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Potential growth of productive areas ecologically equipped (APEA) adherens of the FICEI

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**POTENTIAL GROWTH OF PRODUCTIVE AREAS ECOLOGICALLY
EQUIPPED (APEA) ADHERENTS OF THE FICEI**

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ABSTRACT

The working group, in enhancing the scientific publications made in previous years on the quantification and measurement of indicators of "attraction" of a territory, sought to identify a sustainable development model by checking the effect that the recent introduction APEA (Industrial Areas Ecologically equipped) has as a tool enabling the "site location", in order to verify the effect that the reduction of the time of release of the necessary authorizations to the settlements has the potential for growth of one or more "cluster competitor" adhering to FICEI (Italian Federation Industrial Consortia). The FICEI is a federated admitted to the program of support for technology transfer RIDITT, funded by the Ministry of Economic Development and the study has led to the development of decision support tools to hack so rewarding on the ability of "strategic positioning" of industrial clusters in regime of mutual competition or in competition. In particular, the simulation of the growth of the industrial areas under the competition APEA inter and intra cluster was made possible through the development of database aggregates to which it was decided to associate logistics functions who viewed "real time" the growth potential under the renewed action of technology transfer provided by the ministerial program. In particular, the research team has identified in the province of Rieti an industrial cluster candidate in the Lazio Region for experimentation APEA. Industrial cluster of Rieti is actually under actions of certification ISO 14001 by the local municipality of Cittaducale and has approved a LIFE project by the European Commission on issues of environmental management in industrial areas (project SIAM).

1. INTRODUCTION

Environmental certification is a tool developed in the international community and, for the sustainable management of production, products and services. The ISO 14001 certification was issued by the International Standard Organization (ISO) in November 1996; EMAS is an EU regulation that has had two phases regulations: the first (EMAS I) relating to the EC Regulation. 1836 of 1993, the second (EMAS II) for a new EC Regulation. 761 of 2001. The definition of sustainable development as "*development that is able to meet the needs of the present without compromising the ability of future generations to meet their own*" (Brundtland, 1987) involves the concept that economic growth is not a mere quantitative growth of goods and services. It can be considered as regardless of the consumption of natural resources, their renewability, and the environmental impacts of human activities and its ability of ecosystems to absorb these impacts.

Sustainable Development is therefore a unified, integrated, a new quality ecological, social and economic. It is widely shared the need for new forms of sustainability-oriented projects: designing the utmost respect for ecological balances, change patterns of production and consumption by promoting eco-efficiency, promote the elements which help to achieve social equity. The objectives and actions of the strategy for environmental improvement geared to sustainable development, initially focused on the certification of manufacturing companies; then there was, with the EMAS II, the extension of the certification to the field of services, including those provided by the Public Administration. Among the institutional instruments identified to achieve those quality objectives are so, finally, the voluntary and informed public bodies in the system of environmental certification.

In Italy certification has started to affect the system of regional and local authorities, who have begun to develop studies and to prepare strategies for the implementation of quality objectives in relation to their specific ecological, economic and social. The Ecologically Equipped Productive Areas (APEA) are an example of how an industrial cluster can manage production processes in respect of the management and monitoring of key environmental indicators, it made sustainable through processes Agenda 21 agreed with public and private stakeholders practicing virtuous path of environmental sustainability.

Figure 1 - Percentage of EMAS registered organizations in Italy.

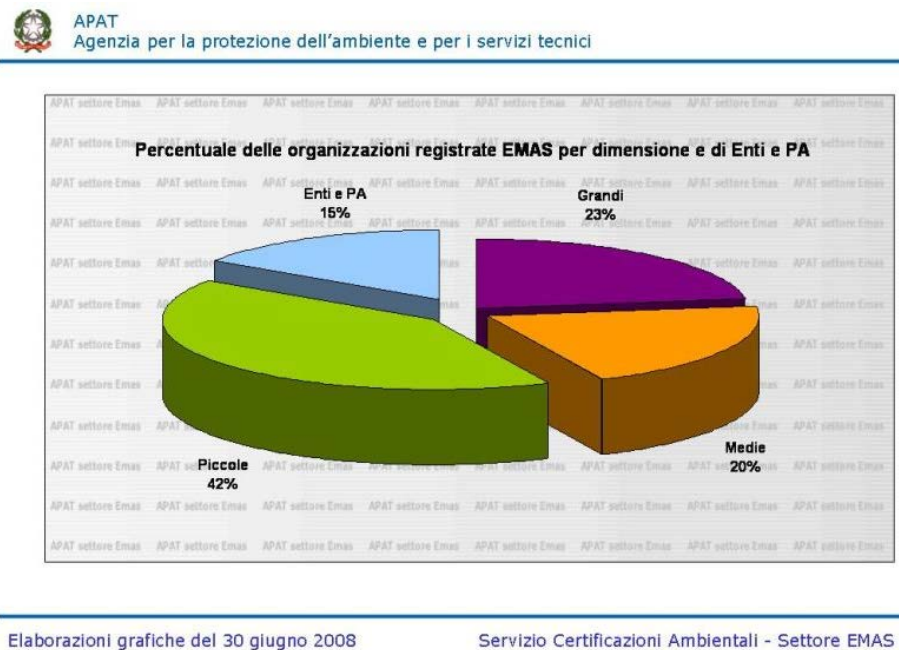
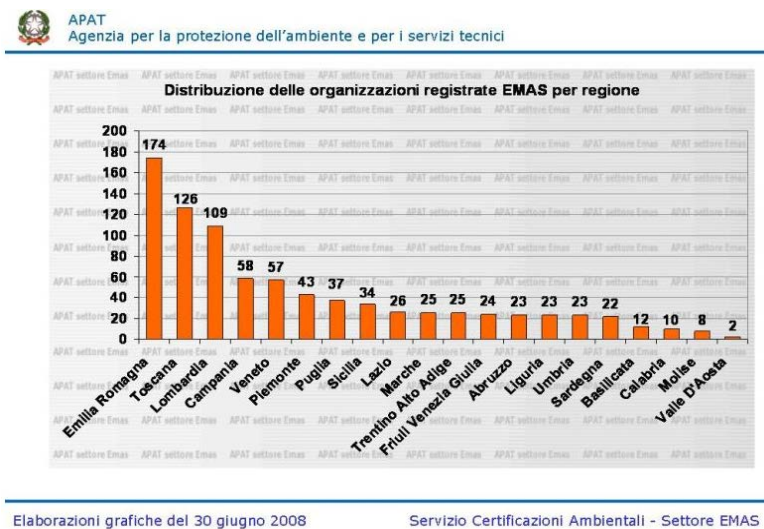


Figure 2 - Distribution of organizations by region



The path for the certification of an environmental management system for complex organizations such as local authorities and public authorities is, in view of the Lazio region, an even innovative. Public organizations historically have not followed a logic of corporate type, with goals and objectives purely economic management, but are, in institutional form, the complex social and production system rooted in an area and have the role of building a model development-oriented

balance between economic growth and environmental quality and life. The difficulties encountered in the course of the certification of a local authority and that differentiate it from that of a corporate structure, are due to three main reasons:

- The inability to uniquely identify a property or a single manager for the presence in decision-making of a variety of institutional, intermediate entities (eg municipal), from individuals and associations of citizens who interact with each other;
- The limited period of the mandate of the government and the delicate institutional arrangements that make it difficult the setting of policies and management whose effects are perceptible in the medium to long term, ie after the expiry of the mandate the same time;
- The complex relationship that exists between the government decisions and the effects of these on the socio-economic system involved, and vice versa.

The area APEA of Rieti-Cittaducale, for the realization of simulation model concerning the impact inside cluster, has formed a diverse team of people from the world of research, training and consulting, with the objective of structuring an application capable of guiding the choices of strategic positioning by simulating the growth potential compared to "cluster competitor" with a method quite similar to that offered by way of liberalization, the same research group in session AISRE 2012/2013/2014 and characterized by the introduction of functions parametric saturation of the population of businesses and the introduction of parameters of "predation" capable of simulating the competitive effect in the pilot area object of study against one or more clusters Italian. The working method used was, therefore, the following: (I) mapping of the distinctive features of the cluster Ficei-Apea; (II) identification of the effect of technology transfer through the structuring of the saturation parameters to be included in logistics functions; (III) identification of the parameters of predation required to simulate the effect of competitive industrial clusters; (IV) data processing in the light of the selected indicators and representation of the dynamics of growth through comparative analysis of the functions of saturation.

The research team has already developed a single indicator of performance presented in territorial session ERSA 2011 (Spain) and the results of the research group will operate in more areas of application in line with the innovation needs of the area by helping to assess the sustainability enterprises of new business models in an area characterized by a higher degree of competition. The publication of this work is, therefore, the evolution of the work presented last year confirming the effort made by the research team to make available to the scientific community, including through

the use of new regulatory instruments (Apea) and new ministerial programs (RIDITT), predictive models to assess the impact that public support for the administrative simplification and technological innovation has on the local SMEs and the related question of development.

So the qualitative challenge that the local authority must take requires a quantum leap in the approaches of the government for the implementation of a new development model which tends to orient the productive apparatus and services towards environmental sustainability that sees in the public consultation -private-citizens a key competitive strategy. The hope is to find a tangible environmental improvement targets and direct citizens, these perceptible and measurable. An important role is taken from information constant, dynamic and effective on the progress achieved thanks to the process of certification ISO 14001 or EMAS registration and the relative progress of the environmental program through the active involvement of all segments of the public.

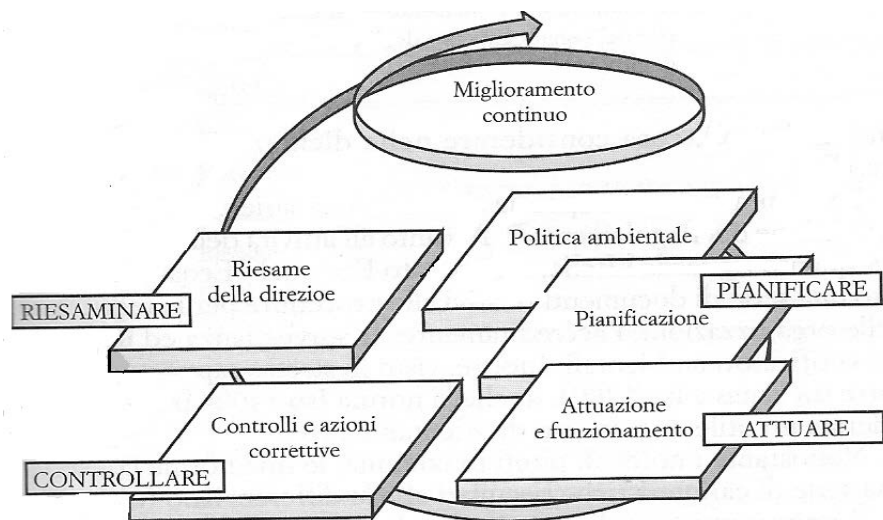


Figura 3



Ministero dello Sviluppo Economico



2. FOCUS: THE PROCESS MANAGEMENT APEA AND THE SUSTAINABILITY INSIDE CLUSTERS FICEI ALLOWED IN ENVIRONMENTAL PROGRAM RIDITT

The adoption of voluntary instruments of environmental management (ISO 14001 and EMAS) in a local authority comes from the awareness of a modernization process framed in the policies for sustainable and able to be able to achieve:

- Increase the effectiveness and efficiency in the management of environmental issues;
- Identification of policy options for reducing impacts on the environment;
- Recovery of competitiveness;
- Improvement of the ecological conditions and the image of the territory;
- Improving the quality of life of citizens.

The ISO 14001 is a standard reference issued by the International Standards Organization, which defines the rules for the implementation of an Environmental Management System (EMS) to which an organization may decide to participate voluntarily. EMAS is an EU regulation (EEC Regulation 1836/93 and the new EC Regulation no. 761/2001), which is the clearest expression of the environmental policy of the European Union to implement the principle of sustainability. The key principles that organizations need to be guided on the path of environmental management are: the enforcement of environmental legislation of reference, the continuous improvement of environmental performance and transparency and external communication. Both models of environmental certification have in common, in addition to voluntary membership, including rules of conduct and self-represented in the so-called "management of Deming Cycle ':

Plan (plans) - Do (implement) - Check (checks) - Act (act, review)

The differences between the two reference standards are represented mainly by the fact that while EMAS, at the end of the certification path, requires to prepare a public environmental statement, the same obligation, however, is not present in the ISO standard; Moreover, while EMAS obliges to consider among the basic requirements of the beginning of the process of certification that they meet regulatory compliance with environmental legislation, the ISO standard does not give a peremptory obligation even considering such compliance as a determinant in the certification process. The environmental certification process provides for a specific pathway which can be summarized graphically in the following way:

IDENTIFICATION OF THE SUBJECT OF REFERENCE



INITIAL ENVIRONMENTAL REVIEW



ENVIRONMENTAL POLICY



ENVIRONMENTAL PROGRAMS

(Based on the definition of objectives and targets)



ENVIRONMENTAL MANAGEMENT SYSTEM

(roles, responsibilities, procedures, documentation, audit, management review)



ENVIRONMENTAL STATEMENT

Subject reference is the local authority that intends to adhere to environmental management standards;

The Initial Environmental Assessment describes the impact and environmental issues concerning the activity of the organization: are examined with the laws and regulations to which the organization subscribes, identify the environmental aspects having a significant impact, are examined the practices and management procedures;

The Environmental Policy sets out the organization's commitment to environmental protection, for the respect of existing legislation, continuous improvement and to the enunciation of the consequent strategic decisions;

The Environmental Programmes describe the measures to be taken to achieve the objectives;

The Environmental Management System is now operational and is summarizing the environmental aspects of the overall management system of the organization;

The Environmental Statement is an environmental report (required for EMAS registration) which is the instrument through which the organization implementing the principle of transparency by informing stakeholders, on the path of environmental management done. It is a public document to which, therefore, can access citizens, institutions and companies.

The activities of analysis of the state of the environment, the environmental impact assessment, strategic assessment of plans and programs, make use of indicators as tools to represent, in simplified and synthetic form, a set of data and information. They are, in fact, be used to interpret, synthesize and communicate a large amount of data (and relationship between them) with a limited

number of parameters that show quantitatively the conditions of the system. Through the use of indicators you can detect any situations of risk or environmental degradation, compare local conditions than regional or national, verify the distance from the environmental objectives set by law or voluntarily recruited locally, verify the effectiveness of programs or individual stocks.

In recent years, several international bodies have developed models of representation and identification of indicators. Depending on model Pressure-State-Response (PSR) proposed by the OECD (Organisation for Economic Cooperation and Development) you can be identified three types of environmental indicators:

- 1) **State**: describe the individual components of the environment considering their quantity and quality and changes over time;
- 2) **Pressure**: measure the pressure exerted on the environment by human activities and are expressed in terms of emissions or consumption of resources;
- 3) **Response**: they describe the capacity and efficiency of actions for environmental restoration, conservation of resources and the achievement of the objectives assumed.

The model Determinants-Pressures-State-Impacts-Responses (DPSIR), defined by the EEA (European Environment Agency), is an extension of the PSR model and forms the structure of indicators most widely accepted; It introduces two other elements: the determinants, which can be identified by the human activities that cause pressures and impacts, or changes in the state of the environment induced by pressure factors. It is a conceptual approach that allows you to take information from causes to effects, and vice versa in accordance with a feedback; once known impacts on the components and the development trends of their state of quality, you can retrace the relationships that bind determinants impact with its effects. It can, therefore, intervene in correspondence with the different levels of the schema by the application of appropriate responses.

At the international level it has been set up a list of indicators established by the OECD; a set of indicators has also been detected in the EU, it suggested as a common basis for the EU member states. Obviously these indicators "common" can not predict the specific environmental and socio-economic of the particular area in question and, therefore, it is left to the local authorities responsible for carrying out the analysis of their specific situations and attributed to each community autonomy to select the most appropriate indicators to the situation, specification. It 'also important to consider the relationships between the common "general" and the local ones, making sure that they are selected thinking about the "system" of the indicators.

In any case, the choice of the set of indicators to be used locally must ensure compliance with three basic requirements:

- the Relevance (representative picture of environmental conditions, ease of interpretation, sensitivity to changes in the environment, ability to be exported to other local);
- the Analytical Balance (precise definition in terms of technical and scientific validation and consensus in the international arena, predisposition to the interface with economic models and revisional);
- the measurability (data already available or obtainable with reasonable cost / benefit ratio, documented and verifiable quality, updated at regular intervals).

It is also important to ensure the synthesis and the communicability of the indicators chosen.

The choice of the industrial cluster of Cittaducale area for the experimentation APEA in Region Lazio is, therefore, justified by:

- 1) The activity of the Municipality of Cittaducale has enabled the institution to achieve, in April 2007, the ISO 14001 certification through the identification of suitable indicators for the examination and monitoring of the environmental conditions of the municipality , in a sustainable development perspective.
- 2) The activity of the Consortium industrial development of the province of Rieti in the project Life-Siam funded in 2009 by the European Commission to introduce processes of environmental sustainability within industrial clusters.
- 3) The activity of FICEI in partnership with the National Research Council for the project RIDITT-Genesis, funded in 2011 by the Ministry of Economic Development to support the transfer of technology in production processes.

3. METHODOLOGY

As has already been studied, analyzed and presented in the work of MAMaggioni (Univ. Catholic) and AQCurzio (Univ. Catholic; Lincei Academy) and M.Fortis (Fond. Edison; Univ.Cattolica) entitled. Complexity and Industrial Districts, The Mill (2002), there is a real ecology of industrial clusters strongly dependent on the expected profitability arising from the location in it. So if the number of companies entering is proportional to the average benefits of location available in the cluster and the entry rate is proportional to the current level of net benefits of localization is expected that the growth is characterized by a path S with a slow start (benefits of locating low) a middle period explosive (high average net benefits) and a final part that stabilizes (balance). The simplest model that describes the path to S is the logistic equation r_q Where is the growth rate of intrinsic and K_q is the equilibrium level.

$$\frac{dn_q}{dt} = r_q n_q(t) \left(1 - \frac{n_q(t)}{K_q} \right)$$

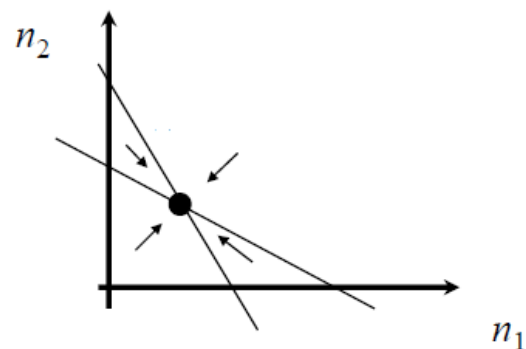
Integrating:

$$n_q(t) = \frac{K_q n_q(0) e^{r_q t}}{K_q + n_q(0)(e^{r_q t} - 1)}$$

Formula 1 - Logistic Function

The intrinsic growth rate r_q is often calculated as the difference between birth rates and mortality in a population. In particular, the logistic model in two clusters allows us to compare the dynamics of saturation of the two populations of firms, identifying the points at which it is "indifferent" position within the "cluster competitor"

$$\begin{cases} \frac{dn_1}{dt} = r_1 n_1(t) \left(1 - \frac{n_1(t) + c_{12} n_2(t)}{K_1} \right) \\ \frac{dn_2}{dt} = r_2 n_2(t) \left(1 - \frac{n_2(t) + c_{21} n_1(t)}{K_2} \right) \end{cases}$$

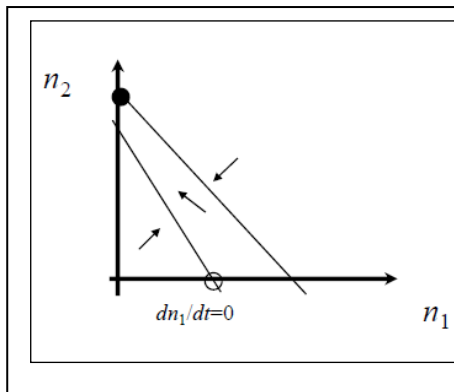
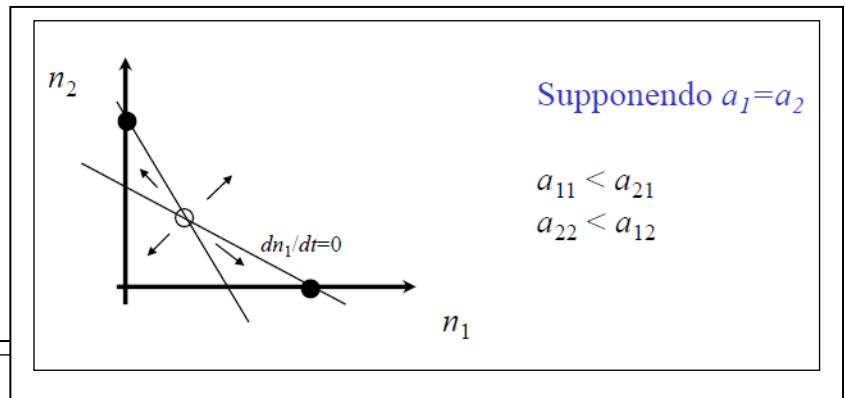


So, the budget constraint (saturation level K) expresses the effect of "predation" in competition between the two clusters and highlights of what decreases the population of the first cluster than any increase of "cluster competitor". The meeting point between the isoclines is, therefore, a point of equilibrium in which the composition of the population for the two clusters analyzed is identical, the effect of competition is neutralized. Simplifying algebraically:

$$\begin{cases} \frac{dn_1}{dt} = (a_1 - a_{11}n_1 - a_{12}n_2)n_1 \\ \frac{dn_2}{dt} = (a_2 - a_{22}n_2 - a_{21}n_1)n_2 \end{cases}$$

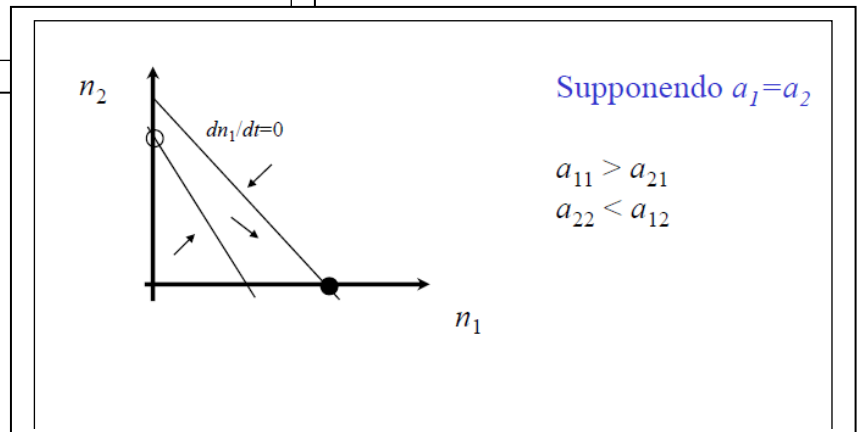
$a_1 = r_1$	tasso di crescita
$a_1 / a_{11} = K_1$	valore di equilibrio in isolamento
$a_{11} = a_1 / K_1$	competizione intra-cluster
$a_{12} = a_1 \cdot c_{12} / K_1$	competizione inter-cluster

It's clear that the situation of equilibrium of the two-cluster model may differ in function of parameters that these functions assume:



Supponendo $a_1 = a_2$

$a_{11} < a_{21}$
 $a_{22} > a_{12}$



So the model expresses different types of interaction between cluster competitors whose results can be summarized by the following panel:

$$\begin{cases} \frac{dn_1}{dt} = (a_1 - a_{11}n_1 - a_{12}n_2)n_1 \\ \frac{dn_2}{dt} = (a_2 - a_{22}n_2 - a_{21}n_1)n_2 \end{cases}$$

Tipo	a₁₂	a₂₁
Competizione	-	-
Mutualismo	+	+
Commensalismo	+	0
Predazione	+	-
Neutralità	0	0
Amensalismo	0	-

The results of this development allow us to assign values of certain of the individual functions and logistics as just argued, the growth model in two clusters require the estimation of a coefficient of competitiveness that was determined by comparing each other's unique indicators of attraction of the territory, shown in table no 3:

Rieti-Cittaducale / North Italy	0,925821
Rieti-Cittaducale / Center Italy	1
Rieti-Cittaducale / South Italy	1,004419

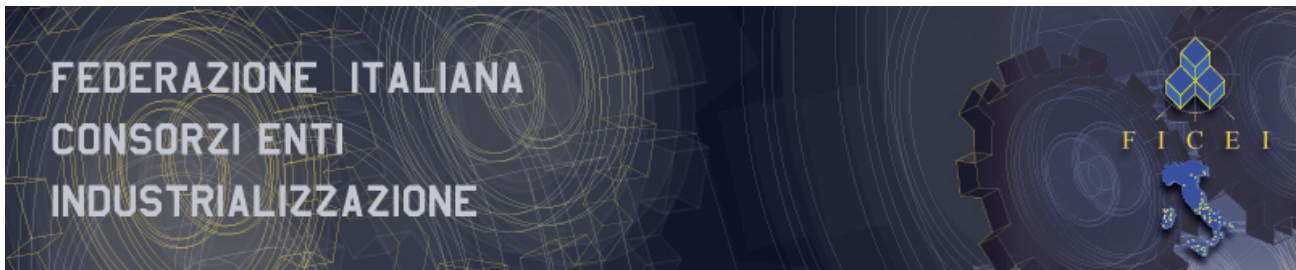
Table 1

Ancona-lesi / North Italy	0,925821
Ancona-lesi / Center Italy	1
Ancona-lesi / South Italy	1,004419

Table 2

The coefficients of competitiveness were included in the logistic functions generating a relaxation of the dynamic growth in the case of comparison of the pilot area with a cluster of industrial northeast, a neutral effect with respect to a cluster of central Italy and an increasing effect the dynamics of growth in comparison with the case of a cluster of industrial southern Italy. These calculations have required an interpretation on the individual quantities in the formulas (for example, which should be the maximum number of profitable enterprises to which they may tend in the cluster object of study, this value was calculated by multiplying the indicator k for the population N, 0 time (year 2011), also the rate r is expressed in %. The change in the territorial structure of the cluster, compared to its main components, it is then plotted every five years by projecting the population of enterprises of individual industrial clusters within the logistics function of the national pilot program allowed RIDITT– Genesi.

4. RESEARCH : POTENTIAL GROWTH OF PRODUCTIVE AREAS ECOLOGICALLY EQUIPPED (APEA) ADHERENTS OF THE FICEI ELIGIBLE FOR FUNDING RIDITT



The F.I.C.E.I. (Italian Federation of Consortia Industrialization Bodies) is the Italian organization that brings together and represents approximately 70 consortia and institutions for the promotion and industrial development which express approximately 10% of national GDP. Consortia are typically made up of Chambers of Commerce, local communities, financial institutions and business associations. They shall by virtue of the skills of urban dimensions supra, to design, build and operate the infrastructure (ports, roads, water, sewerage networks, etc.) And the technological systems (wastewater treatment plants, waste disposal) necessary to enable industrial settlements. They also provide real services to the companies and conduct any activities helpful to the economic development of the territory. The F.I.C.E.I. joins consortia in all activities aimed at encouraging the promotion and enterprise development and the project are eligible for funding Riditt_Genesi Ministerial:

Entrepreneurial Zone Consortium in the Province of Ancona (ZIPA)

The Consortium Entrepreneurial Zone Province Ancona (ZIPA) promotes the development of entrepreneurial activities in industry, crafts, trade and services in the Province of Ancona. The consortium is a public body ZIPA economic territorially based, are assigned duty as urban planning and propulsion of the overall development of the territory and the economy by organizing business zones and infrastructure. The body, which promotes the emergence of new industrial initiatives and the necessary conditions for the creation and development of productive activities and services, accompanies and supports the economic development of the province of Ancona since it was constituted in 1950. The mission of the Consortium is to establish ideal conditions for the boundary settlement in their areas, in a highly qualified from the environmental point of view, companies really competitive on the global market; this strategic objective are dedicated substantial resources, energy and labor, using virtuously, for themselves and the companies settled, all the operational tools offered by current standards. In the present study we have focused attention on the area Jesi-Ancona

Consortium for the industrial development of the province of Rieti

In recent years, the Consortium for Industrial Development of the Province of Rieti has grown strongly to meet the new needs of small and medium-sized enterprises established in the agglomeration, that need to be increasingly effective services and capillaries, which, above all, a concrete action to support the promotion of the development of the entire area of Rieti. The mission of the institution is to encourage the setting up of operations in Rieti, in order to create more wealth, avoid depopulation and improve the living standards of citizens. In recent years it has gone from the management of consortium services to a more partnership, in which the consortium is placed next to the companies, which seeks to provide services in areas more extensive, as the commercialization, internationalization, training, promotion and other. In addition to companies, the natural partners of the consortium are local authorities, against which the Consortium itself as the largest partner for the planning and construction of infrastructure, materials and essential for sustainable growth. In the present study we have focused attention on the area Rieti-Cittaducale.

The mapping of the abovementioned industrial agglomerations FICEI ministerial RIDITT admitted to the program with their growth potential has been carried out following the Istat 2011 and presented at the Annual Congress AISRe, Padua in 2014. Furthermore, the performance indicators identified in the territorial areas of excellence national FICEI are the result of the work done by the same research group, and presented during the annual congress ERSA Barcelona 2011:

A) STRATEGIC INDICATORS		Northeast	center	south		
<i>business demography indicators</i>						
<i>context indicators</i>		0,4	0,8	1		
<i>perceived image indicators</i>		1	0,8	0,6		
<i>environmental sustainability</i>		1	1	0,7		
<i>infrastructure indicators</i>		0,5	0,8	1		
		1	0,75	0,5		
B) INDICATOR BUDGES						
<i>Local services</i>						
<i>leadership</i>		1	1	0,8		
<i>Local cooperation</i>		0,8	1	0,8		
		1	0,8	0,8		
C) FINACIAL INDICATORS						
<i>ROI, ROS e ROE per sector</i>						
<i>Average turnover per sector</i>		0,6	1	0,6		
<i>Workers average per sector</i>		1	0,6	0,8		
<i>EBITDA per sector</i>		1	0,8	0,7		
		1	0,5	0,8		
		10,3	9,85	9,1		
		average	0,858333	0,820833	0,758333	FICEI model
		G.average	0,81	0,75	0,75	result of research
I [^] range		0 - 0,25				B.D.
II [^] range		0,25 - 0,5				C.
III [^] range		0,5 - 0,75				I.P.T.
IV [^] range		0,75 - 1,00				S.-S.
						Infrastructure index
						local services
						Leadership
						Local Cooperation
						Roi, roe, ect....
						Sales
						workers
						EBITDA
						northeast
						center
						south
						0,5
						0,7
						1
						1
						0,9
						0,8
						1
						1
						0,7
						1
						1
						0,8
						0,8
						0,8
						0,8
						0,5
						0,3
						1
						0,2
						1
						0,7
						0,5
						1
						1

Table 3 - Unique Indicators of Attraction of the Territory

The methodology used to build synthetic indicators based on data has been the construction of basic indicators; normalization of basic indicators performed by comparing the basic indicators to a cash consists of the land area of the area or the population; standardization of normalized performed by comparing, within the same category, the normalized indexes of each territorial unit to the maximum value of the series; aggregation of standardized indicators through the use of the arithmetic mean for the aggregation of elementary indicators within a main category and the geometric mean for the synthesis. So the parameter estimation (population of companies by sector), (their growth rate) and (maximum saturation of the sector) has taken place through the development of statistics Istat that have identified these parameters in an objective manner which only later we were validated through sensitivity analysis performed with industry experts. In particular, the estimate of the parameters relating to individual sectors of the economy, was carried out by distributing the categories Ateco 2007 seconds encoding Istat 2009, so as reported below for the year 2011:

Istat 2009	N
AGRICULTURE	307
OTHER SERVICES	1,958
TRADE	12,067
BUILDINGS	4,971
INDUSTRY	4,832
SERVICES	19,457
TOTAL	43,592

ANCONA-JESI (year 2011)

Table 4

Istat 2009	N
AGRICULTURE	31
OTHER SERVICES	245
TRADE	1,232
BUILDINGS	481
INDUSTRY	397
SERVICES	1,760
TOTAL	4,146

RIETI-CITTADUCALE (year 2011)

Table 5

The estimated parameter r^* was determined by performing a survey on Turnover of SMEs detected through changes in the number of companies and employees:

Istat 2009	r
AGRICULTURE	0.03
OTHER SERVICES	0.06
TRADE	0.05
BUILDINGS	0.05
INDUSTRY	0.04
SERVICES	0.07

ANCONA-JESI

Table 6

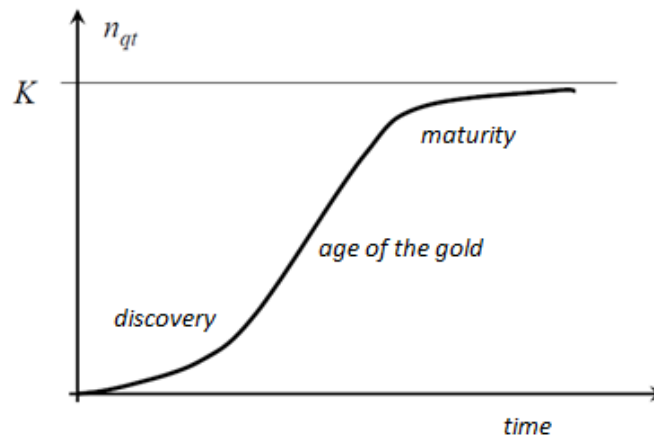
Istat 2009	r
AGRICULTURE	0.03
OTHER SERVICES	0.06
TRADE	0.05
BUILDINGS	0.05
INDUSTRY	0.04
SERVICES	0.07

RIETI-CITTADUCALE

Table 7

It is good not confuse the parameter r^* with the annual growth rates of the enterprises because the parameter r^* is the intrinsic growth rate, we could say of bottom, of the logistic model. This

parameter does not change if the structural conditions do not change and generates annual growth rates that vary depending on the development phase of the system in which we find ourselves (age of discovery, age of the gold, age of maturity).



Graphic 1

The estimated parameter K was performed through the analysis of structural indicators, context and perceived image of the territory, which allowed to determine how the cluster is attractive compared to the individual sectors of the economy (source: ERSA Barcelona 2011):

AGRICULTURE / OTHER SERVICES

STRATEGIC INDICATORS		ENVIRONMENTAL SUSTAINABILITY										Tot.Ind.mix	K	
		water. mc*inh	Met. mc*inh	E.E. kwh*inh	kg MSW * A	Cars euro 4 *1000 inh	Cars euro 2 * 1000 inh	bicycle path	load * inh					
Northeast Italy		61,5	729,85		1162,55	631,65		200,9		254	82,36	3,157107	3,297693957	1
Center Italy		75,55	390,85		1107,45	682,95		193,85		287	14,35	2,659175	3,507361259	1,06357998
South Italy		59,05	190,35		1149,25	598,05		134,9		314,8	3,25	2,193426	3,312142659	1,00438146

Table 8

TRADE / BUILDINGS

STRATEGIC INDICATORS		BUSINESS DEMOGRAPHY												K
		turn over	workersx100	din. Sme	din. W.	din. Sale	% Export	din. Sale*W	din. Export	within effect	between eff	din.FN.I.	din.FI.C.	
Northeast Italy		0,0014675	580	0,107	0,11375	0,23925	0,509	0,1285	0,15475	0,025	0,2175	-0,037	0,0605	1,2552175
Center Italy		0,000532	425	0,101667	0,186	0,344333333	0,24	0,18116667	0,190166667	0,398333333	0,1766667	-0,108833	0,071833333	1,02844867
South Italy		0,001305	275	0,09125	0,3	0,4305	0,13725	0,16225	0,14125	0,565	0,0625	0,03575	0,01075	1,034305

Table 9

INDUSTRY / SERVICES

STRATEGIC INDICATORS		Context indicators		Perceived image index		Infrastructure Indicators		standard		average index	k
Northeast Italy				4	9,5		1013784,5	0,96945148		4,823150495	1,378043
Center Italy				3,5	9,5		987341,25	0,9441646		4,648054868	1,32801568
South Italy				3	6,5		1045730	1		3,5	1

Table 10

To simulate the effect of process APEA inside clusters, the research group has structured an index to correct the value of K. This is e ratio to apply in case of APEA area (K_1) and in case of no APEA area (K_2).

The methodology presented in 2008 by Dosi, Bonazzi and Sansoni AISRE meeting in Bari, analyzed the potential for an accounting tool, NAMEA (National Accounting Matrix with Environmental Accounts), a hybrid matrix with units both monetary and physical, where the economic aggregates of national accounts are associated with residues of the production and consumption. The application of **Shift Share analysis** to report emissions / Value Added allowed to analyze the effects of three "industry mix, effect of differential, effect of allocated" for the entire local economy and individual sectors. In particular, the **S-S** has been applied to our problem, and makes possible a quantitative summary of the reasons that underlie the differential emission intensity (IE) between the region and national average (Xe-X), or an area in relation to the mean of the territories which it belongs (usually the country). They thus provide information on bills and explanatory factors of the energy emitting region considered in relative terms to the context where it belongs: in other words, we analyze the determinants of its effectiveness on emitting. The application of S-S allows you to isolate and measure the role of the production structure and energy emission of specific economic sectors, such as causal elements in the gap (average) efficiency as an indicator of IE in the following component:

- 1) Structural: the first component indicates the portion of the differential attributed to the particular sector mix that characterizes the local production system than that prevailing at the national level;
- 2) Differential: the second hand on performance measures the contribution of sectoral emission;
- 3) Allocative: the third component, captures the possible combinations of the two previous effects.

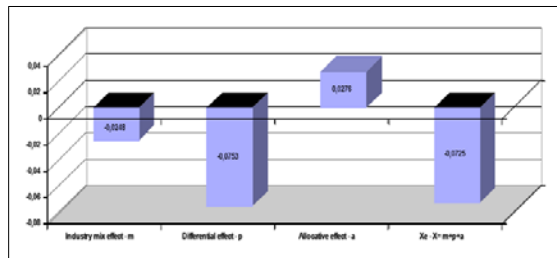
For FICEI clusters object of our study we introduce the following formalization:

STRATEGIC INDICATORS	ENVIRONMENTAL SUSTAINABILITY										Tot. Ind. mix	eff. Differenz	eff. Alloc.	Tot. S-S
	Acq. mc*A	Met. mc*A	E.E. kwh*A	kg RSU * A	Auto euro 4 *1000 A	Auto euro 2 * 1000 A	piste ciclabili	carico et*A						
Northeast Italy	61,5	729,86	1162,55	631,66	200,9	254	62,36	3,1571072	3,297694	0,14058677	0,4835382	3,92182		
Padua	55,9	874,5	1289	702,1	196,1	254,4	133,32	3,1571072	3,1566344	-0,0005727	-0,0018079	3,15415		
Verona	67,1	585,2	1036,1	561,2	205,7	253,6	31,4	3,1571072	3,4388535	0,28174629	0,9688842	4,68948		
Center Italy	75,55	390,86	1107,45	682,96	193,85	287	14,35	2,6591748	3,5073613	0,84818641	2,9352748	7,29082		
Massa-Carrara	91,2	383	1152,6	845,9	212	215,9	28,7	3,0780391	3,6516748	0,57363675	2,0947312	6,32004		
Ancona	58,4	625,1	1105,2	571,4	212,8	247,8	2,7	3,3163642	3,5332232	0,21686909	0,7662116	4,51629		
Rieti	59,9	398,7	1062,3	520	175,7	358,1	0	2,2403106	3,3630477	1,12273708	3,7758184	8,2616		
South Italy	59,05	190,35	1149,25	598,05	134,9	314,8	3,25	2,1934256	3,3121427	1,11871708	3,7670044	4,88572		
Naples	61,9	153	1090,5	577,2	104,5	372,4	0	2,1473278	3,5384631	1,39113536	4,9224812	6,31362		
Bari	56,2	227,7	1208	618,9	165,3	257,2	6,5	2,2395234	3,0858222	0,84629881	2,6115276	3,45783		
Fonte: Rapporto Istat 2009														

Table 11

In particular the analysis of the data evidences differences in the parameters of environmental integrity between Ancona (4.5162) and Rieti (8.2616). These differences have allowed the working group to estimate the parameter of APEA area (K_1) and in case of no APEA area (K_2), through a simple process of normalization compared to the average of the total **S-S** indicator (7.2908) in the center of Italy.

Table 12



STRATEGIC INDICATORS	
Northeast Italy	
Padua	
Verona	
Center Italy	
Massa-Carrara	
Ancona	
Rieti	
South Italy	
Naples	
Bari	

Indicators of environmental sustainability				standard
industry mix	eff. Differenz	eff. Allocat.	Tot. S-S	
3,29769396	0,14058677	0,48353817	3,921818889	0,5
3,15653444	-0,00057274	-0,00180788	3,154153823	
3,43885347	0,28174629	0,96888421	4,689483976	
3,50736126	0,84818641	2,93527478	7,290822451	1,0
3,65167481	0,57363575	2,09473121	6,320041766	
3,53322325	0,21685909	0,76621159	4,516293932	
3,36304771	1,12273708	3,77581835	8,261603137	
3,31214266	1,11871708	3,76700441	4,885721497	0,7
3,53846314	1,39113536	4,92248121	6,313616568	
3,08582217	0,84629881	2,51152762	3,457826425	

In case of APEA area (Rieti-Cittaducale) K_1 is $8.2616/7.29082 = 1.1331$

In case of no APEA area (Ancona-Jesi) K_2 is $4.5162/7.29082 = 0.6194$

The estimate of the coefficient k has been made and validated by industry experts with appropriate sensitivity analyzes, this value is the maximum value that can take on the logistic function (asymptote) and expresses the maximum increase in the population N can get in case of APEA area (K_1) and in case of no APEA area (K_2) :

Istat 2009	K
AGRICULTURE	1.06357998
OTHER SERVICES	1.06357998
TRADE	1.02844867
BUILDINGS	1.02844867
INDUSTRY	1.32801568
SERVICES	1.32801568

Rieti-Cittaducale in case of APEA areas	K₁
AGRICULTURE	$1.06357998 * 1.1331 = 1.2051$
OTHER SERVICES	$1.06357998 * 1.1331 = 1.2051$
TRADE	$1.02844867 * 1.1331 = 1.1635$
BUILDINGS	$1.02844867 * 1.1331 = 1.1635$
INDUSTRY	$1.32801568 * 1.1331 = 1.5048$
SERVICES	$1.32801568 * 1.1331 = 1.5048$

Ancona –Jesi in case of no APEA areas	K₂
AGRICULTURE	1.06357998 * 0.6194 = 0.6588
OTHER SERVICES	1.06357998 * 0.6194 = 0.6588
TRADE	1.02844867 * 0.6194 = 0.6370
BUILDINGS	1.02844867 * 0.6194 = 0.6370
INDUSTRY	1.32801568 * 0.6194 = 0.8826
SERVICES	1.32801568 * 0.6194 = 0.8826

Table 13

By inserting the obtained parameters were obtained projections to 5, 10, 15 years of the territorial cluster. Obviously in logistic models traditional choice for an enterprise is only enter or not in a cluster while the introduction of more complex models has allowed to highlight the interactions between clusters highlighting the benefits for a company to select the "cluster competitor" more performance. So the effect of "preying" on the dynamics of population growth in the two clusters was obtained by comparing the pattern of growth of both areas entitled to the benefits of the program APEA and verifying the effect that an action for better technology transfer will have within the cluster system competitor expressed by FICEI.

The interactions between clusters require the estimation of a coefficient of competitiveness between the single clusters which was determined by comparing each other the indicators unique attraction of the territory, referred to in table no.

Following there are the results of our simulation divided by clusters.

LOGISTICS MODEL INTER- CLUSTER RIETI CITTADUCALE

RIETI-CITTADUCALE / CENTER ITALY

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	31	37,35941674	3%	1,20514248	32	32	33
OTHER SERVICES	245	295,25990646	6%	1,20514248	256	265	273
TRADE	1232	1435,69295159	5%	1,16533519	1272	1305	1332
BUILDINGS	481	560,52622542	5%	1,16533519	497	509	520
INDUSTRY	397	597,39550310	4%	1,50477457	423	446	468
SERVICES	1760	2648,40323793	7%	1,50477457	1954	2118	2251

Table 14

Neutral effect with respect to the cluster of the center Italy (coefficient of competitiveness 1).

RIETI-CITTADUCALE / NORTH ITALY

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	31	34,58813256	3%	1,11574621	31	32	32
OTHER SERVICES	245	273,35782186	6%	1,11574621	252	257	261
TRADE	1232	1329,19468413	5%	1,07889179	1252	1268	1281
BUILDINGS	481	518,94695054	5%	1,07889179	489	495	500
INDUSTRY	397	553,08130208	4%	1,39315189	418	438	455
SERVICES	1760	2451,94733415	7%	1,39315189	1920	2051	2155

Table 15

Effect of "relaxation" in growth compared to the hypothesis of isolation (the growth is in all areas but is smaller compared to that provided to central Italy that is the hypothesis of isolation). The coefficient of competitiveness is 0,925821.

RIETI-CITTADUCALE / SOUTH ITALY

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	31	37,52450800	3%	1,21046800	32	32	33
OTHER SERVICES	245	296,56465998	6%	1,21046800	257	266	273
TRADE	1232	1442,03727874	5%	1,17048480	1273	1307	1335
BUILDINGS	481	563,00319081	5%	1,17048480	497	510	521
INDUSTRY	397	600,03539383	4%	1,51142417	423	447	469
SERVICES	1760	2660,10653184	7%	1,51142417	1955	2121	2256

Table 16

With reference to cluster South Italy you notice a stimulus to growth that can be interpreted in various ways, such as inclusion of companies from the south in the cluster of Rieti-Cittaducale for its greater attractiveness or as as keeping of number of clusters in terms of minor outputs respect to the new inputs. The coefficient of competitiveness is 1,004419.

We report also the table of the total number of companies (table no 17) and the table of differential values, products from competition between clusters (table no 18) according to the proposed model:

PROJECTIONS INTER CLUSTER

Cluster Competitor	2011	2016	2021	2026
Center Italy	4146	4434	4675	4877
North Italy	4146	4362	4541	4684
South Italy	4146	4437	4683	4887

Table 17

DIFFERENTIAL VALUES INTER CLUSTER

Cluster Competitor	2011	2016	2021	2026
Center Italy	0	0	0	0
North Italy	0	-72	-134	-193
South Italy	0	3	8	10
Saldi complessivi	0	-69	-126	-183

Table 18

Now let's try to estimate, through the logistic model proposed, the effects that the program APEA should have in the area of Rieti-Cittaducale.

RIETI-CITTADUCALE / CENTER ITALY IN ABSENCE OF PROGRAM APEA

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	31	32,97097938	3%	1,06357998	31	31	32
OTHER SERVICES	245	260,57709510	6%	1,06357998	249	252	254
TRADE	1232	1.267,04876144	5%	1,02844867	1240	1246	1250
BUILDINGS	481	494,68381027	5%	1,02844867	484	486	488
INDUSTRY	397	527,22222496	4%	1,32801568	416	432	447
SERVICES	1760	2.337,30759680	7%	1,32801568	1898	2010	2097
	4146				4318	4457	4568

Table 19

TOTAL PROJECTIONS INTER CLUSTER

Cluster Competitor	2011	2016	2021	2026
Rieti-Cittaducale without APEA	4146	4318	4457	4568
Rieti-Cittaducale with APEA	4146	4434	4675	4877
North Italy	4146	4362	4541	4684
South Italy	4146	4437	4683	4887

Table 20

TOTAL DIFFERENTIAL VALUES INTER CLUSTER

Cluster Competitor	2011	2016	2021	2026
Rieti-Cittaducale with APEA	0	116	218	309
North Italy	0	-72	-134	-193
South Italy	0	3	8	10
Overall balances	0	47	92	126

Table 21

The presence of the program APEA will produce net growth in the area of Rieti-Cittaducale because as well as allowing the absorption of net losses planned for the attractiveness of the North Italy (-193, with reference to the year 2026) will increase the attractiveness of the pilot area, attracting businesses or helping to keep existing ones (+309, with reference to the year 2026).

LOGISTICS MODEL INTER- CLUSTER ANCONA JESI

ANCONA-JESI / CENTER ITALY IN CASE OF ISOLATION (WITHOUT APEA)

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	307	326,51905386	3%	1,06357998	310	312	314
OTHER SERVICES	1958	2.082,48960084	6%	1,06357998	1989	2012	2030
TRADE	12067	12.410,29010089	5%	1,02844867	12141	12200	12246
BUILDINGS	4971	5.112,41833857	5%	1,02844867	5002	5026	5045
INDUSTRY	4832	6.416,97176576	4%	1,32801568	5058	5260	5438
SERVICES	19457	25.839,20108576	7%	1,32801568	20988	22220	23179

Table 22

The table represents the logistics evolution of the area in the event of insulation (without APEA).

ANCONA-JESI / CENTER ITALY WITH APEA

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	307	202,24590196	3%	0,65878144	286	271	258
OTHER SERVICES	1958	1289,89405876	6%	0,65878144	1726	1587	1498
TRADE	12067	7686,93368849	5%	0,63702111	10716	9857	9278
BUILDINGS	4971	3166,63191891	5%	0,63702111	4415	4061	3822
INDUSTRY	4832	3974,67231171	4%	0,82257291	4650	4511	4403
SERVICES	19457	16004,80115252	7%	0,82257291	18292	17551	17064

Table 23

The reduction of competitiveness linked to the non-application of the program APEA will lead to a reduction in the number of firms in each sector, this is due to the fact that the non-application of the program APEA will reduce the carrying capacity of the area (parameter K).

ANCONA-JESI / NORTH ITALY

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	307	302,29819696	3%	0,98468468	306	306	305
OTHER SERVICES	1958	1928,01260474	6%	0,98468468	1950	1944	1940
TRADE	12067	11489,70719150	5%	0,95215938	11934	11833	11755
BUILDINGS	4971	4733,18425863	5%	0,95215938	4916	4875	4843
INDUSTRY	4832	5940,96721715	4%	1,22950480	5001	5149	5276
SERVICES	19457	23922,47498842	7%	1,22950480	20592	21475	22144

Table 24

For the first four sectors (agriculture, services, trade and construction), the competitors cluster of the north - east will bring a reduction in the number of firms (more or less strong depending on r) while the sector of industry and services a relaxation of the growth compared to the hypothesis of isolation.

ANCONA-JESI / SOUTH ITALY

SECTORS	N	K	r	k	2016	2021	2026
AGRICULTURE	307	327,96194156	3%	1,06827994	310	312	314
OTHER SERVICES	1958	2091,69212239	6%	1,06827994	1991	2016	2035
TRADE	12067	12465,13117285	5%	1,03299338	12153	12221	12274
BUILDINGS	4971	5135,01011521	5%	1,03299338	5006	5034	5056
INDUSTRY	4832	6445,32836399	4%	1,33388418	5062	5267	5447
SERVICES	19457	25953,38451536	7%	1,33388418	21010	22262	23238

Table 25

With reference to cluster South Italy you notice a stimulus to growth that can be interpreted in various ways, such as inclusion of companies from the south in the cluster of Ancona-Jesi for its greater attractiveness or as as keeping of number of clusters in terms of minor outputs respect to the new inputs.

We report also the table of the total number of companies (table no 26) and the table of differential values, products from competition between clusters (table no 27) according to the proposed model:

TOTAL PROJECTIONS INTER CLUSTER

Cluster Competitor	2011	2016	2021	2026
Assumptions of isolation	43592	45488	47030	48251
Center Italy with APEA	43592	40085	37838	36323
North Italy	43592	44699	45582	46263
South Italy	43592	45532	47112	48364

Table 26

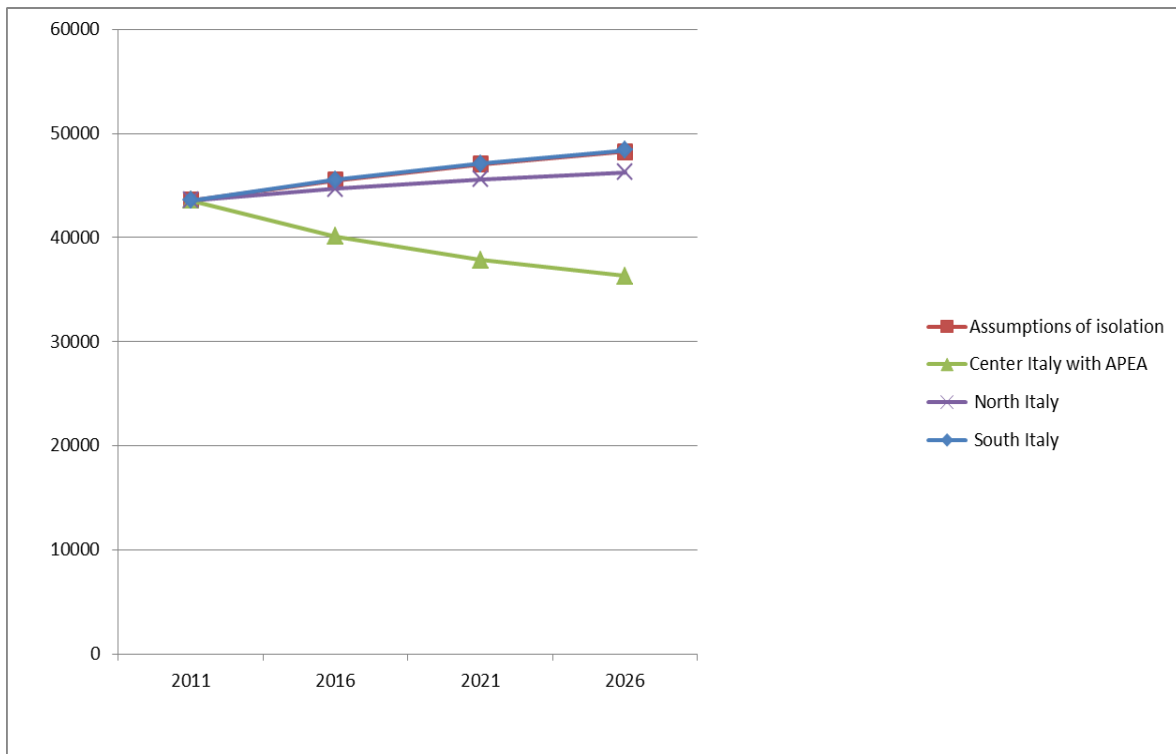
TOTAL DIFFERENTIAL VALUES INTER CLUSTER

<i>Cluster Competitor</i>	2011	2016	2021	2026
Center Italy with APEA	0	-5403	-9192	-11928
North Italy	0	-789	-1448	-1988
South Italy	0	44	82	113
Overall balances	0	-6147	-10557	-13802

Table 27

The algebraic sum of losses and the acquisition leads to a reduction in the number of firms in the cluster, according to the logistic model proposed. It is not said that the net losses are the algebraic sum indicated above because businesses that could exit to due to both clusters, therefore, the model produces an interval of net losses that varies from a maximum of -13,802 to a minimum of -11,815, with reference to year 2026.

The following we report the chart aggregate growth over time by considering all sectors, with reference to the various competitors clusters.



Graphic 2

5. CONCLUSIONS

The publication of this work is the development of the effort put in place by the research team for make available to the scientific community, as well as to public and private operators, the simulation model presented in the Conferences ERSA and AISRe of the years 2013 and 2014. In addition, model has been improved and further verified by the development of the project RIDITT_GENESI. The sensitivity analysis conducted with industry experts and officials FICEI allowed us to verify that the coefficient of competitiveness between industrial clusters, estimated by the single indicator of attraction of the area, is able to support the logistic function in the simulation of the effect of "predation" inter clusters of the model that characterizes two clusters.

For which the competitors clusters can stimulate or inhibit the dynamics of population of companies belonging to the national pilot area and growth remains neutral only to simulation mode in isolation ie in the hypothesis "intra-cluster". The opportunity to use the model for processing large amounts of data on other national clusters could then open the way for new research projects that can improve studies on the effect of competition between industrial clusters and support choices strategic positioning of the territory with even more refined methodologies able to highlight the performance of the factors that facilitate the allocation of potential expressions of interest made by national and international investors.

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