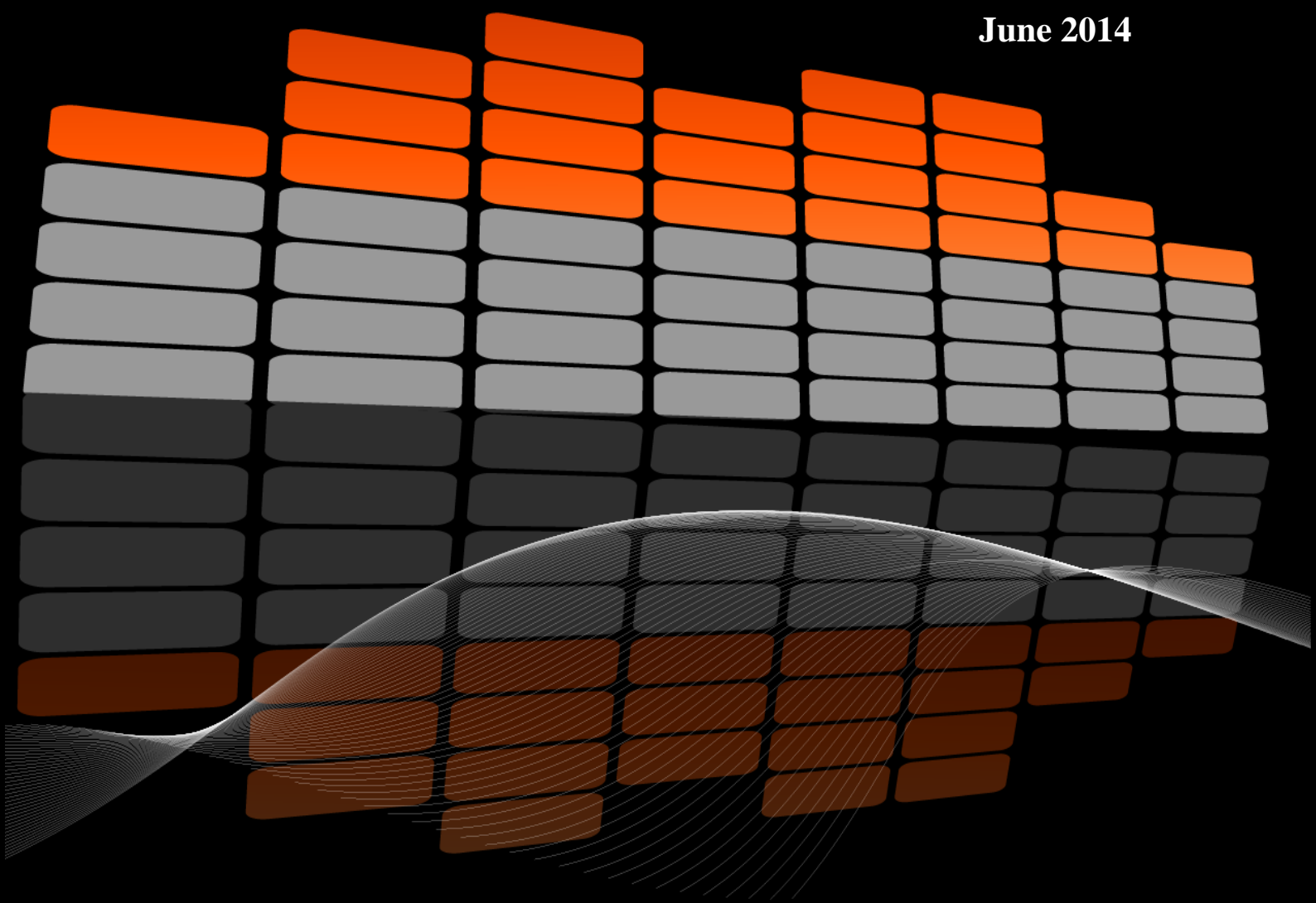


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Table of Contents

1. A New Income Indicator for the Assessment of Regional Competitiveness and Sustainability.....	711
Luca Salvati, Alberto Sabbi	
2. Motivation at Work of Brazilian Executives.....	717
José Chavaglia, José António Filipe, Manuel Alberto M. Ferreira, Ítalo Calliari Jr.	
3. Anti- Tourism Destinations: A Methodological Discussion on Commons and commons. The ‘Ammaia’ Project’s Locale Impact	725
José António Filipe,	
4. Game Theory, the Science of Strategy.....	738
Maria Cristina Peixoto Matos*, Manuel Alberto M. Ferreira	
5. An Application of the Anti-Commons Theory to an Elderly Nursing Home Project in Portugal	746
José Lamelas, José António Filipe	
6. Networks and Network Analysis for Defense and Security-A Book Review.....	753
Manuel Alberto M. Ferreira	

A New Income Indicator for the Assessment of Regional Competitiveness and Sustainability

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Abstract - The present study evaluates the economic dynamics of more than 600 local districts for two years (2001 and 2005) in Italy with the aim to propose a new income indicator for the assessment of regional competitiveness in a traditionally divided country. The spatial distribution of district value added standardized by land surface was analyzed and compared with traditional indicators of per capita and per worker district value added. The three income indicators were then correlated to 15 variables (including share of agriculture and industry on total product, labour productivity by sector, per-capita and per-worker value added) to produce a multidimensional analysis of regional development using exploratory statistics. This approach allows evaluating the complex geography of economic development in Italy and the different relationships between the three income indicators and the selected socioeconomic variables at the district scale. Results indicate that the three income indicators show a diverging spatial distribution being correlated to different socioeconomic variables. The north-south divide and other geographical gradients traditionally observed in Italy (coastal-inland, urban-rural, among others) were identified by all income indicators. The joint use of the three income indicators reviewed in this study is considered to improve monitoring of regional competitiveness dynamics in divided countries.

Keywords - *Economic development, Local district, Exploratory data analysis, Italy.*

1. Introduction

Formation and consolidation of value added at the local scale and of territorial disparities among regions is an important issue not only for applied economics (Barro and Sala-i-Martin, 2004), but also for other disciplines, including urban/rural sociology, geography and planning (King et al., 2001). Indicators of urban and regional competitiveness, economic sustainability and territorial cohesion are commonly used in reporting regional disparities and improvements in developmental policies (Terrasi,

1999; Arbia and Paelinck, 2003; Proietti, 2005). Local value added was sometimes seen as a proxy for more complex socioeconomic dynamics; using multivariate analysis, Salvati and Carlucci (2014) demonstrated that the district value added in Italy is strongly correlated with a number of different indicators in both economic and social research domains and can also reflect, in specific territorial conditions, the level of sustainable development. Impressive changes in the economic structure of countries and regions were also described using long-term value added time series and the analysis of territorial disparities largely benefited from indicators derived from district income or value added estimated at the municipal scale (Viesti et al., 2011).

Different (direct and indirect) indicators were proposed to assess the level of income at the local scale by computation on value added, disposable income, revenues from personal taxes and consumption levels, among other (Casadio Tarabusi and Palazzi, 2004). The majority of these indicators were derived from official statistical sources embedded in the national accounting systems (Salvati and Carlucci, 2014). Regional income is generally expressed through computation of value added at various geographical levels, from administrative regions to provinces or prefectures or other relevant spatial units. Relevance of the used spatial unit is evaluated according to the peculiarities of the administrative system enforced in each country and to the developmental policies that are targeted to improve income levels (Salvati and Zitti, 2007). Indicators at local district and municipality are being increasingly diffused according to the large availability of digital statistical data and ancillary information from other relevant sources. These indicators usually provide a more detailed picture of the geography of wealth and economic development

of a certain region or country that more traditional regional estimates. At the same time, these indicators may be affected by important sampling errors or represent poor estimates of regional account aggregates due to the negative impact of up-scaling procedures on value added estimates' precision (Patacchini, 2008).

Another problem deals with the standardization of the aggregated value added using adequate variables. Different measures were generally computed to provide a direct value of local (district or municipal) value added: (i) per-capita value added, i.e. divided by the resident (or present) population at a certain year in the study area or (ii) per-worker value added, i.e. divided by the working population observed at a certain year in the study area. Based on the assumption that product value added is a function of capital, labour and land, emphasis was therefore attributed to the use of production factor standardization variables when developing these indicators. The present study introduces a new income indicators, based on land, the third production factor. In particular, this indicator should represent the spatial dimension of the local income aggregate, by dividing district or municipal value added by the surface area of that administrative unit. Per-area local value added could be integrated with per-worker and per-capita value added at the same spatial scale in order to provide a more comprehensive picture of territorial disparities and urban competitiveness.

This study analyzes the spatial distribution of the three income indicators illustrated above for two points in time (2001 and 2005) in more than 600 local districts, taken as homogeneous spatial unit and relevant from the economic point of view, in Italy. Correlations with ancillary indicators, made available at the same spatial scale and year, were studied in order to highlight latent patterns specifically characterizing each of the studied income indicators.

2. Methodology

2.1. The study area

The examined area covers the whole Italian territory (301,330 km²). The Local Labor Market Area (LLMA) districts, reflecting homogeneous areas from the economic perspective at an enough detailed geographical scale, are considered as the analysis spatial unit (Giusti and Grassini, 2007). A total of 686 districts were defined by the Italian National Statistical Institute (Istat) according to data collected in 2001 National Census of Population (Istat, 2006).

2.2. Socioeconomic indicators

Three income indicators (VAOC: per-worker district income, VAPC: per capita district income and VAPS: per-area district income expressed as euros/km²) and 15 ancillary socioeconomic indicators (see Table 1) have been made available at the district scale from official statistical data provided by Istat referring to 2001 and 2005. Both strictly economic indicators derived from regional accounts and variables describing territorial features of the local districts have been considered (Istat, 2006).

Table 1. The variables considered in this study.

Acronym	Name	Unit of measure
South	Dummy labeling southern districts	0 and 1
pAGR	Share of agriculture in district product	%
pIND	Share of industry in total product	%
pSER*	Share of services in total product	%
PR_AG	Labour productivity in agriculture	Euros
PR_IN	Labour productivity in industry	Euros
PR_SE	Labour productivity in services	Euros
Urban	Dummy labeling urban districts	0 and 1
Monta	Dummy labeling mountainous districts	0 and 1
Sup	Surface area of each district	km ²
Dens	Population density	Inhabit/km ²
CapReg	Dummy labeling regional head district	0 and 1
CapPr	Dummy variable labeling province	0 and 1
Dist_reg	Distance from the regional head town	km
Dist_pro	Distance from the province head town	km

2.3. Data analysis

Maps were provided to assess graphically the spatial distribution of the three income indicators (VAOC, VAPC, VAPS). To explore separately the pair-wise relationship between each of the three income variables and the selected ancillary indicators on a local scale, a non-parametric Spearman rank correlation analysis was carried out for both 2001 and 2005 testing for significance at $p < 0.05$ based on Bonferroni's correction for multiple comparisons. A Principal Components Analysis (PCA) was also carried out to assess the evolving regional disparities in Italy and to identify the geo-economic gradients underlying differences in the spatial distribution of the income indicators proposed in this study. The PCA was applied to a matrix (see Table 1) composed of 9 variables in both 2001 and 2005 (pAGR, pIND, PR_AGR, PR_IND, PR_SER, VAOC, VAPC, VAPS, Dens) and 8 stable variables in both years (South, Urban, Monta, Sup, CapReg, CapPr, Dist_Reg, Dist_Pro) for a total of 26 evaluated variables *plus* 1 supplementary variable (pSER in both 2001 and 2005) excluded from the PCA due to multi-collinearity with pAGR and pIND. All variables were made available on the 686 Italian districts. As the analysis was based on the correlation matrix, the number of significant components (m) was chosen by retaining those with eigenvalue > 1 (Salvati and Zitti, 2009). The Keiser-Meyer-Olkin (KMO) measure of sampling adequacy, which tests

whether the partial correlations among variables are small, and Bartlett's test of sphericity, which tests whether the correlation matrix is an identity matrix, have been used in order to assess the quality of PCA outputs. These tests indicate if the factor model is appropriate to analyze the original data. Based on the scores of the two most important components, districts were segregated into different groups based on the score plot (Salvati and Zitti, 2009).

3. Results

The spatial distribution of the three income indicators in 2005 is shown in Figure 1. Per-worker value added in the Italian districts (a) identifies a north-south gradient with northern regions producing homogeneously above 50,000 euros per workers and southern regions being almost below this threshold. Central districts showed a more heterogeneous income distribution, alternating high and low productivity areas. Per-capita value added (b) showed a typical latitude gradient with the highest income districts concentrated in the Po plain (northern Italy) and in Rome metropolitan area (central Italy). A more patchy income distribution was observed in southern Italy according to the local socioeconomic context. Coastal areas usually diverged from inland areas as far as the income distribution is concerned.

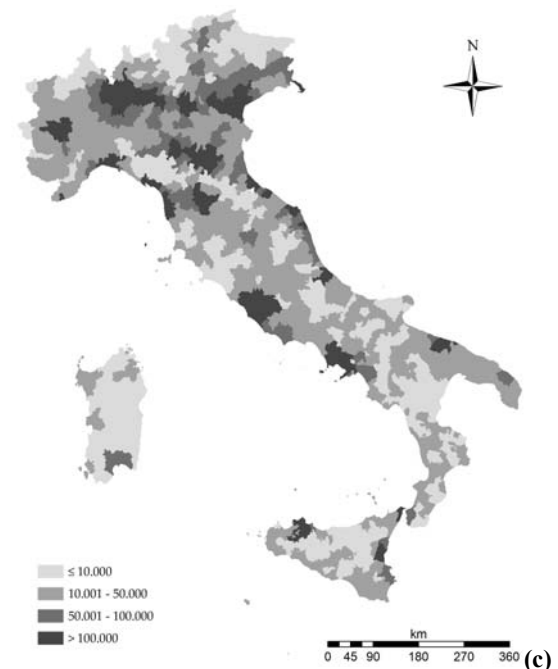
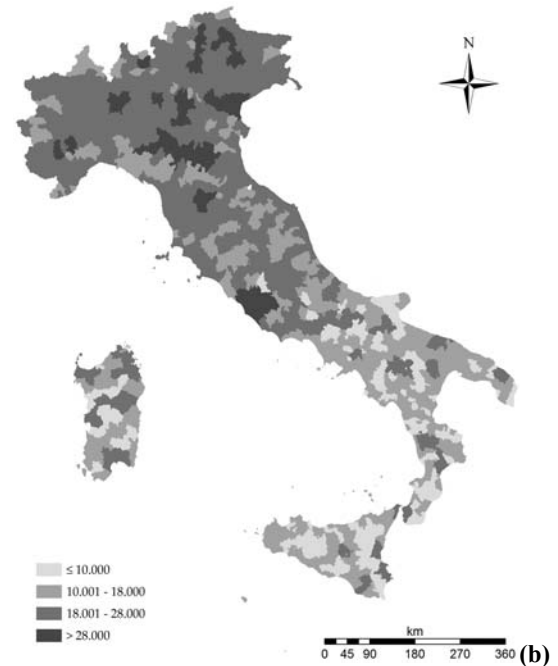
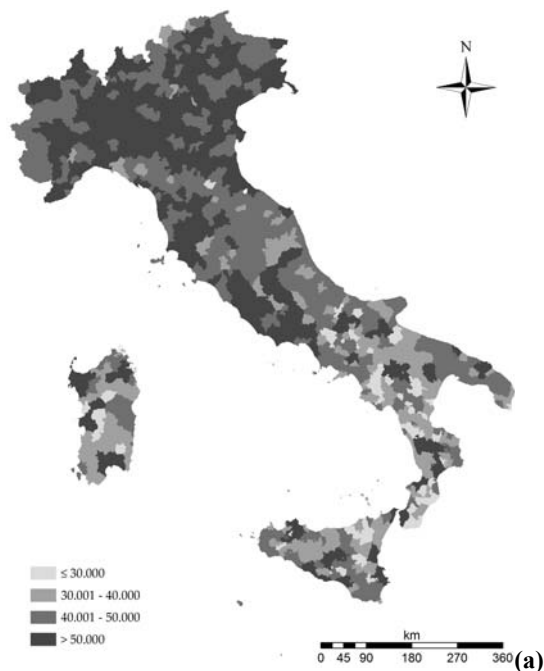


Figure 2. Maps illustrating the spatial distribution of (a) per-worker (b), per-capita and (c) per-area value added in the Italian districts (2001).

Finally, another territorial gradient emerged from the analysis of per-area value added distribution in Italy (c) evidencing the urban-rural divide based on the gap between large metropolitan systems (Rome, Milan, Turin, Naples, Genoa, Venice, Bologna, Florence, Pescara, Palermo, Cagliari, Bari and few other head towns) and less dense, internal or agricultural-devoted areas throughout the country.

Non parametric Spearman rank correlations were carried out separately between the three income indicators and the 15 selected socioeconomic variables (Table 2). A total of 10 and 9 variables respectively for 2001 and 2005 correlated significantly with all income indicators with coherent signs (South(-), pAGR(-), PR_IN(+), PR_SER(+), Urban(+), Dens(+), CapReg(+), CapPro(+), Dist_Pr(-); pIND(+) in 2001 only). As expected, this indicates a regional process of value added formation mainly based on economic agglomeration, the contribution of more productive industrial and tertiary sectors, the divided structure of urban-rural system and the consolidated gap between northern and southern districts. PR_AG and Sup were found positively associated to only per-worker and per-capita district income possibly suggesting the importance of the income standardization based on surface area and the urban-rural gradient identified by per-area income. This was confirmed by the negative correlation with Monta and DistReg found only with per-area income.

Table 2. Spearman correlations between the three income indicators and the selected socioeconomic variables (bold indicates significant coefficient at $p < 0.05$ after Bonferroni's correction for multiple comparisons).

Variable	Income		
	Per-worker	Per-capita	Per-area
	<i>2001</i>		
South	-0.62	-0.74	-0.29
pAGR	-0.58	-0.62	-0.65
pIND	0.33	0.46	0.20
pSER	0.01	-0.11	0.15
PR_AG	0.46	0.47	0.17
PR_IN	0.76	0.71	0.40
PR_SE	0.88	0.75	0.57
Urban	0.30	0.33	0.29
Monta	-0.13	-0.08	-0.55
Sup	0.47	0.47	0.12
Dens	0.30	0.25	0.92
CapReg	0.20	0.21	0.21
CapPr	0.44	0.42	0.46
Dist_reg	-0.09	-0.18	-0.23
Dist_pro	-0.38	-0.33	-0.53
	<i>2005</i>		
South	-0.60	-0.75	-0.29
pAGR	-0.62	-0.68	-0.64
pIND	0.21	0.37	0.16
pSER	0.14	0.00	0.18
PR_AG	0.38	0.30	0.13
PR_IN	0.75	0.74	0.41
PR_SE	0.90	0.76	0.58
Urban	0.33	0.34	0.29
Monta	-0.18	-0.09	-0.56
Sup	0.49	0.47	0.12
Dens	0.35	0.27	0.93
CapReg	0.20	0.20	0.21
CapPr	0.49	0.43	0.46
Dist_reg	-0.10	-0.17	-0.22
Dist_pro	-0.41	-0.33	-0.53

Out of 26 examined variables, PCA extracted three main components explaining together 60.2% of the total variance. Loadings were reported in Table 3. Component 1 (37.2%) identifies, for both examined years, a gradient based on the opposition between per-worker and per-capita value added, in turn associated positively with labour productivity of industry and services and negatively associated with the share of agricultural product in district value added. This component clearly reflects a north-south gradient. Component 2 (15.5%) identifies a gradient primarily based on agglomeration economies with per-area value added and population density showing the highest positive loadings. This suggest that the three income indicators proposed here assess different economic dimensions and thus can be used together in a more comprehensive analysis of regional competitiveness dynamics. Finally, component 3 (7.5%) is primarily based on sector specialization in industry and services characterizing especially northern and central Italian districts. The share of industrial product on district value added is negatively correlated with the share of service product on district value added along component 3.

Table 3. PCA loadings (bold indicates significant loadings $> |0.6|$; * indicates supplementary variable in the analysis).

Variable	Factor 1	Factor 2	Factor 3
South	-0.67	0.40	0.13
pAGR01	-0.68	-0.05	-0.07
pIND01	0.42	-0.49	-0.61
pAGR05	-0.71	-0.01	-0.04
pIND05	0.38	-0.50	-0.64
PR_AG_01	0.40	-0.33	-0.31
PR_IN_01	0.72	-0.27	0.02
PR_SE_01	0.77	-0.10	0.28
PR_AG_05	0.27	-0.22	-0.22
PR_IN_05	0.74	-0.29	0.00
PR_SE_05	0.81	-0.04	0.30
VAOC01	0.91	-0.19	0.18
VAOC05	0.91	-0.12	0.22
VAPC01	0.92	-0.19	0.05
VAPC05	0.90	-0.17	0.08
VAPS01	0.57	0.71	-0.28
VAPS05	0.57	0.72	-0.28
Urban	0.40	0.19	0.32
Monta	-0.25	-0.34	0.21
Dens01	0.38	0.81	-0.34
Dens05	0.39	0.81	-0.35
Sup	0.46	-0.18	0.40
CapReg	0.31	0.42	0.18
CapPr	0.54	0.36	0.38
Dist_reg	-0.26	-0.13	0.22
Dist_pro	-0.49	-0.28	-0.02
*pSER01	-0.04	0.52	0.65
*pSER05	0.00	0.50	0.66
% variance	37.2	15.5	7.5

Factor score plot (Figure 2) indicates a quite homogeneous distribution of local districts along

component 1 reflecting the north-south gradient (northern and more affluent districts with positive PCA scores) and a more heterogeneous distribution along component 2. Some metropolitan areas (Milan, Naples, Rome, among others) were identified along component 2 and characterized by high per-area district value added in both 2001 and 2005. Only moderate differences between 2001 and 2005 were found in the relationship among variables as shown by PCA. This indicates that the economic structure and local performances changed only moderately in the short-term in Italy conserving the structural patterns observed among income indicators and ancillary socioeconomic variables.

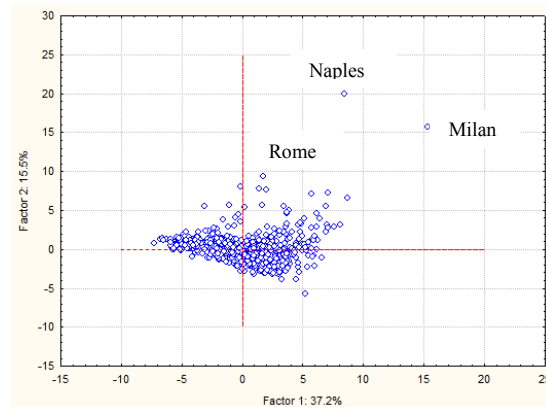


Figure 2. MFA factor score plot

4. Discussion

The present study provides insights in the analysis of local development in a divided country exploring the spatial distribution of three income indicators and a set of socioeconomic variables made available at the district scale in Italy at two years (2001 and 2005). High-resolution spatial units and key socioeconomic indicators together with diachronic multidimensional approaches are successfully applied to the study of regional competitiveness and territorial disparities. Despite some criticisms concerning the relevance of the LLMA district as an homogeneous economic region (Giusti and Grassini, 2007), this spatial unit shows appreciable features that fill the need for data integration, reliability and relevance to regional issues (Salvati and Zitti, 2009).

Results highlight the importance of integration among different income indicators, possibly producing a more comprehensive picture on the local economic structure and performances. At the same time, results indicate an increasingly complex economic geography of Italy reflected in the multiple

relationships among income indicators and the ancillary socioeconomic variables (Dunford, 2008). Especially the north-south gap consolidated in the last year and other gradients (urban-rural, coastal-inland, among others) emerged from the analysis as particularly important to determine territorial disparities (Dunford, 2002). Geo-economic gradients involve processes, related not only to economic but also to organizational, institutional, social and cultural factors (Dunford and Greco, 2007), which develop at the regional scale and need specific monitoring based on local-scale indicators and geographic information systems as a support to decision-making and developmental policies. More comprehensive income indicators can also offer a novel contribution to the study of sustainable development of local districts (Zuindeau, 2006, 2007; Karlsson, 2007).

Permanent monitoring of socioeconomic conditions on a local scale may benefit from a holistic approach based on multi-scale quantitative models possibly coupled with qualitative approaches. Both process understanding and policy implementation depend on the mutual interactions among the drivers of economic development acting differently at the various relevant geographical scales.

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Motivation at Work of Brazilian Executives

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Abstract – This study aimed to verify the extent to which the Brazilian executives are motivated at work. Companies seek constantly for practices that allow greater motivation of employees in day-to-day activities. Such search gets particularly important when looking at the work of executives in Brazil, in which working conditions are extremely stressful, whether by race against time, either by issues relating to the relationship among people. Traditional management theory seems to be ineffective when searching for the solution of problems related to the process of management of employees motivation.

Keywords – Motivation, Brazilian Executives, Logistics, Neuromotivation, People Management.

1. Introduction

The world is increasingly dynamic. All this dynamism has reversal effects in the intensive conditions at work, stressful traffic, boss demands, little time for personal life, among other many stress factors in everyday's professionals life. The professionals are getting discouraged with their job's life. Particularly in the logistics industry which requires much control and rigorous deadlines, as very few other economy' segments have. This generates a huge concern for businesses, particularly for people management departments. Thus the big question for companies is how to better understand the motivation at work?

The answer to this question is not easily answered. However, recent studies on the subject of neuroeconomics applied to motivation at work point to three crucial factors:

- we are influenced by our genetics features;
- the working environment is important for

the workers's performance;

- it is possible to change brain connections, with training processes, to act in a more motivated way at work.

Some managers *status quo* may hinder the improvement of some aspects related to motivation in their working life. This happens despite the scientific evidence that humans are not as rational as it is proposed by many studies of Orthodox Economics. In truth, just a few number of large companies have awakened to this reality. These companies already use some incipient forms of these physiological techniques using also the study of the brain itself to the professionals development. These companies have been deployed in front of the rivals in this area.

People are partially programmed in order to present specific reactions before a stimulus. For example, many people's body low production of the serotonin neurotransmitter tend to feel much more a "hard lesson" from their boss, what sometimes makes them to become less motivated.

However, not everything depends on genetics. The truth is that the environment and life experience of each one also influences on vocational motivation. Just imagine a professional who has just been hired to take a big job in a company. Arriving there he is placed in a room with terrible conditions of structure, accompanied by bad employees and to complete this scenario he finds out that there are several types of moral abuse in the company. Certainly, he comes to a frustration situation, being led to think about going back to the old job. The conditions of the working environment **are** important, because the brain will

present reactions as the body's interaction with that environment. Genetics and professional's life experience will determine the perception. If this perception is negative it tends to undermine his forces for the proper execution of his work.

Therefore, unlike the dominant idea in the corporate world of hard management of motivation, it may be possible to manage the process of motivation in the company through a new vision bringing interesting results. There is an important methodological difference. While the traditional model is based on subjective criteria, which leads to disbelief of the effectiveness of the method, the strand of neuroeconomics utilizes physiological variables which facilitates the quantitative treatment of information collected and therefore allows a better management of the motivation.

2. Motivation at Work

Motivation is an internal strength of the individual that allows the creation of personal and economic value through a specific action. Using a brief query to the dictionary, some specs on the meaning of motivation can result, as follows: motivation is the act of raising the interest for something; there is a set of factors that determine the conduct of someone; it is the process that triggers a conscious activity. Considering these appointments, some clarifications can be performed. The motivation awakens a desire because it is linked to the performance of activities that direct the individual to reach his goal. These activities are specific and so it is possible to find there a set of factors that influence the result and the achievement of the goal. It is conscious because the motivation is materialized in physical and mental developmental activities for the realization of tasks.

Although there is a concisely concept of motivation found in the dictionaries, these definitions may little explain the motivation related to economic life.

Motivation is an issue that has aroused much interest on scholars now and in the past. Several are the conceptual aspects in this area. Some ideas related to the motivation conceptualization relating to various areas of study can be presented as follows:

- In ancient Greece, the Greek philosophers believed that the motivation was fruit of the hedonists principles. In this way each individual should at all minimize the pain and maximize pleasure.

- Considering the concepts focused on economic life, it is necessary to identify the motivation derived from studies of orthodox economists, for which every action in economic life is motivated by a possibility of optimization of productive resources. Therefore, the individual acts on the basis of how much he expects to win (not losing) for each action. For example, faced with the possibility of investing in an ice cream parlor that would yield 7% per month or of investing a fixed income investment in a commercial bank that pays 11%, he will surely not invest in the ice cream shop to invest in the fixed income. However, in the course of this text, it can be seen that human brain works differently than expected, in particular, on the assessment of risk, uncertainty and trial.
- Motivation refers to the forces that drive and sustain the efforts of people in a particular direction (see Bateman and Snell, quoted by Macedo *et al*, 2006). Already for Motta cited by Macedo *et al* (2006, p. 92) motivation is the energy coming from the set of aspirations, desires, values, challenges and individual sensitivities, manifested through specific goals and tasks. According to Porter cited by Macedo *et al* (2006, p. 92) the ideal conditions to have strong motivation are the ones in which personal energies and skills are sufficient to meet organizational expectations, and resources of the organization are also suitable to meet the individual needs and goals.

Despite the enormous effort of many authors in various areas of knowledge now, with the advent of modern neuroscience, scientists have additional tools to deliver results with an increased efficiency in motivation study.

It is important that a professional is motivated to achieve his goals. Generically, in the professional's life a professional will be motivated if he is able to get the achievement and success; in the economic life, motivation means to have a greater productivity and value creation.

Motivated employees tend to be loyal and dedicated and become, willingly, "ambassadors" of their companies. Actually, it is common knowledge the

fact that companies with motivated employees have lower employees to leave the company and tend to outperform their competitors in sales and profits (see Silverstein, 2013, p. 14).

People, in average, may spend a third of their lives in the workplace. In this sense, identifying factors that allow motivation is essential for good performances, especially in this contemporary world, where the search for innovative professionals is increasing each day. Without motivation there is no innovation. Therefore, companies around the world are conspicuous by their professionals' selection and training to get able to be motivated and so providing innovations for the company.

A motivated team of professionals is essentially more productive and ultimately influences much of the company. This is the "contagion effect" that implies the distribution or propagation of a meme to a social group. However, a professional without motivation has the power to contaminate the others negatively.

In this context, both endogenous factors like genetic formation of a professional, as exogenous factors as, for example, life experience, education or culture, can determine whether a professional will be motivated at work.

Imagine a person who is in his first professional stages in a company, who is humiliated constantly at work, affecting his moral values, performing his tasks without receiving any feedback from other colleagues or his superior. What will determine whether the professional feels negatively about this situation is his way of being which, as seen before, depends on the genetic formation and experience of life. Every time the individual interacts with the environment, his brain will process the information by choosing at last the possible perception based on these two factors (see Berns, 2009).

In a series of recent studies, it was evidenced that the contempt at work activates brain regions responsible for pain. In this way, something that seemed without much importance is showed to be essential among the many factors that the leader must manage in his day to day professional life.

When a professional suffers from the lack of motivation he enters in a situation of "airplane mode" at work. He no longer transmits or receives information, he does not connect anymore to anyone

and he is operating at work without being engaged in the objectives of the company and its team.

After having seen some specific points it is necessary to make some additional notes about job satisfaction, by starting considering the following question: letting the employee fully satisfied at work is good? An apparently unpretentious question is configured, in truth, as a paradox. A professional who is fully satisfied at work runs the serious risk of getting into a motivational danger zone. This fact is consistent with the operation of the brain reward system.

Having a professional doing his best regardless of existing context in the company is, with no doubt, one of the biggest challenges of contemporary companies. However, the absence of brain research techniques did not allow an assertive approach.

On the basis of modern research techniques in neuroscience, today it is possible to present solutions with a high level of precision and effectiveness for generating personal motivation.

According to Nohria *et al* (2008, p. 86) the human being is guided (motivated) by four basic impulses. They are:

- Impulse purchase - we are all moved to obtain scarce goods that reinforce our sense of well-being. We get thrilled when these wishes are satisfied and we are thwarted when that desire is frustrated. This phenomenon applies not only to physical goods like food and clothing, housing or money, but also to experiences like travel and leisure and, of course, for things that improve the social status of the individual, as being promoted and earn a larger room or taking place in the Council of the company. The impulse to acquire tends to be relative (we are always comparing what we have with the possessions of others) and insatiable (we always want more). This explains why people call not only for their own salary, but for everybody else's, too. And it also shows why it is so hard to impose salary ceilings.
- Boost to form tie - Many animals create bonds with their parents, with family members or the tribe, but only man extends these bonds to larger groups, such as organizations, associations and Nations. The

desire to form ties, when satisfied, is associated with strong emotions such as love and care and, if not, the negative feelings such as loneliness and anemia. At work, the desire of forming ties, if accomplished, allows a huge increase in motivation when people feel proud to belong to the Organization and is followed by the collapse in their morale when betrayed by the institution. There is also a big difficulty in breaking divisional or functional sets: people get connected to the closest colleagues. However, sometimes there is the ability to establish links with larger groups leading the person to care more about the Organization as a whole rather than a particular group within it.

- Impulse to understand – There is a great desire to understand the world around and to produce theories and scientific, religious and cultural reports that allow the understanding of facts and suggest actions and reasonable answers. We feel frustration when something seems meaningless. The challenge of seeking answers, generically, energizes us. At work, the impulse to understand makes us to desire to give a significant contribution. The individual is motivated by a job that challenges and allows him to grow and to learn; an individual demoralize by the activity that sounds dull or seems to lead to nowhere. Feeling without prospects, a talent worker may tend to leave the company to get challenges elsewhere.
- Impulse to defend himself - we have a natural impulse to defend ourselves from external threats: our own person, our possessions, our achievements, our family and friends, our ideas and beliefs. This desire has its origin in the basic fight-or-flight response common to most animals. In man, manifested not only as a defensive or aggressive behavior, but also how to create institutions that promote justice, which have clear goals and intentions and to allow people to express their ideas and opinions. Satisfied this impulse of defending, a feeling of trust and security is produced; otherwise a feeling of frustration generates negative feelings like fear and resentment. The

human impulse to defend himself says a lot about the people's resistance to change; it is one of the reasons why people can be devastated by the possibility of a merger or acquisition - an especial significant change may come even though the business is the only way out for the survival of the organization. A person can hear, for example, which has excellent performance and it is essential for the success of the company, but the next day may be informed that he/she may lose his/her job due to a restructuring; it is a direct challenge what makes the individual to tend to defend from the uncertainty.

Each of the four pulses described above is independent; there is no way to sort them hierarchically or to trade one for another. It is useless paying a wonderful salary and expecting the people get excited by the work in an organization that does not promote the formation of ties, or in which the work seems without sense or people feel helpless. Besides, it is not enough just to help people to establish links and form a cohesive team when wages are low or the job is boring. Obviously it is possible to have people working in this context. However, they will never work hard enough for reaching companies' aims (see Nohria *et al*, 2008, p. 89).

While contemplating the four basic emotional impulses of personnel is essential to any company, research carried out suggests that each of them reacts better to a distinct and specific organizational lever (see Nohria *et al*, 2008, p. 89), as suggested:

Awards system - the best channel to the satisfaction of the impulse to acquire is the awards system of the organization – awarding the best with effectiveness, rewarding according to the performance and giving the chance of progressing to the best performances.

Culture - the best way to satisfy the urge to form ties is to generate a strong sense of camaraderie by creating a culture that promotes teamwork, collaboration, openness and friendship.

Design of work - to satisfy the impulse to understand the best is to make the work interesting, challenging, with sense.

Performance management processes and resource allocation - fair, reliable processes and transparent

performance management and allocation of resources help to satisfy the desire of people's defense.

According to Nohria *et al* (2008, p. 88) for evaluating the motivation is necessary to measure four basic indicators:

- Involvement - the involvement represents the energy, effort and initiative that the individual displays at work;
- Satisfaction - satisfaction reflects the extent to which workers believe that the company satisfies their expectations at work and complies implicit and explicit contracts signed with all;
- Commitment - the commitment shows to what extent the workers engage in corporate citizenship;
- Intention of leaving the company - the intention of leaving the company is the best indicator of workers' leaving the company.

So, the motivation at work appears in the emergence of a new model. This model is based on motivational impulses that direct the study of motivation, not to the reasoning ability, but rather to the unconscious side of decisions.

3. The Study

To carry out the study an investigation was conducted with executives of the cities of Ribeirão Preto, Franca, Campinas, São José do Rio Preto, Caxias do Sul, Curitiba. The ultimate goal is to map the motivation of those executives as much as the intermediate objectives:

- verify the involvement with the work;
- job satisfaction;
- the commitment in the work; and
- the intention to leave the company.

The study was conducted between July 2013 and April 2014 by sending emails to the executives. The criterion for choosing the sample was based on accessibility.

3.1 Results

Figure 1. Involvement on Work

Options for the Answers	Answers (%)	Answers (number)
1	1.5 %	2
2	4.5 %	6
3	19.7 %	26
4	31.1 %	41
5	43.2 %	57
Total	100%	132

Source: Authors, based on field research

Considering a scale ranging from 1 to 5, where 1 represents a lesser degree of involvement and 5 the greatest possible degree. It was observed that most of the respondents have high involvement with the current work (the involvement represents the energy, effort and initiative that the individual displays at work).

Figure 2. Satisfaction with current job

Options for the Answers	Answers (%)	Answers (number)
1	4.5 %	6
2	18.0 %	24
3	23.3 %	31
4	36.8 %	49
5	17.3 %	23
Total	100%	134

Source: Authors, based on field research

Considering the satisfaction with current job, it is observed that most of the respondents consider themselves satisfied with the current work (the degree of satisfaction reflects the extent to which the respondents believe that the company satisfies their expectations at work and implicit and explicit contracts signed complies with everyone at work).

Figure 3. Commitment at work

Options for the Answers	Answers (%)	Answers (number)
1	2.3 %	3
2	5.3 %	7
3	12.0 %	16
4	36.1 %	48
5	44.4 %	59
Total	100%	133

Source: Authors, based on field research

As regards commitment most employees present high commitment to work (the appointment shows how far the respondents engage in corporate citizenship).

Figure 4. Intention of leaving the company

Options for the Answers	Answers (%)	Answers (number)
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1	18.7%	25
2	11.9%	16
3	23.1%	31
4	22.4%	30
5	23.9%	32
Total	100%	134

Source: Authors, based on field research

The intention of leaving the company is an important indicator because it measures the rotation in occupied positions in the company. In this case, the higher the index, the less willingness to leave the company. Considering the results, it is possible to see that Brazilian executives have little desire to leave the company at the moment. This can be checked by seeing that the sum of the larger values (3, 4 and 5) reached 69.4%.

Figure 5. Schooling

Options for the Answers	Answers (%)	Answers (number)
High School	2.2 %	3
Higher Education	27.6 %	37
Graduate/MBA	55.2 %	74
Master's Degree	9.0 %	12
PhD	4.5 %	6
Postdoctoral	1.5 %	2
Total	100%	134

Source: Authors, based on field research

Based on the results it was possible to verify that the vast majority of respondents (55.2%) have completed at least one MBA course, 27.6% completed higher education. Joining holders of master's degrees, doctorate and post-doctorate, a percentage of 15% was obtained. Therefore, it is possible to conclude that the executives that were interviewed have excellent academic training. This is not surprising once they are the elite of Brazilian professionals.

Figure 6. Sex

Options for the Answers	Answers (%)	Answers (number)
Male	67.7 %	88
Female	32.3 %	42
Total	100%	130

Source: Authors, based on field research

Taking into account that 67.7% of respondents are male and 32.3% female, it can be inferred that this result points to a growing trend of occupation of executive positions by women in Brazil. However, it is still a low percentage compared to the executive positions occupied by men.

Figure 7. Age

Options for the Answers	Answers (%)	Answers (number)
18	0.0 %	0
19-20	1.5 %	2
21-30	23.1 %	31
31-40	41.0 %	55
41-50	29.9 %	40
51-60	3.0 %	4
61-70	1.5 %	2
71-80	0.0 %	0
More than 80	0.0 %	0
Total	100%	134

Source: Authors, based on field research

Based on the results obtained from the executives interviewed, it is possible to see that most of them are between the ages of 31-40 years (approximately 41%). Then 29.9% of respondents are aged 41-50 years. Finally, 23.1% are between the ages of 21-30 years. This result reflects a certain normality in terms of occupation of executive positions as it is necessary to have some experience in the market.

Figure 8. Remuneration for work

Options for the Answers	Answers (%)	Answers (number)
1	6.0 %	8
2	16.5 %	22
3	41.4 %	55
4	27.8 %	37
5	8.3 %	11
Total	100%	133

Source: Authors, based on field research

Considering the obtained results it is possible to verify that the executives interviewed are reasonably satisfied with the compensation they receive: 41.4% of respondents appear in rating 3 (which is exactly in the middle of the table) and other 27.8% considered the score 4 as representative of their satisfaction with the remuneration received.

3.2 Some Notes about the Results

Based on the results obtained with the field research it is possible to mention some few notes about the motivation of Brazilian executives of classes A and B, as follows:

- Employees generally are motivated to work, given the degree of engagement, satisfaction, commitment and desire to leave the company;

- Executives who responded to the questionnaire were involved with the work. Perhaps a prudent explanation for this result is the level of requirement demanded in executive positions. Then it is expected that executives in particular, at the beginning and mid-career, may create high an expectations level for professional growth;
- In the question regarding job satisfaction the executives' respondents also presented a high degree of satisfaction. Compared to so many jobs on the market the wages, benefits and bonuses of executives portray themselves as the best in the labor market as a whole;
- The commitment to the job is another point at which respondents showed an high degree, that represents the degree in which he participates in the company's culture;
- The intention of leaving the company was the variable that was more balanced on top of the table, although the majority of respondents said not be willing to leave the company at the time;
- Respecting the general data of the respondents: more than a half have complete postgraduate course, with age varying between 21 and 51 years, 67% of respondents were male and 33% female;
- Finally, a variable was included beyond the scope proposed for measuring the satisfaction with the income received by executives. At this point, a little contradiction, because the executives presented neutrality; neither satisfied nor dissatisfied regarding the retribution for the work they offer to the market.

4. Some Conclusions

Facing new challenges derived from new forms of allocation of resources, in particular, of the media which require speed, accuracy and diverse skills of executives, it is possible to observe that the class A and B Brazilian managers have high motivation at work.

Despite the proposed indicators show that professionals are motivated not ends the discussion,

because it is necessary to find out by other means of investigation about the four impulses. For example, physiological research like reading facials' microexpressions may allow to discover what the main emotions are involved, being one way to reach the aims of this kind of study.

Another point concerns the fact that even for a questionnaire survey the sample was small and not adequately geographically distributed. This happens because the universe studied is difficult to reach, given the short time these professionals have available to parallel issues in addition to the functions carried out at work.

Despite the difficulties relating to the investigation, can be inferred that when considering the four basic impulses (urge to acquire, to form ties, to understand and to defend) to analyze the level of motivation at work, the survey reveals interesting results on the analytical contents compared to traditional models.

In this way it is possible to ascertain that when considering the theory of the four impulses the executives show high motivation at work.

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Tourism Destinations: A Methodological Discussion on Commons and Anti-commons. The 'Ammaia' Project's Locale Impact

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Abstract – In this work, a methodological study is made to analyze the specificities resulting from analyzing tourism destinations through commons and anti-commons frameworks. Some studies have been made recently in the area of tourism considering these frameworks. Although interesting results have emerged, there is yet much work ahead. Some studies have considerable results, but the fundamentals in tourism literature require yet much work in order to develop additional models to provide new combinations of tools to the decision makers to enhance welfare standards for communities and high levels of sustainable development in tourism structures. A project is studied on this context which the consequent analysis of the regional implications.

Keywords – Tourism, Tourism Destination, Commons, Anti-commons, Coordination Ammaia Project.

1. Introduction

Tourism became one of the most important activities for countries' economies. Tourism problems are classically discussed with authors around the world bringing to the discussion eclectic aspects of tourism phenomena. Many improvements have brought new tourism models to the actual debate.

The case of the commons and anti-commons theories applied to tourism can be included in these new developments emerged in literature. In Tourism Economics the discussion around commons and anti-commons in tourism can be found recently for authors as Andergassen, Candela and Figini (2013), Candela, Figini and Scorcu (2006) or Álvarez-Albelo and Hernández-Martín (2009), for example. In fact, in some conditions, it is possible to find out the two problems faced, which have conflicting properties: the commons and the anti-commons, conducting the tourism for over-production and under-production,

respectively.

In this paper, commons and anti-commons are presented and a discussion over the tourism problems involving these theories is made, having Ammaia Golf Course - a project in Alto Alentejo (Portugal) - as a backdrop to analyze the implications in the involving area management.

2. Commons and Anti-commons

The discussion around the definition of property rights is classical. The types of property rights require that the limits of these concepts are consistently investigated. As stated in Coelho, Filipe and Ferreira (2009), ambiguous concepts blur analytical and policy prescription clarity. For the analysis of this subject and clarification of the conceptualization on this matter see Coelho, Filipe and Ferreira (2009).

In property rights field, it is possible to define the actions that individuals can take in relation to other individuals regarding one object: if one individual has a right, someone else has the corresponding duty to match that right.

In common pool resources, there is an evident relationship between the separation in the property rights and the economic incentives, which has been studied in order to highlight the resulting implications and externalities.

Coase (1960) stated that well-defined property rights could contribute to well understand and overcome the problems of externalities, particularly those related to the common pool resources (open and shared resources).

The commons problems are discussed since the

middle of last century, involving the idea that commons problems reflect usually the overexploitation of resources. The “lack of property rights” implies that no one may exclude others to access to a given resource. The existence of many agents to use a given resource, in these conditions, causes an inefficient level for the resource use and causes a special motivation for agents over-using the resource. The real level of use for the resource will take place at a higher level compared with the optimal level for the society as a whole. A problem on the commons arises when the property rights are not clearly assigned and therefore private costs underestimate social costs, which results in over-production.

There are very diverse implications in the way that commons are managed. For instance, formal and informal cooperation between local government agencies in a region may lead to interesting solutions in terms of economic and ecological effects. Ostrom (1990) wrote that there is not a trap in the inflexible tragedies of the commons nor that people is free of moral responsibilities through the creation and support of incentives that facilitate the occurrence of results. There are rules and principles, community institutions and sometimes even partial property rights which may serve as engines of social effective arrangements to share common pool resources. Yet high transaction costs may imply that completely defining extensive property rights over common pool resources might probably be impossible.

By its turn, anti-commons theory has appeared representing the idea of an excessive partition of property rights. This theory has appeared in the 80's of last century, introduced by Michelman (1982). In the last years of the 20th Century several ideas about this new problem around property rights have emerged in which too many rights of exclusion and a reduced level of utilization of the resource are present. Many examples have been given in the areas of pharmaceuticals, intellectual property, or natural resources, for example.

When Michelman (1982) presented the notion of “anti-commons”, he defined it as “a type of property in which everyone always has rights respecting the objects in the regime, and no one, consequently, is ever privileged to use any of them except as particularly authorized by others”.

Considering the anti-commons conceptualizing, Buchanan and Yoon (2000) wrote that the anti-commons concept helps to explain how and why potential economic value may disappear into the “black hole” of resources underutilization.

The description of the “anti-commons” settings makes evidence of the lack of efficiency in several situations in which each one of several owners with property rights over a given resource has no effective rights to simply use the resource (and also, each one has the right to exclude other agents from its utilization) or to use it properly.

If property rights are too dispersed and complementary factors owners are unable to come up with efficient agreements, a “tragedy of the anti-commons” may happen (Heller, 1998 and Bergstrom, 2010).

Anti-commons tragedies conceptualization allow to join, in a unifying framework, a construction that reflects a set of coordination failures in very distinct areas, such as patents, telecommunications, eminent domain, tourism or bureaucracy, just to add some more cases to the supra mentioned anti-commons cases. Overcoming these failures may be difficult, often brutal, but solutions can be got, by understanding the problems and finding the solutions on the available set of strategies for agents, sometimes considering administrative solutions to overcome the problem. The ability for one person to veto a solution drastically increases the obstacles to get a solution.

It is interesting to observe Vanneste *et al* (2006) opinion that anti-commons dilemmas seem to elicit more individualistic behavior than commons dilemmas and are more prone to underuse than commons dilemmas are to overuse. These authors suggest that “if commons leads to ‘tragedy’, anti-commons may well lead to ‘disaster’” (see the case of aquaculture projects in Portugal in Filipe, Ferreira, and Coelho, 2011).

3. Tourism Destination

In general, the theoretical developments in Tourism Economics are based on the systemic nature of tourism and on the big heterogeneity of the tourism activities. Tourism presupposes a strong net of relationships among the economic agents in a complex system of interactions among local, regional and national levels of governmental

agencies, firms, tourists and residents. In this sense, tourist products necessarily include a set of heterogeneous and complementary goods and services, supplied by firms belonging to different industries which are mainly, but not exclusively, located in the tourist destination.

Considering that the tourist destination is, in essence, a travel destination that gets the attention of a large numbers of tourists, visitors may come to visit these destinations to see historical sites, natural wonders, national buildings, etc. Some tourist attractions also include many activities and souvenirs that are often got on these destinations.

As Leiper (1990) refers, cited in Andergassen, Candela and Figini (2013), from de researcher's perspective the tourism destination embodies all the specific and problematic features of tourism, such as its systemic nature, in which, the "space" plays a fundamental role.

In Leiper (2004), tourist destinations are defined as "places where travelers choose to stay awhile for leisure experiences, related to one or more features or characteristics of the place – a perceived attraction of some sort". Derived from the concept of tourist destination, also the tourist destination region may be considered for analysis as a geographic concept.

Considering that often the perspective of the definition may be depending on the scientific area of study, the tourism destination may, in fact, be understood, for example, as a product or a territory where visitors arrive to, or - as Cooper *et al* (2008) defend - a territorial system supplying tourism products to satisfy the complex demand needs of tourists.

For this definition, Cooper *et al* (2008) have identified the following common features of the destination:

- The destination is a "product" in itself, with an economic value;
- Such economic good is perishable: seasonality, the overload of tourists over its carrying capacity, the unsustainable use of natural resources etc. can reduce its economic value, thus leading the destination out of the market.
- In the destination, tourists and residents compete for a limited amount of available resources;
- The variety of goods and services which compose the tourism product must be of the same quality to guarantee the economic success of the destination.

Andergassen, Candela and Figini (2013) have pointed that:

- tourism supply meets demand in the destination;
- environmental and cultural resources, attractions and the hospitality industry are all located in the destination;
- the demand for tourism is revealed in the destination;
- tourism destination is the conceptual link between the complexity of the sector, the complementarity and substitutability of the many goods and services of which the tourism product consists, and the supply of available local resources.

4. Commons and Anti-commons in Tourism

To discuss the problem of commons and anti-commons in tourism area it is necessary to bring to the debate several additional essential considerations about this issue.

It is important to state firstly that – as mentioned before - the boundaries of these concepts have been largely discussed last decades and much work is needed to enhance new developments considering the large implications of the property rights discussion in so many different studying areas, as it is the case of natural resources or tourism, for instance (see Filipe, 2006; Filipe, Coelho and Ferreira, 2006a,b; Filipe, Coelho and Ferreira, 2007, analyzing this subject in the area of natural resources, or Álvarez-Albelo and Hernández-Martín (2009) for tourism, for example).

Considering the specificities of the common pool resources and their particular inherent features of subtractability and nonexcludability, they appear as usually indivisible local or global resources whose boundaries are difficult to delineate (Berkes 1998).

Many resources that are used by tourists are freely available (the landscape and the territorial spaces in general). In consequence, they can be considered as common resources, as proposed by Hardin (1968); other resources can be developed by the destination country or region, as it is the case of sports events, cultural events, etc.

For the tourism activities, it is possible to say that the resources are used in common by tourists, locals, and others. Usually it is difficult, even socially unacceptable, or physically impossible, to exclude any of these groups from using a given resource. In addition, consumption by one user may reduce the quantity of resources (of the same quality) available to others. This includes even those resources relatively abundant in supply, such as air, water, and scenery. The abandoned or the decaying structures, for example, are blots that spoil the area's landscape. Also the congested and overcrowded streets and other facilities, especially in highly heterogeneous tourist places, diminish variously the value of the tourist experience. This discussion suggests that the tourism resources possess the two distinguishing characteristics of common pool resources (nonexcludability and subtractability / rivalry) in addition to being indivisible and with "fluid" boundaries (see Briassoulis, 2002).

A central issue emerges to the debate related to the way how to manage the natural, built, and socio-cultural resources of visited communities in order to meet the fundamental conditions of promoting the economic well-being, of preserving the natural and socio-cultural capital, of achieving intra-generational and intergenerational equity in the distribution of costs and benefits, of securing their self-sufficiency, and of satisfying the needs of tourists (Briassoulis, 2002; Butler, 1991; Eber, 1992; Farrell, 1992; Hunter, 1997; Ko, 2001).

As referred in Briassoulis (2002), focusing on the central feature of the problem, the supra mentioned resources are used, on the one hand, by tourists in common with other tourists and, on the other, by tourists and locals. As "common pool resources" their exploitation by one user reduces the amount (or quality) available for others, being the exclusion of additional users difficult or impossible (Bromley, 1991; Ostrom, 1990). As a result, tourism resources experience the characteristic problems of common pool resources: overuse and lack of incentive for individuals to invest in maintaining or improving

them (Healy, 1994). Once they are overexploited, however, the sustainability is difficult to meet; thus, sustainable tourism development may be severely threatened.

Cerina (2007) considers also the existing relationship involving growth dynamics and environmental sustainability in a model in which tourism resources are considered common goods. A theoretical basis for the concept of sustainable tourism is also given.

In what anti-commons concerns, Candela, Figini and Scorcu (2006, 2008) were the first in using the concept of anti-commons to analyze tourism markets. On their paper, the authors concluded that tourist product is composed by a bundle of different goods and services, complementing to each other in the tourist destination and, hence, the local tourist systems might solve a problem of production coordination. However, such a combination might not automatically develop, since tourist production presents an anti-common problem, the policy maker intervention is required, although a private intervention (i.e., tour operator) could solve the problem too, even if a profit distribution conflict arises.

Within the destination, the tourism product is successful if the many firms offering single parts of the holiday are coordinated (Candela and Figini, 2010). This statement results from the existing complementarity between the single items which compose the holiday¹.

Considering that each firm owns the right to accept or to refuse the tourist in the destination, a problem of rights management is involved here².

The assumption of a good on which many agents share the same property right defines the anti-common.

According to Candela and Figini (2010), a tragedy of anti-commons may be present in tourism, once three dimensions of the coordination problem may be taken into account on this area: the coordination in

¹Lodging in a hotel is a complement good of the meal offered in the restaurant and, in general, of all the other goods offered by local firms.

²For example, if the hotel refuses the accommodation, it would produce a negative externality on the restaurant, since tourists would not travel to the destination. See Candela and Figini (2010).

quantities, the coordination in quality and the coordination in prices:

- Coordination in quantity: it simply means that the carrying capacity of one firm has to match with the carrying capacity of its complements, otherwise tourists would not gain the physical access to the destination. This involves, for the destination management, the right to plan the (sustainable) development of the territory in the long run, and the possibility to use pricing and booking strategies in the short run to counteract phenomena such as seasonality, overbooking etc.
- Coordination in quality: if there is a luxury hotel in the destination its guests would probably ask for a luxury restaurant. If, instead, there is only a pizzeria, or a take-away, tourists would probably not come to the destination at all. A complication arises when, at the same time, the destination hosts different types of tourism. In such case, the destination has to offer a range of different qualities (and varieties) in order to match the specific demands.
- Coordination in prices: without coordination among firms, the final price paid by the tourist may be too high, the number of overnight stays too low and, as a consequence, profits of the firms are not maximized. So, without coordination, there will be a market failure stemming from the anti-common property.

As referred in Álvarez-Albelo and Hernández-Martín (2009), Candela, Figini and Scorcu (2006, 2008) – when studying the local tourist systems - showed that when the complementary goods in tourism are produced under imperfect competition, the anti-commons problem may emerge. This problem appears when there is no coordination among the firms in making their decisions. As a consequence, each industry charges its own mark-up, which leads to a higher package price and a smaller tourism production than if a unique mark-up were charged on the package price.

Álvarez-Albelo and Hernández-Martín (2009) have studied countries with a high level of specialization in tourism, and basing their study on a set of premises

they analyzed the effects of the commons and anti-commons problems on the aggregate equilibrium of a tourism economy. They studied these market failures with consequences on factor allocation and welfare as much as the appropriate governmental measures to reach a suitable policy. In the case of the commons the authors consider a congestion problem (not a tragedy – not an exhaustion of the common resource due to overuse). It is interesting to note that several cases are analyzed, considering several working hypotheses (for the specific contextualization, see Álvarez-Albelo and Hernández-Martín, 2009). The first situation deals with direct selling wherein the local and the foreign firms make their decisions independently. In this case, it would become optimal to tax the local tourism price whenever the commons problem overcome the anti-commons problem. When the opposite applies, subsidizing would become optimal. With the emergence of tour-operators, according to the authors, based on the industrial organization literature, the joint maximization of profits would be a solution for the anti-commons problem, provided that a unique mark-up is charged (see Álvarez-Albelo and Hernández-Martín, 2009, considering Andreiychenko, Girnius and Saha, 2006 analysis).

In the tourism markets, tour-operators choose the package prices and productions that maximize the total surplus, and then the surplus is shared out between the tour-operators and the local firms through negotiation processes. According to Álvarez-Albelo and Hernández-Martín (2009) from the firms' point of view the joint maximisation of profits would be a solution for the anti-commons problem, but not from the perspective of the tourism economy because the maximization of the total surplus does not imply the maximization of profits earned by the tourism country. It is relevant to note that foreign tour-operators and tourism destination do not have the same objectives, and consequently their views on the problems' solution for commons and anti-commons necessarily differs considerably.

In that situation, in the particular case of an economy specialized in tourism the commons problem may remain unsolved (congestion problem), and therefore, a public intervention is needed to reduce the tourism production.

In this study, the authors conclude that:

- since the foreign transport services and the local tourism goods are complementary, they can be combined as a package, and hence the direct selling and the presence of foreign tour-operators emerge as possibilities;
- in the direct selling situation the optimal policy depends on the relative importance of the problems;
- the presence of either one or several tour-operators does not solve the anti-commons problem provided, and it always leads to tourism over-production;
- the existence of a unique tour-operator does not solve the congestion problem;
- under sensible assumptions, the switch from several tour-operators to a single one turns to be welfare reducing;
- the tour-operators seek to maximize profits and not welfare of the tourism destination;
- the government at the destination should not leave the solution of these problems in the tour-operators' hands;
- the study is somehow limited once there are restrictive hypotheses in their theoretical framework (although they believe the main conclusions may prevail).

Andergassen, Candela and Figini (2013), by their turn, model the optimal development strategy of a tourism destination³ by identifying and analyzing two key economic features:

i) the long-term choice of whether to invest in the enhancing of natural and/or cultural resources (which act as common goods in the destination) or to increase the degree of sophistication of the tourism product (intended as the variety of complementary services to accommodation that are demanded by tourists);

ii) the short-term choice of whether or not to implement price coordination among local firms, a

problem stemming from the anti-common nature of the tourism product.

Their economic model for the tourism destination focuses on these specific aspects of the economics of tourism which have not been properly addressed by existing literature, i.e.

i) the issue of coordination between local firms and

ii) the degree of sophistication of the tourism product.

The works of Andergassen and Candela (2012) on the issue of sophistication were extended and integrated in the Andergassen, Candela and Figini (2013) study, including the supply of a variety of different local goods and services that are also demanded and purchased by tourists during their stay, and also the works of Candela, Figini and Scorcu (2006, 2008) and Candela and Figini (2010), who addressed the issue of price coordination.

Andergassen, Candela and Figini (2013) approach also follows Papatheodorou (2003), who was the first to formally analyze the issue of the complementarity and variety of services within the tourism product, and Wachsman (2006), the first to formally analyze the problem of price coordination within the destination (see also Alvarez-Albelo and Hernandez-Martin, 2009).

In Andergassen, Candela and Figini (2013), the authors generalized the problem of coordination, tackling the main limitations in the results of Wachsman (2006) and Candela, Figini and Scorcu (2006/2008) and jointly considered sophistication and coordination, thus building a unique economic model to describe the development and the organizational pattern for the tourism destination.

This approach allows important implications for the economics of the destination, by highlighting important policy outcomes for destination management and local stakeholders.

By comparing the solution of no coordination with those in the case of exogenous coordination through the destination management and endogenous coordination through the tour operator, the authors present the following:

Theorem 1 (The Coordination Theorem). Given the anti-common property of the tourism product,

³ These authors make a classification of destinations based on the type of coordination and on whether the primary resource is natural, cultural or organizational.

coordination among firms in the destination, which can either be provided by the destination management or by a tour operator, increases profits from tourism.

Then, can be seen that price coordination enables the tourism activity in the destination to be more efficient. It can be noted that this is an example of the prisoner dilemma where (price) coordination yields a Pareto superior solution to non-coordination.

Besides, a “Love for Variety Theorem” for the destination is presented by the authors, allowing tourism to “take-off” in the long run. Variety in the tourism product can then be a strategic asset:

Theorem 2 (Love for Variety Theorem). As long as the negative externalities on tourism quality are small, reorganization of the tourism destination toward increasing the variety of available goods and services raises tourists’ welfare and their willingness to spend on tourism at the expense of non-tourism consumption, thereby stimulating the economic development of the destination.

As a conclusion, the authors show that there are two key issues that have been identified in order to understand the rise, specialization, development and institutional arrangement of tourism destinations:

i) the choice between investing in the variety of the tourism product (its sophistication) or enhancing local resources;

ii) the coordination of local firms, stemming from the anti-common property of the tourism product.

As can be noted, important developments have emerged to analyze the tourism destinations as a significant part of the tourism literature. This kind of approach to this theme is an important contribution to provide a manageable tool to the decision makers in order to solve several kind of tourism dilemma when facing tourism management problems. The framework of commons and anti-commons allows to methodically organize possible solutions for a set of problems arising in the tourism area.

5. The “Ammaia” Project in Marvão/Sintra, Alentejo Region, Portugal

5.1 Geographical and Historical Contextualization

Northern Alentejo – Portalegre District – is a very preserved region. There are vast plains, mountains, thermal waters, dolmens and menhirs stones, manor houses, ancient convents, wineries, ... There are also festival and fairs, popular music and dancing, local art. The region is intended to maintain tradition and, in general, it has been kept offside of all tourists paths and from tourism mass.

Since prehistoric times this region has been sought by mankind. Over half a hundred dolmens and menhirs - of which that Meada (Castelo de Vide) is the biggest of the Iberian Peninsula - bear witness to the exuberance of the megalithic culture. The Romans were to surprise the natives in their fortifications. They built on the best lands of the valley and plains. The Roman town of Ammaia (Marvão) and the Roman villa of Torre de Palma (Monforte), with their beautiful mosaics retell a little of the splendours of the Empire. Following the Barbarians, the Moors left their indelible imprint on the language, the agriculture, the military architecture (Elvas, Marvão) that the Christians from the North were able to assimilate and transform into anchors of Portuguese nationality. The castles and town walls of the Northern Alentejo - which form the country's most important group of fortifications - as well as the headquarters of the powerful military religious orders (Crato, Avis) constitute the eternal documentation of those disturbed times of the fight for independence. They now form a countless nucleus of historic centres unmatched in Portugal: Marvão - World Heritage candidate, Castelo de Vide, Portalegre, Crato, Alter do Chão, Campo Maior, Elvas. Touches of Manueline, Renaissance and Baroque erudition's were added to their vernacular purity, in places, churches and convents, permitted by the centuries of the Discoveries.

5.2 The Geographic Triangle: Portalegre - Castelo de Vide - Marvão

Natural Park of Serra de S. Mamede is a very beautiful natural region.

Portalegre lies on one of the sides of Serra de São Mamede, a mountainous range with a variety of fauna and flora, part of which has been designated a natural park. Portalegre itself is of roman origin though it is filled with fine Renaissance and Baroque mansions. Castelo de Vide, on another green slope of Serra de São Mamede, is known for its curative waters since roman times and its castle, that gave the

town its name. From the castle in Marvão, spectacularly set on an escarpment facing Serra de São Mamede and Spain, the splendid views can be enjoyed over the fertile plains. This small and tranquil medieval town is completely enclosed by walls, with whitewashed houses blending into the granite of the mountains.



5.3 The Project

On this scenario, some projects have been developed, some of them with considerable investments. "Ammaia"⁴ was the first golf course emerging in Alentejo countryside away from coastal areas. It was a handsome space fully integrated in the landscape of the Natural Park of Serra de S. Mamede.

It was inaugurated in April 1997, being the first golf course in Eastern Portugal and the first one in Alentejo, located 5 Km from the historical village of Marvão (UNESCO world patrimony candidate) and 6 Km from Castelo de Vide, also known as "Sintra of Alentejo".

When it opened in 1997 offered varied infrastructure: areas to train, bunker and chipping areas, putting green, a clubhouse offering restaurant and bar services, manual and automatic trolleys, among other services.

Landscape is fabulous in the area, allowing magnificent sightseeing over Marvão and S. Mamede's mountain.

⁴ Ammaia is the name of a 1st century Roman city, located at 2 Km from the golf course, and that gave the name to the golf project. The Ammaia-Clube de Golf de Marvão, S.A. was the owner of the project.

This golf course has been ranked by the magazine "European Golf" in 1999 as the 7th most beautiful of Portugal (with respect to the surrounding landscape and insertion of the field in the landscape) and was distinguished as the "Golf Course of the year" by the Portuguese Federation of Golf, in 2000.

As published in the website <http://www.portugalgolfcourses.com/portugal/golf/alentejo/marvao.html>, covering 137 hectares of the São Mamede Natural Park and strategically placed in the Marvão – Portalegre - Castelo de Vide triangle, the Ammaia Club de Golf of Marvão was a pioneer in the Alto Alentejo. As referred before, the name comes from an ancient Roman town that was once there, and which historic remains can still be seen scattered about the course. The welcoming clubhouse was inspired by the design of a typical Alentejo house, perfectly blending with the local landscape.

The course⁵, designed by the Architect Jorge Santana da Silva (also responsible for the Amarante and Quinta da Barca courses), has undulating greens, several bunkers and four lakes. Three of these lakes are in the early part of the course (14 holes in flat terrain), and one in the challenging final sequence of four holes set in elevated countryside.

5.4 The Project Failure

Despite all the potentialities, Marvão golf course is closed since 2007 after having entered into insolvency proceedings, in 2006, when it belonged to Carlos Melancia, former Governor of Macau.

In April 2007, through the Solévor, the Fernando Barata Hotel Group acquired the property of "Ammaia Clube de Golf de Marvão, SA", after the insolvency of the company, requested by the Administration and decreed by court, due to debts to suppliers and employees.

The same group, which had previously purchased the tourist village associated with the golf course, the "Aldeia d'Azenha", was one of the four partners of

⁵ Running to 6,170 metres, the emphasis of this course is on holes number 4, 12 and 17. Hole number 4, is a Par 4, requiring a precise drive because of water running along the right side of the fairway. Hole number 12, a Par 5, rises sharply to finish with a green made up of a double platform. Hole number 17, a Par 3, has a teeing-off point set on high ground, while its green is placed in a peninsula surrounded by water on three sides and exposed to the wind.

Ammaia, also integrated by Bevide, a company of Carlos Melancia (Ranhola, 2007).

The company of Fernando Barata has left the project for breach of deadlines for payment to the Commission of insolvency, and lost a deposit of about 400 thousand euros.

In 2009, The Edge Group, real estate fund of Miguel Pais do Amaral and José Luís Pinto Basto, tried to buy the project by 750 thousand euros. However, they did not reach an agreement to get the project. The *Turismo de Portugal*, for saving the golf course, bought it at public auction in February 2010 by 565 thousand euros. In 2011 a group of private investors offered about 640 thousand euros to acquire the venture (Conceição, 2011).

A new golf course is being studied for Abrunheira, Portalegre, when in the region of Portalegre already exists the above mentioned example of failure: the Ammaia golf course, Marvão, which current abandonment of land and associated buildings are clearly visible. Nowadays, sheep can be seen grazing in these areas.

This example claims for reflection and collective responsibility when promoting this kind of investments; public institutions may better ponder the approval of large projects of this nature.

5.5 The Methodological Discussion

Taking into consideration the frameworks considered for the present discussion - commons and anti-commons theories – some preliminary comments are appropriate:

- There is an enormous natural scenery and historical heritage, claiming for being enjoyed and being potentially very significant for tourism exploitation in a sustainable basis, guaranteeing the space and legacy preservation;
- the existing structures, the cultural features and the communities' organization also reflect a under exploited region but with great potential for developing a sustainable tourism offer;
- preserving all this region for sustainable tourism development is a central issue for managing the natural, built, and socio-cultural resources of the host communities of the region;
- there is no enough coordination among local agents themselves and with local and national authorities to develop integrated strategies of development of tourism products for the region;
- There are no joint strategies, including integrated and diversified offers for tourism products, combined with price coordination and a net of joint actions to find chain added value for economic agents in the region.
- There are not tour-operators concerned with a high value product for the region, integrating a set of activities and facilities.
- Such a "space" needs the appropriate promotion to become a demanded tourism region.

In short, there has not been any agents coordination in order to make the correct (and higher level) exploitation of the project, considering the existing tourism products in the region.

Additionally, some other notes need to be presented, specifically considering the supra mentioned broken project. What are the reasons for the bankruptcy of the project "Ammaia"? Equating the various possible hypotheses, may it have been due to:

- errors and incompetence of management? Independently for this project or considering other developed projects, having anyhow some joint focal points associated, particularly on management and investment?
- connections among politics and businesses that subsequently did not have developments in conformity?
- problems of economies of scale in the regional economy?
- a market failure as a result of the lack of coordination of agents to allow the success of the venture?
- a wider surrounding of inabilities to get an association of infrastructures and other structures to be made available for supporting the local tourism projects?

- a strict question of communication and marketing that failed?

Considering all the above statements and evidences, it is clear that “Ammaia” was a big investment in a region with no much facilities and with no tradition in big tourism demanding. Anyway, some facilities were created to support the project and a well known and famous hotel (in Castelo de Vide) was in the neighborhood supporting the project. Additionally new related facilities were being created. Yet, new investors keep interested in the project, as it is the case of Dr. Pais do Amaral.

As recognized by Candela and Figini (2010) there are several fundamental economic problems of a destination, including that:

- in the destination, it is necessary to coordinate the different production activities provided by independent firms;
- in the destination, it is necessary to supply a variety of goods and services in order to meet tourists' needs and improve their satisfaction;
- the destination needs to “complete” the tourism product through the supply of public goods (structures and infrastructures) and services (information) which cannot efficiently be offered by the private sector.

In a region as the one approached in this study, it is relevant to understand that many goods and services are lacked in the area and much is necessary to be done to have attractive tourism products.

It seems also clear that the President of Marvão Municipality has been – and continues to be - very committed with the project's success. However, the financial resources and his power of influence is not enough by himself alone to open a new perspective for the future of the project.

However, it seems that, considering the promoters and all the involved agents, the commitment was not significant. The coordination among municipalities' authorities and among the economic agents of the different municipalities who were interested in the development of the project has not worked. Also the venture's direct promoters did not develop or search for new solutions.

Now, a profound analysis is requires for the future.

While such kind of a project brings considerable chemical pollution to the water courses, significant in golf area and some other kinds of risks, which amount would be depending on the dimensions of the tourism arrivals, it is also true that a possible increase of investments would come and new improvements would be made considering the facilities in the region.

At the same time, some other activities could be implemented in the region in order to develop traditional arts, to contribute for promoting the preservation of historical mankind resources in the region and the natural and other tourism landscapes. In practice, several activities, although constituting activities used by tourists, (natural, socio-cultural, built attractions, ...), could have their maintenance supported and financed by tourism, providing their preservation and improvements. In that extent, the same is applicable, for example, specifically to the facilities serving the needs of tourists (for example, accommodation or specialized facilities), to other facilities serving both, tourists and locals, to the broader landscape, to the natural environmental elements (water, air, land, ...), infrastructures, etc.

In such kind of space, the carrying capacity of this area in Alentejo, in general, is far away from being reached and until then, many improvements for the region as a whole and for local population may be got. However, the ways to minimize the negative externalities may be considered, mainly the ones occurred in consequence of the watering and fertilizing system of the golf course with direct environmental impacts on habitats, species, soils and hydric resources.

To solve the anti-commons problem as a result from the agents' lack of coordination⁶, more coordination and more commitment among the agents are required.

6. Some Conclusions and Recommendations

In several countries in which tourism is a fundamental activity, the framework of commons and

⁶ Other kind of problems that may have contributed for the bankruptcy of the supra mentioned project is not considered in the analysis, once it is out of the purposes of the current study.

anti-commons is a possible tool to methodologically deal with tourism problems.

The tourism products and destinations may request the modelling of optimal development strategies, combining the measures provided by national and local authorities with the ones of economic agents. The exploitation of the tourism products may deserve an analysis strong enough to allow that the tourism activities in a region are sustainable; that the tourism resources be kept preserved; that the suitable rates of firms profitability and the benefits from the tourism for communities are got; and the governmental aims, of all kinds, be kept consistent with long term exploitation of tourism resources.

According to the previously exposed, governments have to be a part in the decision process and shall create the sustainable conditions for the tourism exploitation in the long term. When needed, they may be representative as a part in the solutions' findings. Not always the interests of the economic agents are compatible. Usually being the products offered complementary, often there are also conflicting ones once they are competitive. In both circumstances, as much as possible, the agents may look for coordination in order to find acceptable results. Often cooperation appears as a solution and agents have to study the specific conditions in which they benefit from cooperation.

In this study, Alto Alentejo was used to show that one region with important geographical, historical, and socio-cultural resources and an enormous natural beauty can develop tourism products, improving the welfare of the locals and providing an excellent route for tourists. The development of tourism can provide an important improvement in the region commons.

However, the Ammaia Golf Course (Ammaia Club de Golf of Marvão) was a project developed in the region but, considering a set of reasons, fell into the liquidation.

The framework of anti-commons may explain that a better agents coordination in the region would contribute to reduce the risks of collapse of such a kind of project. This outcome frustrated what would be a socially desirable outcome, considering all the agents involved in the project, since the entrepreneurs and the beneficiaries of the service, until the region authorities and the community.

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Game Theory, the Science of Strategy

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Abstract – This paper makes a simple presentation of strategy games emphasizing their application to management in general. The language used is very straightforward and mathematical symbols are avoided. Mathematical reasoning is presented descriptively. The dominant perspective is critical in that game theory has promised so much but to a certain extent has failed to fulfill its promises, mainly in real world practice. However, recent developments envisage a brighter future for game theory in both from a practical and theoretical aspect.

Keywords – Game theory, Cooperation, Minimax theorem, Zero-sum games.

1. Introduction

Defined in their broadest generality, the games can abundantly be found in real life situations. International politics, the economy, family life, election campaigns and many other situations are cases in which a player seeks a strategy that results so as to obtain a certain goal in opposition to other players who are also trying to optimize their perspective. The final result depends on the set of strategies adopted by all participants.

We may say that a game is a situation in which two or more participants, the players, confront each other in order to achieve certain goals which sometimes may not be achieved simultaneously. Thus, a game is a description of strategies that include restrictions on the actions that players can take and on the players' interests in not specifying what actions the players should take. In a game each player's interests are confronted, forcing each one to develop action strategies to maximize gains or minimize losses.

As games are disputed between competitors where the result of the decisions of a player's decision depends on the actions of other players, apart from knowledge of the dispute, it is important to knowing

the competitor. That is, to know how competitors may choose their strategies, their action strategy, what their interests are, what their objectives are. It is important to have information not only for the player himself, but mainly regarding the information held by the competitor.

Game theory is a discipline that seeks to understand phenomena that are observed when interacting decisions are taken. The basic premise of this theory is the rationality of decisions, i.e. it starts from the principle that decision makers are rational and act strategically, taking into account their knowledge or expectations about the behaviour of other decision makers.

Despite the fact that theoretical ideas of the game are not entirely mathematical, game theory uses mathematics to express its ideas formally because it is thus easier to define concepts rigorously, creating independence of mathematical interests, checking the consistency of ideas and exploring the implications of the results. Consequently, the concepts and results are accurate, interposed with motivations and interpretations of concepts.

2. Minimax Theorem

In 1985 the Babylonian Talmud – a compilation of ancient laws and traditions which formed the basis for the Jewish religion and civil and criminal law for the first five centuries BCE was recognized as having anticipated modern game theory. Nevertheless, it was in the 1940s that it emerged with most work directed at a special class of games: **zero-sum games**. These are games in which each player gets exactly what the other loses, regardless of the possible strategy.

Von Neumann presented one of the greatest results for the constant-sum games – games where sum of the gain and loss of players is a constant (not

necessarily zero) and can always be reduced to zero-sum games. He showed rigorously that there is always a rational course of action in two-player games, as long as their interests are completely opposed. Von Neumann singularly and unequivocally answered the question, “**how can I maximize my payoffs in zero-sum games with two players?**”.

2.1 SUMUS versus SUNEK

To illustrate this result consider a duopoly example based on R. A. McCain of two companies that sell bottled juices. To facilitate the study let us call these companies SUMUS and SUNEK. Each company has a fixed cost of 5,000 monetary units (m. u.) regardless of the number of bottles sold. Both companies compete for the same market and have to choose between selling each bottle for the price of 1 or 2 m u. The assumptions of the problem are as follows:

- for the price of 2 m. u. per bottle, 5 000 bottles can be sold with a return of 10 000 m. u.;

- for the price of 1 m. u. per bottle, 10 000 bottles can be sold with a return of 10 000 m. u.;
- if both companies place the bottles on the market for the same price, sales will be equally divided;
- if one company places the higher price, the company with the lower price sells the entire amount, whereas the company which places the higher price does not sell anything;
- the payoffs are the profits after deducting fixed costs.

Of course, when making decisions, companies have diametrically opposed interests. What is good for SUMUS is bad for SUNEK and vice versa. Clearly, it follows that both companies will take decisions that may be classified as risk-averse, i.e., decisions that renounce some possible gains to avoid incurring unnecessary losses.

To get an overview of the situation, consider the payoff matrix that defines the normal form of the game:

		<i>SUNEK</i>	
		1 m. u.	2 m. u.
<i>SUMUS</i>	1 m. u.	(0,0)	(5 000,-5 000)
	2 m. u.	(-5 000, 5 000)	(0,0)

Figure 2.1. The “SUMUS versus SUNEK” game - normal form

Interpretation of the payoff matrix is as follows: the rows of the matrix represent the SUMUS’s options and the columns represent SUNEK’s options. Each ordered pair represents the earnings of each company depending on the chosen strategies. The value on the left is the gain for SUMUS, and the one on the right is the gain for SUNEK. Because it is a zero-sum game, SUMUS’s earnings are symmetrical with regards to SUNEK’s.

Let us begin by analysing the result from SUMUS’s point of view, assuming that despite being able to reasonably predict the payoff matrix, neither company knows the strategy their competitor will adopt. Unaware of SUNEK’s plans, SUMUS may proceed as follows:

		<i>SUNEK</i>		
		1 m. u.	2 m. u.	
<i>SUM</i>	1 m. u.	0	5 000	min: 0
	2 m. u.	-5 000	0	min: -5 000
				maximin: 0

Figure 2.2. The “SUMUS versus SUNEK ” game - Maxmin strategy

Examining the game’s results from SUNEK’s point of view, adopting the same criteria, the company will

- Determine the lowest payoff they can receive in each of their strategies – the minimum of each row of the payoff matrix;
- Choose the strategy that has the highest minimum - choose the line of the payoff matrix.

By doing so, SUMUS can ensure that, whatever its competitor’s decision, they will not get the worst possible outcome, avoiding the less favourable results (lower minimum lines). Likewise, the company will also never achieve the best possible outcome as they ignored the best results on purpose. Applying this procedure to Figure 2.1, SUMUS obtains:

seek to maximize the set of minimums in the columns of their payoff matrix, obtaining:

		<i>SUNEC</i>	
		1 m u	2 m u
<i>SUMUS</i>	1 m u	0	-5 000
	2 m u	5 000	0
		min: 0	min: -5 000
		maximin: 0	

Figure 2.3. The “SUMUS versus SUNEC ” game - Maximin strategy

Meanwhile, given the concept of zero-sum game, the choice of the maximum of the minimums of the columns of the payoff matrix, SUNEC must generate

the same strategy which gives the minimum of the maximum in the columns of SUMUS’s payoff matrix. Let us consider the following figure:

		<i>SUNEC</i>	
		1 m. u.	2 m. u.
<i>SUMUS</i>	1 m. u.	0	5 000
	2 m. u.	-5 000	0
		max: 0	max: 5 000
		minimax: 0	

Figure 2.4. The “SUMUS versus SUNEC ” game - Minimax strategy

It follows that if SUNEC tries to determine the minimum set of maximums – **minimax** – from SUMUS’s payoff matrix, they will select the same strategy when trying to find the maximum of the minimums – **maximin** – from the respective payoff matrix. Such strategies, in which the maximum of the minimums of the lines is equal to the minimum of the maximums of the columns is called the **equilibrium point** or **saddle point** of the game, because by choosing these strategies, both companies assure themselves a minimum gain regardless of what the opponent does. Thus, no company will feel motivated to leave its equilibrium strategy unilaterally. Furthermore, no company will have cause to regret their decision as soon as they know their opponent’s choice, because they both know that, given the opposing company’s choice they would do worse if they took another decision. In other words, the equilibrium solution is stable in the sense that each company may announce its choice before the opponent, assured that the opponent cannot use such information to achieve a higher gain.

2.2 Rock-Paper-Scissors

All of the strategies considered in the previous game were completely deterministic. That is, strategies that

establish everything a player should know. Any strategy that is completely deterministic is called **pure strategy**. An equilibrium where both players use a pure strategy is an **equilibrium in pure strategies**. However, there are situations in which the equilibrium considers that players use strategies that are not completely deterministic. Any strategy that is not completely deterministic said to be mixed strategy. An equilibrium in which at least one player operates a **mixed strategy** is said to be an **equilibrium in mixed strategies**. When players use mixed strategies, they act randomly. The advantage of using mixed strategies is to include uncertainty in the opponent; that is, when player play with mixed strategies they are no longer predictable. Although the goal of a mixed strategy is to keep the opponent in the dark through unpredictability, it does not imply at all a totally random pattern of moves. In a situation where players use mixed strategies, each of them may choose a strategy randomly in each round. Thus, the opponent cannot predict which strategy the player will adopt. Each player’s problem will then be to adjust these probabilities optimally.

Mathematically a mixed strategy is a probability distribution over pure strategies. It is through this concept that a game which does not have equilibrium

points in pure strategies can be solved, because if any exist they are the game's solution.

To illustrate this, consider the ROCK-PAPER-SCISSORS game. This two-player game, Maximum and Minimum, is played as follows: each player simultaneously makes a gesture representing each of the three objects (rock, paper, scissors). If both players choose the same object, they neither win nor lose; otherwise, victory is achieved according to the following rules: scissors cut paper, paper wraps stone, stone breaks scissors. The payoff is +1 for a win and -1 for a loss. Figure 2.5 represents the normal form of this classic two-player game:

		Minimum		
		Scissors	Paper	Rock
Maximum	Scissors	(0,0)	(1,-1)	(-1,1)
	Paper	(-1,1)	(0,0)	(1,-1)
	Rock	(1,-1)	(-1,1)	(0,0)

Figure 2.5. The "Rock-paper-scissors" game –normal representation

Each player has three pure strategies, Scissors (T) or Paper (P) or Rock (D). Let us take (T,T). Minimum has an incentive to play Rock (D) and, thus, turn a defeat into a victory. The same occurs in each of the nine combinations of pure strategies, where none of the combinations of pure strategies is an equilibrium point. The "scissors-paper-rock" game cannot be solved using pure strategies. This game's solution necessarily involves mixed strategies.

Let us consider p_1 the probability that Maximum choose scissors, p_2 the probability of choosing paper and p_3 , the probability of choosing rock. Similarly, let us suppose q_1 is the probability of Minimum choosing scissors, q_2 , the probability of choosing paper and q_3 , the probability of choosing rock. Now let us consider Maximum's payoffs. Assuming Maximum uses pure strategy Scissors and Minimum uses a mixed strategy $q=(q_1,q_2,q_3)$. As Minimum uses a mixed strategy, Maximum anticipates an expected payoff

$$E(T,q)=q_1x_0+q_2x_1+q_3x(-1).$$

When Minimum chooses Paper Maximum wins; when chooses Minimum Rock, Maximum loses, and when Minimum chooses Scissors neither player wins.

Let us suppose now that Maximum chooses the pure strategy Paper. As Minimum plays a mixed strategy, Maximum anticipates an expected payoff

$$E(P,q)=q_1x(-1)+q_2x_0+q_3x_1.$$

When Minimum chooses Scissors, Maximum loses; when Minimum chooses Rock, Maximum wins, and when Minimum chooses paper the players tie. Let us suppose now that Maximum chooses the pure strategy Rock. As Minimum uses a mixed strategy, Maximum anticipates an expected payoff

$$E(D,q)=q_1x_1+q_2x(-1)+q_3x_0.$$

When Minimum chooses Paper, Maximum loses; when Minimum chooses Scissors, Maximum wins, and when Minimum chooses Rock, the players tie. From balancing the various expected payoffs number, we get

$$E(T,q)=E(P,q)=E(D,q) \text{ that is } q_1x_0+q_2x_1+q_3x(-1)=q_1x(-1)+q_2x_0+q_3x_1=q_1x_1+q_2x(-1)+q_3x_0$$

Because mixed strategy is a probability we have $q_1+q_2+q_3=1$. Solving the system consisting of these equations we obtain $q^*_1=q^*_2=q^*_3=1/3$, the value for the Minimum mixed strategy equilibrium. Given the symmetry of the game, the same strategy is an equilibrium for Maximum. In equilibrium each player obtains an expected value of $1/3$.

With a simple calculation it is easy to check that if one player maintains equal probabilities for their strategy and the other player changes his set of probabilities, the latter cannot improve his payoff average. We conclude that the strategy of combining equal probability is an equilibrium point for the game. In this situation both players can inform their opponent their chosen strategy without incurring any harm.

If a game has a saddle point, the players should not deviate from the strategies that lead to this equilibrium as the pair of strategies such that each player maximizes their respective minimum is the game's solution. When there is no saddle point, being rational players, considering the use of mixed strategies we can use the same criteria to ensure a set of probabilities for each player leading to the same average result, which will be the best payoff each player could get.

This powerful result that von Neumann demonstrated is known as:

Minimax Theorem: Any two-player zero-sum game has a mixed strategy for each player, such that the expected gain for both has the same value when players use these strategies. This value is the best

gain each player can expect to get, so that such mixed strategies are the optimal strategies for the players.

Thus, for two people in a zero-sum game it is rational for each player to choose the strategy that maximizes the minimum payoff, and the pair of strategies and payoffs such that each player maximizes the minimum. This is the respective game's solution.

Despite attempts by von Neumann and Morgenstern to "extend" this powerful result, that von Neumann demonstrated, to non-constant-sum games with multiple participants, it is only valid for zero-sum games for two players. The greatest difficulty for non-constant sum games with multiple participants led to the fact that of the various solutions presented, none had been accepted mathematically as a solution for non-constant sum games.

3. Nash Theorem

The Minimax theorem says what the "rational" solution for two-player zero-sum games is, but it is no solution for games where there is no saddle point. In such cases there will not be a strategy for any of

the players that cannot be exploited by an opponent who obtains advance knowledge of what he wishes to do. However, since there is always the possibility of the adversary receiving information about our intentions, how should a rational player proceed under such circumstances? This is the central question supporting all of the mathematical theory of games.

Let us consider another example of price competition based on W. Nutter. Two companies, VILEC and HIPEREL sell "parts" for the price of 1 m u, 2 m u and 3 m u for "parts". It is assumed that:

- the payoffs are the profits, after all fixed costs are subtracted;
- the company practising lower prices have more customers;
- the company practising lower will prices obtain more profits, with limits, than the company practising the highest price.

The following figure represents the payoff matrix associated with this example:

		VILEC		
		1 m. u.	2 m. u.	3 m. u.
HIPEREL	1 m. u.	0; 0	50; -10	40; -20
	2 m. u.	-10; 50	20; 20	90; 10
	3 m. u.	-20; 40	10; 90	50; 50

Figure 3.1. The "VILEC versus HIPEREL" game –normal representation

From the figure we can see this game is not a zero-sum game. Profits may be 100 m u, 40 m u, 20 m u or 0 m u., depending on the strategy chosen by each company. For this reason the maximin theorem does not apply.

Analyzing the payoff matrix from the point of view of the HIPEREL company, they can act as follows: if VILEC chooses a price of 3 m. u., the best price HIPERELEC is 2 m u but at this price for HIPEREL, 1 m u will be the best price for VILEC.

Examining the strategy regarding the choice of price of 3 m u for each company, it appears that each can benefit from reducing their price as long as the competitor sticks to their strategy.

Now considering the strategy corresponding to the price of 3 m um for HIPEREL and 2 m u for VILEC, similar reasoning to that above can be made; VILEC can benefit from reducing its price to 1 m u.

Following this analysis all strategies are eliminated, except the pair in which both companies set the price at 1 m u, i.e., the pair of strategies corresponding to the lowest price is such that neither company can improve its payoff through a unilateral change of its strategy.

This example is based on a generalization of the Minimax theorem for the case of non-zero-sum games involving two or more players in direct competition – non-cooperative games. John Nash showed the theorem that generalizes the Minimax theorem:

Nash Theorem: Any non-cooperative game of n players, in which each player has a finite number of pure strategies, has at least one set of equilibrium strategies.

This theorem shows that there can be multiple equilibrium strategies adding great difficulty to what

we consider to be rational behaviour. On the other hand, despite being non-cooperative games, the theorem shows that players gain more if they agree to cooperate.

4. Prisoner's Dilemma

The frontier between pure and applied game theory is vague; some developments in pure theory were motivated by applications. Such is the case of the example that A. W. Tucker presented at a conference addressed to psychologists at Stanford University (1950) with the aim of illustrating the difficulty of analysing non-cooperative games.

In these games it is not possible for players to plan strategies together. They are games that emphasize the rationality required when two individuals are in a position where a decision of one depends on the decision of the other.

Let us consider the following example: two supposed criminals, Joe and Tony are imprisoned. The problem for the police is, assuming that both are involved and

in the absence of evidence, the need for a confession. The prisoners are in individual and distant cells with no communication between them. Each receives an explanation of the rules of the case:

- If neither of them chooses to confess both will be charged with a misdemeanour that involves a symbolic penalty of only one month in prison.
- If both confess to taking part in the crime, then they will both be sentenced to six months in prison.
- Finally, if one confesses and the other does not, then whoever confesses will be released immediately, and the other will be sentenced to the maximum sentence under the law: nine months in prison (six months for the crime plus three more for obstructing justice).

The strategies in this case are: to confess or not to confess. The payoffs are the sentences. We can express this example using the following payoff matrix:

		<i>Tony</i>	
		<i>Does not confess</i>	<i>Confesses</i>
<i>Joe</i>	<i>Does not confess</i>	<i>(1,1)</i>	<i>(9,0)</i>
	<i>Confesses</i>	<i>(0,9)</i>	<i>(6,6)</i>

Figure 4.1- Prisoner's dilemma –normal representation

The matrix reads as follows: each prisoner chooses one of two strategies. Joe chooses a line while Tony chooses a column. Both numbers in each cell express each prisoner's sentence and correspond to the pair of strategies chosen by them.

The number on the left corresponds to the payoff of the prisoner who chooses lines – Joe, while the number on the right corresponds to the payoff of the prisoner who chooses columns – Tony. Thus, reading

	<i>Tony does not confess</i>	<i>Tony is sentenced to 9 months in prison</i>
<i>Joe confesses</i>	<i>Tony confesses</i>	<i>Tony is sentenced to 6 months in prison</i>

Figure 4.2- Prisoner's dilemma – Joe confesses

the first column in descending order, if neither confesses, each is sentenced to a sentence of 1 month, but if Joe confesses and Tony does not, Joe goes free, while Tony is sentenced to 9 months.

Which will be the "rational" strategies so that each of the criminals minimizes the time he will spend in prison? Two things can happen: Joe confesses or does not confess. Now, if Joe confesses, we have:

If Joes does not confess, we get:

	Tony does not confess	Tony is sentenced to 1 month in prison
Joe does not confess	Tony confesses	Tony goes free

Figure 4.3- Prisoner's dilemma – Joe does not confess

Observing the previous two tables we find that, in both cases, it is better for Tony to confess. Reversing Joe and Tony's roles, it will also be better for Joe to confess. The result of the game will be one in which both prisoners confess to the crime, both prisoners' rationality makes them choose the strategy of confessing the crime.

This is due to the fact that both criminals are facing **dominant equilibrium strategy**; regardless of the combinations of strategies that each of criminals does, the best choice is always "to confess" and thus called a dominant strategy. Since both players "play" the dominant strategy, they "fall" into the dominant strategy equilibrium.

The Prisoners' Dilemma game is a two player game that is based on the conflict between individual and collective rationality. According to individual rationality, the prisoner gets a higher payoff by denouncing the other. If both prisoners sacrifice themselves through silence, they get a better payoff. So, to ensure the best payoff, prisoners are base their decisions on common interests. In this game, players do not communicate with each other and play only once. Since these are changed assumptions, it is most likely that the outcome of the game will also change.

5. Conclusion

Even when Tucker thought up the Prisoners' Dilemma, game theory was already a recognized science. We can say that those responsible for this recognition were John von Neumann and Oskar Morgenstern with the publication of the book "Theory of Games and Economic Behaviour" (1944). John Nash (Nobel prize 1994), was also a pioneer in this science by having formalized clearly the types of games and their possibility for equilibrium. Later Nash's results were successively extended to more complex cases, with crucial steps in this process taken by Reinhard Selten and John Harsanyi (Nobel prize 1994).

Today game theory is well advanced, enabling vast and interesting results to be obtained in classifying, formalizing and solving day-to-day conflicts in all areas and in all situations involving strategic interaction.

However, because the assumptions impose constraints which guide the actions of the players involved, and do not observe their personalities, there is still much to do. With no intention of discrediting the techniques and analyses studied, of course, its limitations are mentioned in order to allow the reader to gain a clear awareness of the limitations of the analytical methods studied, because without that "we may become their slaves rather than their masters".

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An Application of the Anti-Commons Theory to an Elderly Nursing Home Project in Portugal

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Abstract - The present study evaluates the consequential economic and ethical problems which occur when bureaucracy is present in companies' projects evaluation by governmental agencies. The delay of projects approval generates loss of value once projects may not be implemented or are implemented after the suitable time. Theory of anti-commons is presented in the contextualization of the problem. As seen in this study, when an "anti-commons" emerges, resources may be prone to under-use. In an anti-commons situation there are too many entities deciding what may lead to the under-use of the resources. In Portugal, bureaucracy in projects approval contributes to such a situation of anti-commons. The present study analyses a project for the construction of an elderly nursing home, for which is necessary a permit to be obtained from the Portuguese government. This study is made according to the framework of the anti-commons theory.

Keywords - Bureaucracy, Anti-commons, Elderly Nursing Home, Portugal.

1. Introduction

The discussion on property rights is classical and in the last decades the discussion has been enlarged to consider new frameworks. An approach has been presented on some issues generated by the excessive fragmentation of property rights: the anti-commons theory. Michelman (1982) has exposed the anti-commons as "a type of property in which everyone always has rights respecting the objects in the regime, and no one is ever privileged to use any of them except as particularly authorized by others". Later, Heller (1998) stated that in an anti-commons problem there is a property regime in which numerous owners hold effective exclusion rights over a scarce resource. Therefore, the co-existence of multiple exclusion rights creates conditions for the suboptimal use of a resource. In the "tragedy of the anti-commons", resources may stay idle even in the economic region of positive marginal productivity.

A project in the construction sector (of an elderly nursing home) in Portugal is studied and allows to evaluate the possibility of using the hypothesis suggested by Buchanan & Yoon (2000) that bureaucracy can be studied with the help of the anti-commons conceptualization.

In this context, some questions are posed about the time that a project needs to be approved by official entities and about the necessary administrative procedures in order to take the project approved. The bureaucratic procedures show the incapacity of administrative official structures to allow that economic system operate efficiently. Processes depend on too much legislation and on the will of a set of bureaucrats that often "want to show that they control the system".

Particularly in this case, it can be seen a significant delay in the project's approval, what makes the project to get unviable because too much time has gone.

An economic analysis allows to show how a problem of anti-commons can originate an important loss of value. It is seen how anti-commons tragedies appear in such situations as the ones that are shown in the present study's problem.

2. Anti-Commons and Bureaucracy

After the introduction of the concept of anti-commons by Michelman, the tragedy of the anti-commons was formulated by Michael Heller to describe a coordination breakdown where the existence of numerous rights holders frustrates achieving a socially desirable outcome.

Considering the anti-commons theory, generically, it can be said that when several rights holders have, each one, the right to exclude others

from using a scarce resource, this resource may have a limited and unsatisfactory use. This problem of the “tragedy of the anti-commons” reflects that the resource is prone to be under-used.

After the emergence of an “anti-commons”, its particular passage to an efficient process may be long and extremely slow, due to the properties inherent to “anti-commons” and to the difficulties existing for overcoming the “tragedy of the anti-commons”.

As a consequence of all this, it is necessary to make an important reflection about the definition of property rights to overcome several important aspects for resources exploitation. When there are too many property rights and too many rights of exclusion, tragedy may be seen as the probable last result. In thesis, too many decision makers have the right to exclude others but, in fact, no agent has the privilege to use the resource suitably. An insufficient use is the corollary for this situation.

Bureaucracy is also often seen as a possible object of application of anti-commons framework. The suggestion of Buchanan and Yoon (2000) that the anti-commons construction offers an analytical means of isolating a central feature of “sometimes disparate institutional structures” shows, in fact, the problems arisen from bureaucracy in this context.

Buchanan and Yoon (2000) presented a case on which bureaucracy is evident on diminishing the potential of a project. On a Buchanan’s visit to Sardinia, Italy, in early 1999, he was informed that a potential entrepreneur was seeking to invest in a combined seaside/hunting-preserve resort. Action was inhibited by the necessity of getting permits from several regional agencies (for example, the tourist board, a hotel-restaurant agency, and the wildlife protection agency), each one of which hold effective exclusion rights to the project that would, if implemented, be productive of value. Another example stated by the authors involving the bureaucratic barriers was the residential construction. Housing permits were showed to require the approval of several separate overlapping agencies, each of which could prevent construction.

The persistence of bureaucratic circuits of approval and implementation of projects can difficult the entrepreneurship activities diminishing the potential for regional and local development. The present study analyses a problem in which a project is proposed to Portuguese authorities to be approved according the existing legislation and the rules

needed for this kind of projects. The delayed project’s approval made the project to become unviable.

3. The Problem

The object of the present study is supported on the way how a construction permit in Portugal is got for building an elderly nursing home located in a land outside the urban area, in a district capital in the countryside.

In recent years, some legislation has been published in order to try to facilitate licensing procedures. However, these measures just simplified the current licensing, i.e. when there is an estate plan that provides all the criteria for the construction and the permit may not be different from what was previously established.

In case something in the permit application is different from the current process, this soon becomes more complex and time consuming.

The process set out herein relates a situation of a permit application for an elderly nursing home, which became an unusual project, because its respective type of use and location were too specific.

In late September 2008 the first formal meeting with the designer was held. Then the aims of the project were approached, namely the building capacity for a total of 120 users, but at the start of its operation it should be able to receive 80 users. In this meeting other issues were also approached, such as the respective instructions and information provided by Social Security for this kind of construction.

On 18th November 2008 the preliminary study of the project was delivered at the Town Hall, so that it could give instructions about its feasibility, namely on how to license; to the particular location it would be necessary to draw up a detailed plan. One month after the delivery of this study, the Town Hall informed that it was approved and consequently the preparation of the Detailed Plan, required for the subsequent building permit.

After this approval, on 8th January 2009, the Regional Journal (*Reconquista*) and on 10th January 2009, the National Journal (*Sol*) published Notice No. 217/2008 about the request for the implementation of the referred Detailed Plan. In March 2009 the collaboration agreement for the implementation of the Detailed Plan was signed between the constructor and the Town Hall. However, this agreement and the

identification of the Detailed Plan were published in the Official Gazette only on 9th June 2009.

Meanwhile the Town Hall established a period of 15 days, ending on 2nd July 2009, for the submission of the Detailed Plan Project, which was delivered within the requested term. On 29th September 2009 the Town Hall sent the first letter regarding the project and informing the opinions of some consultees, namely the company EDP - Electricity of Portugal¹ and the public agencies ANACOM - National Communications Authority² and ARS - Regional Health Authority³ and the Social Security. On 9th November 2009 the Town Hall sent another letter informing the CCDRC - Committee for Coordination and Regional Development Center⁴ opinion and asking for the delivery of several elements, including the certified maps of the Detailed Plan location.

On 18th December the elements for the cartography certification were delivered to the Portuguese Geographic Institute⁵. On 21st April, four months after documentation delivery, IGP informed that it was necessary to pay 530 € (five hundred and thirty euros) in order to get the respective cartography certification. Furthermore, they informed that the process would be completed only four months after payment. The account was settled within eight days. On 23rd August IGP sent finally a letter approving the cartography, which was immediately forwarded to the architect. This one delivered it to the Town Hall, as well as the information requested on 9th November 2009.

On 25th November 2010 the Town Hall sent a letter enclosing the CCDRC minutes dated 17th November 2010 and asking for a few more elements, besides the modification of some ones already delivered. In January 2011 the new elements were delivered to the Town Hall.

Finally on 23rd March 2011 the Official Gazette published that the Detailed Plan was in a public discussion phase.

On 30th June 2011 the Detailed Plan was approved in the Municipal Assembly and published in the Regional Journal (*Reconquista*) on 11th August

2011. No complaints were made during the public discussion phase. Finally the Official Gazette published the Detailed Plan on 28th November 2011.

However, after all this long period, i.e. the conclusion of this process – a nursing home for the elderly - the respective licensing for the project was put aside, because three years later the economic situation had changed a lot and so the project was not feasible anymore.

The situation described above shows that the existing plans for the spatial planning and subsequent licensing are too strict and it is impossible to adapt them in a very short term to the changes occurring constantly in the economy.

In summary, the steps were as follows:

¹ EDP - *Eletricidade de Portugal*.

² ANACOM - *Autoridade Nacional de Comunicações*.

³ ARS - *Administração Regional de Saúde*.

⁴ CCDRC - *Comissão de Coordenação e Desenvolvimento Regional do Centro*.

⁵ IGP - *Instituto Geográfico Português*.

Date	Description	Legislation in force to date of the project
Sept. 2008	First meeting with the designers team to draft an elderly nursing home	<ul style="list-style-type: none"> • Normative Despatch 96/89, 25/October; • Normative Despatch 99/89, 27/October; • Law Decree⁶ 133-A/97 of 30/May • Normative Despatch 12/98, 25/February; • Decree 364/98, of 26/June • Law Decree 268/99, 15/July; • Normative Despatch 62/99, 12/November; • Normative Despatch 30/2006, 8/May; • (Decree at present 67/2012, 21/March)
18 Nov. 2008	Delivery of the previous project study at the Town Hall and application feasibility of licensing at the indicated location	PDM- Hall Master Plan ⁷ in force
19 Dec. 2008	The matter was discussed at the Town Hall Board meeting and approved its implementation	
8 Jan. 2009	The notification was published in the <i>Reconquista</i> Journal on 8 Jan. 2009 allowing the execution of the Detailed Plan	Municipal notification 217/2008
10 Jan. 2009	<i>Sol</i> Journal published the notification authorizing the execution of the Detailed Plan	
3 March 2009	Signing the cooperation agreement for the implementation of the detailed plan, between the contractor and the Town Hall	
9 June 2009	Publication of the collaboration agreement for the development of the	Town Hall Notification 10726

⁶ DL - *Decreto Lei*.

⁷ PDM - *Plano Diretor Municipal*.

	Detailed Plan in the Official Gazette	
2 July 2009	Deadline for the delivery of the detailed plan project by the contractor	<ul style="list-style-type: none"> • Law Decree 380/99, 22/September; • Law Decree 46/2009, 20/February
29 Sept. 2009	Town Hall informed the opinions of some consultees: EDP, ANACOM, ARS and Social Security	
9 Nov. 2009	Town Hall informed CCRDC position in relation to the Detail plan and requested delivery of various elements to join the process, the certified cartography among others	Law Decree 202/2007, 25 May
18 Dec. 2009	The necessary elements to carry out cartography certification were delivered to IGP	
21 April 2010	The IGP sent bill of 530€ for payment. Only after its settlement, cartographic certification would be considered and this would take four months after payment	
29 April 2010	The account was settled with the IGP	
23 August 2010	IGP letter informing the cartographic approval	
25 August 2010	Delivery of cartography approval at the Town Hall, as well as other elements required on 9 Nov.	
25 Nov. 2010	Town Hall gave notice of the latest CCDRC positions CCDRC, enclosing a minutes dated 17 Nov. 2010 and requesting the delivery of more elements and correction of others already delivered	
Jan. 2011	Delivery of all the requested elements to Town Hall	

23 March 2011	Start of public discussion of the Detail Plan. No claims were submitted	Notification 7341/2011
30 June 2011	The Detail Plan was approved at Town Hall Meeting	
11 August 2011	<i>Reconquista</i> Journal published approval of the Detailed Plan	
28 Nov. 2011	Official Gazette published approval of the Detailed Plan	Notification 23713/2011

4. Discussion and Results

In the present case, a project submitted for approval was delayed for so long that when entrepreneurs got the permit to exploit the project, the suitable time for its economic exploitation was gone. This project, which was presented to the Portuguese authorities as a profitable business, could be implemented as a viable project. However, too many departments and entities were asked to decide and pronounce about the project. In consequence, considering that, and also all the procedures demanded for the project approval, the project got unviable. This project was not implemented even if it could yield net social benefits.

The existence of numerous rights holders who prevented other agents from using a resource (from building an elderly nursing home and exploring it economically), frustrated what would be a socially desirable outcome, considering all the agents involved in the project, since the entrepreneurs until the beneficiaries of the service.

5. Concluding Remarks

In Portugal, it is usual that often situations emerge in which it is possible to apply the framework of anti-commons. Related to bureaucracy, several papers have shown this possibility (see for example, Filipe *et al*, 2011a,b).

This paper shows how several departments of local government and other governmental and non governmental agencies make a project unviable. All of them have to decide about the project. The timings to decide are too lengthy and the administrative circuits too long and complex. The long process of approval has made that the project got unviable and consequently it was not implemented. In the “tragedy

of the anti-commons”, resources often are not exploited or, being exploited, too much financial resources are spent and, as the suitable time for launching the project is gone, the exploitation conditions for the project got worse. In these scenarios the logical corollary is a loss of value. The evidence is that the resources were under-used with the obvious consequences of loss of welfare and economic value; an important service for the community was not offered although the evident existence of economic and social interest for all the involved agents, entrepreneurs, community, fiscal authorities, Town Hall, ...

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Networks and Network Analysis for Defence and Security-A Book Review

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Abstract – It is intended in this work to review the book "Networks and Network Analysis for Defence and Security", 978-3-319-04146-9 published in Springer Series "Lecture Notes in Social Networks". In this book the following areas are covered: Defence and security risk analysis; Criminal intelligence; Cybercrime; Cognitive analysis; Counter-terrorism and Social Network Analysis; Transnational Crime; Critical infrastructure analysis; Support to defence and security intelligence, emphasizing the idea that network analysis is a "key enabler in supporting defence and security". Not only man-made threats against nation's security are considered but also the ones resulting from natural hazards. With the emergence and enormous progress in "big data" analysis together with innovative interpretative approaches, network analysis facilitates a greater understanding of complex networks: their entities, interdependencies and vulnerabilities.

Keywords – Networks, networks analysis, defence, security.

1. Introduction

A. J. Masys, Editor of this book, identifies in the preface some of the main threats to the nation's security, individually or globally:

- Natural hazards
- Acts of armed violence
- Terrorism
- Transnational crime

with impact/target in the following domains:

- Physical
- Social

- Economic
- Cyber

emphasizing the social and economic costs associated to these occurrences. From this results the importance of studying and analyzing these situations with rigor and efficacy, being network analysis the tool able in helping to support defence and security.

In the book is stressed the contribution of network science in the following areas:

- Defence and security risk analysis
- Criminal intelligence
- Cybercrime
- Cognitive analysis
- Counter-terrorism and Social Network Analysis
- Transnational crime
- Critical infrastructure analysis
- Support to defence and security intelligence

along 12 chapters:

- Network Analysis in Criminal Intelligence
- Identifying Mafia Bosses from Meeting Attendance
- Macrosocial Network Analysis: The Case of Transnational Drug Trafficking

- Policing the Hackers by Hacking Them: Studying Online Deviants in IRC Chat Rooms
- Why Terror Networks are Dissimilar: How Structure Relates to Function
- Social Network Analysis Applied to Criminal Networks: Recent Developments in Dutch Law Enforcement
- The Networked Mind: Collective Identities and the Cognitive-Affective Nature of Conflict
- Conflict Cessation and the Emergence of Weapons Supermarkets
- A Conspiracy of Bastards?
- Decision support Through Strongest Path Method Risk Analysis
- Critical Infrastructure and Vulnerability: A Relational Analysis Through Actor Network Theory
- Dealing with Complexity: Thinking About Networks and the Comprehensive Approach

The only enumeration of these twelve titles is a truthful description of the effective cover of the book. From there it is possible to understand its completeness. In fact almost all kind of defence and security problems are here typified. It is almost impossible not to classify any defence or security problem in at least one of the presented cases studied.

In addition, the methodologies used in the performed studies, many and various, are adequate and used very creatively. So the authors of this work contribute very much to increase the knowledge in this field.

Not also that some of the chapters are based in some countries practical experience. For instance

- Identifying Mafia Bosses from Meeting Attendance
- Social Network Analysis Applied to Criminal Networks: Recent Developments in Dutch Law Enforcement
- A Conspiracy of Bastards?

and in globally experienced phenomena, for instance

- Macrosocial Network Analysis: The Case of Transnational Drug Trafficking
- Policing the Hackers by Hacking Them: Studying Online Deviants in IRC Chat Rooms
- Conflict Cessation and the Emergence of Weapons Supermarkets

The texts are elegant and well written, facilitating the reading of the book. But due to the diversity of the knowledge required some readers must read previous texts before accessing these ones.

2. Complexity and Networks

The problems dealt with in this book are approached as complex problems, in the sense that they are problems about which there is a lot to learn, although very much is already known. So they are good research subjects.

The networks methodology is imperatively considered, since in the models used to study defence and security problems is involved a great number of connections that must be considered to understand, first, and then to solve them.

In approaching a complex problem, no one can say in the beginning which methodologies to use or contemplate. This is possible only in a later stage. The first approach to carry is the “good sense” one. Still less there are protocols or routines established. This happens only in the future when something is known.

Then the number possibilities faced in the beginning is enormous, not being disposable the possibility of creating new ones.

Also there is a significant challenge in the fact that a lot of models impose the human behavior modeling what, happily, will never be completely possible in mathematical terms.

All this makes the study of these problems enriching and rewarding for the researchers. And this is present along the whole book, giving the idea that it was written by wise happy people.

3. Overall Review

Natural hazards, acts of armed violence, terrorism and transnational crime with impact/target in the physical, social, economic and cyber domains are a kind of defence and security problems for which the network analysis, facilitating a greater understanding of complex networks: their entities, interdependencies and vulnerabilities, is the appropriate study approach. This is the thesis exposed in the book "Networks and Network Analysis for Defence and Security", 978-3-319-04146-9 published in Springer Series "Lecture Notes in Social Networks". It is done in a very convincing way, in a

text scientifically rich and very well written. Man-made and nature origin threats are both considered. Recommended either for beginners or experienced investigators, some texts possibly requiring previous readings of other lower level texts.

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