rimini, Bolzano, Milano, Livorno, Viterbo) or for human capital (Bologna, Pisa, Ascoli Piceno) or for both (Trieste). Only Naples is in the South.

5. Conclusions

Whereas the relationship between human capital and economic growth is theoretically well established, this is not so for other forms of territorial capital; moreover, the debate on measures of human capital is not settled. In this paper we complemented conventional education-based measures of human capital with skills-based measures, we introduced measures of natural and cultural capital, and we tackled the issue of capacity utilisation by inserting the tourism industry and the labour market in the analysis.

In the empirical part of this paper we explored the endowments of our chosen types of territorial capital, the better known behaviour of human capital also acting as a benchmark for natural and cultural capital:

- Educational attainment confirmed its ambiguous role, showing up as separate from labour market behaviour; on the contrary, professional skills showed a strong association with labour market performance.
- Human capital in Italy confirmed the well-known North-South dichotomy, and in addition the South and Islands proved much more internally homogeneous than the North and Centre.
- Cultural capital showed up as an important feature, with significant associations with tourist entrepreneurship or tourist employment or both; the role of natural capital was more muted.
- Natural and cultural capital and the tourist industry proved to be useful in characterising Italy's territorial patterns, unexpectedly confirming the North – South dichotomy.
- Associations with productivity per employed pointed to a significant role for territorial capital.

We are now more confident in proceeding to the next step: explaining long- and short-run local performance with territorial capital, including natural and cultural capital.

Appendix A

Table A.1: Indicators of Cultural, Natural, Tourist, Human, and Labour Territorial Capital.

Code	Formula
KA01	Ratio of surface of an SPA (sq km) and land area (sq km) per 100
KA02	Ratio of surface of the SIC (sq km) and land area (sq km) per 100
KA03	Ratio of surface mountains (sq km) and land area (sq km) per 100
KA04	Ratio of coastline length (km) and land area (sq km) per 100
KA05	Ratio of AA (sq km) and land area (sq km) per 100
KC01	Museums per 1,000,000 inhabitants
KC02	Monuments per 1,000,000 inhabitants
KC03	Archaeological areas per 1,000,000 inhabitants
KC04	Theatrical and Musical Performances per 1,000,000 inhabitants
KC05	Public Libraries per 10,000 sq km
KC06	Local units of showing, entertainment and fun (Ateco 92.3) per 10,000 sq km
KC07	Workers in local units of showing, entertainment and fun (Ateco 92.3) per 1,000,000 inhabitants
KC08	Local units of libraries, archives, museums and other cultural activities (Ateco 92.5 *) per 10, 000 sq km (land area)
KC09	Workers in local units of libraries, archives, museums and other cultural activities (Ateco * 92.5) per 1,000,000 inhabitants
IT01	Hotel s per 1,000,000 resident population
IT02	Beds in hotels per 100 sq km
IT03	Complementary accommodation businesses per 1,000,000 inhabitants
IT04	Beds in complementary accommodation exercises per 100 sq.km
IT05	Local units of hotel accommodation (Ateco H: 55.1/Hotel) per 10,000 sq km
IT06	Workers in local units of hotel accommodation (Ateco H: 55.1/Hotel) per 1,000,000 inhabitants
IT07	Local units of restaurant and catering (Ateco H: 55.3/Restaurant) per 10,000 sq km
IT08	Workers in local units of restaurants and catering (Ateco H: 55.3/Restaurant) per 1,000,000 inhabitants
KU01	Turnover rate in degree courses = graduate students per 100 students enrolled in degree courses
KU02	Students enrolled in degree courses per 100 population aged 19-24
KU03	Students enrolled in the 1st year of secondary school age per 100 population aged 15-19
KU04	Students enrolled in 5th year of upper secondary schools per 100 students enrolled in the 1st year of upper secondary schools
KU05	Legislators, entrepreneurs, managers per 1,000 resident population
KU06	Intellectual, scientific and highly specialized professionals per 1,000 resident population
KU07	Technical professionals per 1,000 resident population
KU08	Tourism, hotel and catering professionals per 1,000 resident population
KU09	Artisans and metal workers, precision mechanics, crafts art, printing and assimilated per 1,000 resident population
KU10	Artisans and workers in food processing, wood, textile, 'clothing, leather, leather and related workers per 1,000 resident population
KL01	Employment rate from 15 to 64 years (%)
KL02	Unemployment rate (%)
KL03	Activity rate from 15 to 64 years
KL04	Female activity rate
KL05	Youth activity rate (15-24 years)
KL06	Activity rate over 55 years

Table A.2: Clusters of Italian provinces by natural, cultural and tourism territorial capital.

Cluster	Frequency	Provinces (east-to-west, north-to-south within regions)
2	**4**	Padova, Gorizia, Firenze, Roma.
8	**1**	Trieste.
3	**1**	Napoli.
11	**6**	Venezia, Imperia, Savona, Ravenna, Lucca, Pistoia.
4	**1**	Rimini.
1	**1**	Bolzano.
9	**7**	Aosta, Verbano Cusio Ossola, Sondrio, Trento, Belluno, Siena, Pesaro Urbino.
13	**1**	Milano.
12	**5**	Forlì Cesena, Grosseto, Macerata, Matera, Oristano.
10	**1**	Livorno.
6	**37**	Torino, Biella, Vercelli, Novara, Cuneo, Asti, Alessandria, Varese, Como, Lecco, Bergamo, Brescia, Pavia, Lodi, Cremona, Mantova, Verona, Vicenza, Treviso, Rovigo, Pordenone, Udine, Genova, Parma, Reggio Emilia, Modena, Bologna, Ferrara, Massa Carrara, Prato, Pisa, Arezzo, Perugia, Ancona, Ascoli Piceno, Teramo, Sassari.
5	**37**	Spezia, Piacenza, Terni, Rieti, Latina, Frosinone, L'Aquila, Pescara, Chieti, Campobasso, Isernia, Caserta, Benevento, Avellino, Salerno, Foggia, Bari, Taranto, Brindisi, Lecce, Potenza, Cosenza, Catanzaro, Crotone, Vibo Valentia, Reggio Calabria, Trapani, Palermo, Messina, Agrigento, Caltanissetta, Enna, Catania, Ragusa, Siracusa, Nuoro, Cagliari.
7	**1**	Viterbo.

Table A.3: Clusters of Italian provinces by human and labour territorial capital.

Cluster	Frequency	Provinces (east-to-west, north-to-south within regions)
6	**1**	Bologna.
8	**13**	Como, Lecco, Mantova, Verona, Vicenza, Treviso, Rovigo, Reggio Emilia, Modena, Lucca, Pistoia, Prato, Arezzo.
1	**6**	Aosta, Trento, Belluno, Venezia, Forlì Cesena, Rimini.
5	**1**	Pisa.
13	**7**	Torino, Milano, Genova, Ferrara, Roma, L'Aquila, Pescara.
12	**1**	Trieste.
11	**9**	Pavia, Padova, Parma, Firenze, Siena, Perugia, Pesaro Urbino, Macerata, Teramo.
10	**21**	Biella, Vercelli, Verbano Cusio Ossola, Novara, Cuneo, Asti, Alessandria, Varese, Bergamo, Brescia, Lodi, Cremona, Pordenone, Udine, Gorizia, Piacenza, Ravenna, Terni, Ancona, Frosinone, Chieti.
9	**1**	Ascoli Piceno.
4	**4**	Sondrio, Bolzano, Imperia, Savona.
3	**4**	La Spezia, Massa Carrara, Livorno, Grosseto.
2	**13**	Viterbo, Campobasso, Napoli, Salerno, Bari, Lecce, Cosenza, Catanzaro, Palermo, Messina, Catania, Sassari, Cagliari.
7	**22**	Rieti, Latina, Isernia, Caserta, Benevento, Avellino, Foggia, Taranto, Brindisi, Potenza, Matera, Crotone, Vibo Valentia, Reggio Calabria, Trapani, Agrigento, Caltanissetta, Enna, Ragusa, Siracusa, Nuoro, Oristano.

References

Aghion, P., & Howitt. (1996). *Endogenous growth Theory.* Mc Graw Hill.

Andrews H.F. (1971). A cluster analysis of British towns. *Urban Studies*, 8, 271-284.

Antonelli, G., Leoncini, R., & Nosvelli, M. (1998). Sistema formativo e crescita economica: un'analisi empirica del sistema italiano. *Economia & Lavoro* (2), 9-54.

Bailey, K.D. (1983). Sociological classification and cluster analysis. *Quality & Quantity* 17(4), 251-268.

Bariletti, A., & Causi, M. (1998). Cultural heritage, resources and employment: an Italian perspective. *International Conference on Cultural Economics - 14-17 June 1998.* Barcelona.

Barros, C. P., & Santos, C. M. (2007). The economic return on education for hotel managers. *International Journal of Tourism Research* (9), 103-113.

Bateman, I. J., Lovett, A. A., & Brainard, J. S. (2003). *Applied environmental economics: a GIS approach to cost-benefit analysis.* Cambridge: Cambridge U.P.

Becattini, G. (1979). Dal settore industriale al distretto industriale. Alcune considerazioni sul'unità di indagine dell'economia industriale. *Rivista di Economia Politica e Industriale* .

Bentley, R. (1996). Information technology and tourism: an update. *Tourism Management* (17), 141-144.

Birtwistle, R. (1996). Scottish tourism: an enterprising approach. *Tourism Management* (17), 141-144.

Blashfield, R.K., & Aldenderfer, M.S. (1978). The literature on cluster analysis. *Multivariate Behavioural Research* 13(3), 271-295.

Brent, R. (1996). *Applied cost benefit analysis.* Cheltenham: Elgar.

Buhalis, D. (1998). Strategic use of information technologies in the tourism industry. *Tourism Management* (19), 409-421.

Camagni, R. (1995). Global network and local milieu: towards a theory of economic space. In S. Conti, E. Malecki, & P. Oinas, *The industrial enterprise and its environment: spatial perspectives .* Avebury, Aldershot.

Card, D., & Lemieux, T. (2001). Can falling skill supply explain the rising returns to college for young men. *Quarterly Journal of Economics , 116* (2), 705-746.

Causi, M. (1998). *Riforma della Pubblica amministrazione e modelli di interventi sui beni culturali.* Roma: ISEA documento di lavoro n.3/99.

Causi, M. (1998). *Riforma della Pubblica amministrazione e modelli di intervento sui beni culturali.* Roma: ISEA documento di lavoro n.3/99.

Checchi, D. (2003). In http://www.fondazionedivittorio.it/up/forumdocs/danielechecchi.pdf

Checchi, D. (2004). Does educational achievement help to explain income inequality? In A. Cornia, *Inequality Growth and Poverty in an Era of Liberalisation and Globalisation.* Oxford University Press.

Christaller, W. (1963). Some considerations on tourism location in Europe: the peripheral regions - undeveloped countries -recreation areas. *Regional Science Association Papers* (12).

Colecchia, A., & Papaconstantinou, G. (1996). The evolution of skills in OECD countries and the role of technology. (WP 1996/08).

Confindustria. (2007). *L'industria turistica in Italia.* Centro studi. Note Economiche n.3.

Costa, P. (1985). *il turismo nell'economia italiana.* Cesdit.

Dallari, F. (2004). Sviluppo e ricomposizione territoriale: sistemi locali e turismo. In A. Savelli (A cura di), *Turismo, territorio, identità. Ricerche ed esperienze nell'area mediterranea.* Franco Angeli.

Eurofutures. (2007). *Preparatory study of spatially relevant aspects of tourism.* Stockholm: European Commission.

European Commission. (2003). *Structure, performance and competitiveness at European tourism and its enterprises.* Luxembourg.

Eurostat. (2006, 2008). *Panorama of Tourism.* Luxembourg: Eurostat.

European Commission. (2005). *Third report on economic and social cohesion: a new partnership for cohesion - convergence, competitiveness and cooperation.* Brussels: European Commission.

Faggio, G., Salvanes, K., & Van Reenen, J. (2007). The evolution of inequality in productivity and wages: panel data evidence. *NBER Working Paper* (13351).

Falzoni, A. M., & Grasseni, M. (2007). Home country effects of investing abroad: evidence from Italy. In Piscitello, & Santangelo, *Do Multinationals Feed Local development and Growth?* (Vol. 22). International Business and Management, Elsevier.

Fraley, C., & Raftery, A.E. (1998). How many clusters? Answers via model-based cluster analysis. *Computer Journal* 41 (8), 578-588.

Frinking, E., Ligtvoet, A., Lundin, P., & Oortwijn, W. (2005). *The supply and demand of skills in Europe.* European Commission.

Grolleau, H. (1993). Tourisme en espace rural. *Leader Magazine* (4).

Hanushek, E. A., Rivkin, S. G., & Taylor, L. L. (1997). Aggregation and the estimated effects of school resources. *The Review of economics and Statistics , 78* (4), 611-627.

Heckman, J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *NBER* (WP n. 12006).

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *American Economic Review* (94), 300-316.

Hoxby, C. M. (2000). The effects of class size on student achievement: New evidence from population variation. *The Quarterly Journal of Economics , 115* (4), 1239-1285.

Jehiel, P. (1991). Polycentric spatial development, externalities and cost-benefit analysis. *Annals of Regional Science* (25), 193-208.

Ketchen, D.J., & Shook, C.L. (1996). The application of cluster analysis in strategic management research: An analysis and critique. *Strategic Management Journal* 17, 441-458.

Le, t., Gibson, J., & Oxley, L. (2005). Measures of human capital: a review of the literature. *New Zeeland Treasury* (WP 05/10).

Lee, C. K., & Kang, S. (1998). Measuring earnings inequality and median earnings in the tourism industry. *Tourism Management* (19), 341-348.

Leiper, N. (1979). The framework of tourism: towards a definition of tourism, tourist, and the tourist industry. *Annals of Tourism Research , 6* (4), 390-407.

LEITCH. (2006). *Prosperity for all in the global economy - World class skills.* In http://hmtreasury.gov.uk

LSC. (2005). *National employers skills survey 2004: Main Report.* In http://readinggroom.lsc.gov.uk

Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics , 22*, 3-42.

Marcellino, M (2006). Leading indicators: What have we learned? In: *Handbook of Economic Forecasting*, Vol. 1, 879-960.

Newbery, D. (1998). Spatial general equilibrium and cost-benefit analysis. *Indian Journal of Applied economics* (7), 1-18.

Nordregio. (2005). *Potentials for polycentric development in Europe.* ESPON Project 1.1.1, Stockholm.

OECD. (1998). *Human Capital Investment: an International Comparison.* Paris: Centre for Educational Research and Innovation - OECD.

OECD. (2005). *Learning a living. First results of the adult and life skills survey.* Paris: OECD.

OECD. (2001). *The Well-being of Nations: The Role of Human and Social Capital.* Paris: OECD.

Osservatorio Europeo Leader. (1999). *La competitività territoriale - l'approccio territoriale in materia di sviluppo rurale.* RURALEurope.

Pompili, T. (2002), L'economia del sistema urbano policentrico Lombardo. *Scienze Regionali* (3), 73-109..

Punj, G., & Stewart, D.W. (1983). Cluster analysis in marketing research: review and suggestions for application. *Journal of Marketing Research* 20(2), 134-148.

Requena, J. C., & Aviles, P. R. (1993). Turismo rurale: un'opportunità per le zone rurali svantaggiate? *Leader Magazine* (4).

Rousseeuw, P.J. (1987). Silhouettes: a graphical aid to the interpretation and validation of cluster analysis. *Journal of Computational and Applied Mathematics* 20, 53-65.

Royal Haskoning. (2006). *Territorial trends of the management of the natural heritage.* Utrecht: ESPON Project 1.3.2.

Skaple, O. (2007). The CEO gender gap in the tourism industry-evidence from Norway. *Tourism Management* (28), 845-853.

Stock, J. H. and M. W. Watson (2006), Forecasting with many predictors. In: *Handbook of Economic Forecasting*, Vol. 1, 515-554

Stroombergen, A., Rose, D., & Nana, G. (2002). Review of the statistical measurement of human capital. *Statistic New Zeeland* .

UNDP. (1990). *Rapporto sullo sviluppo umano n. 1: misurare lo sviluppo umano.* Rosemberg & Sellier.

Unioncamere Lombardia. (2010). *Sistema di monitoraggio del turismo e delle filiere turistiche in Lombardia, Progetto FIT.* Milano: Regione Lombardia.

Woessmann, L. (2003). Specifying human capital. *Journal of Economic Survey* (17), 239-270.

World Tourism Organisation. (2006, 2009). *Tourism Highlights.*