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Authors:
Alfonso Vargas-Sánchez
Angelo Presenza
Carolina Rebollo
Daniele Adelaide Brandão de Oliveira
Estrella Gualda
Eugénia Maria Dores Maia Ferreira
Israel V. Guarda
Júlio Mendes
Manuela Guerreiro
Maria Concetta Perfetto
Maria José Baltazar dos Reis de Pinto Gouveia
Maria Rosália Guerreiro
Patrícia Pinto
Rômulo Alves Soares
Silvia Fernandes
Sílvia Maria Dias Pedro Rebouças

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TREES AND SEMI-LATTICES: ANALYSING SPACE CONFIGURATION OF TWO URBAN SYSTEMS IN LISBON REGION

Israel Guarda[1]
Maria Rosália Guerreiro[2]

ABSTRACT

This study examines patterns of order and structure in street networks and its relationships with spatial life of two urban neighborhoods (housing estates). It explores the concepts of "tree" and "semi-lattice" as two different ways of looking and thinking about the structure of cities, each one generating a different form of life and community place (Alexander, 1965). The authors propose a configurational analysis of street networks of two urban plans designed according to different city ideologies and historical background. Based on space syntax methodology the street network was represented both as convex spaces and axial lines as nodes of a graph. The network was then analyzed in terms of the mathematical properties of the graph. The objective was to address a comparative study of structural properties of the urban street networks in order to speculate some implications on social life of each neighborhood. Syntactic measures have shown that conceptual designs have different spatial and social patterns both at global and local scales. It was corroborated that the difference between the characteristics of topological properties which reflects the mathematical principle of tree and semi-lattice is responsible for the different character of public life we found in each urban area.

Keywords: Space Configuration, Urban Plan, Space Syntax, Street Network, Urban Life.

JEL Classification: N9, N94, C8.

1. INTRODUCTION: SPACE CONFIGURATION

Architects and urban researchers seem to be better equipped to measure and discuss forms and design programs rather than space itself. Just as forms are combined to create complex shapes, so can spaces connected to one another create spatial patterns. These topological relationships between spaces, also called configuration play an important role in the way we think about the environment. And influences the subsequent development of cognitive maps. In this way, the configuration of an urban space may contain important information to understand the degree of life of a given place. Spatial relationships influence movement and co-presence, which are strong indicators to envisage the social conditions and function of a space. Therefore, the value of studying spatial configuration as a complement of the study of the form cannot be overemphasized.

Descriptions of the city are shaped by the nearest available concepts and terms in common thought, and these are then turned into design and plans for new cities (Hillier, 2009: 1). The development of housing estates after the Second World War in the western countries

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[1] Israel Guarda, Instituto Universitário de Lisboa (ISCTE-IUL), CRIA, Lisbon, Portugal. (israelguarda5@hotmail.com)
[2] Maria Rosália Guerreiro, Instituto Universitário de Lisboa (ISCTE-IUL), CRIA, Lisbon, Portugal. (rosalia.guerreiro@iscte.pt)

which involved the construction of a large amount of affordable houses is a good example in the history of the modern movement in architecture. The construction of housing estates has been a large impact in the city as whole, however research on the subject is relatively recent and different perspectives have been explored: the tension between the new forms and the absent of spatial culture (Hillier, 1988; Hillier, 1996), the relation between the urban transformations and the history of design ideas (Hanson, 2000), the patterns of revolution in street and building typology (Marshall, 2005) and the consequences with segregation and social disadvantages (Vaughan *et al.*, 2005; Legeby, 2010).

In Portugal, there are some studies that approached the production of housing estates (Pereira, 1999; Nunes, 2011). This studies focus the social and administrative processes, but give little attention to the impact of space configuration on the social life of the place. More recently that attempt was made in a comparative study of five housing estates built in Lisbon region between 1945 and 1974 (Guarda, 2016). This paper is a continuity of the research carried out in that study and focus particularly on how configurational theories and methods of space syntax can contribute to describe the spatial relations within different neighborhoods and in the city as whole.

This study examines patterns of order and structure in street networks and its relationships with spatial life in city neighborhoods (housing estates). The paper investigates the degree of life of two urban plans in Lisbon region, Areeiro (1946) and Portela (1965), having in account the degree of complexity of their spatial layouts. It explores the concepts of "tree" and "semi-lattice" as two different ways of looking and thinking about the structure of cities, each one generating a different form of life and community place (Alexander, 1965). Space Syntax will be the set of methods and techniques used for analyzing patterns of space - or space configuration – of the plans spatial layout. These methods both uncover spatial structures in cities and relate them to the way people move, stop and interact.

The paper is structured in seven sections. After the introduction, section 2 examines different patterns of order and structure in street networks as well as its implication on the life of a place. Section 3 describes the ability of space syntax to analyze this relationship between space and society and section 4 describes its tools and techniques necessary to carried out the configurational analysis of the case studies. Section 5 describes the syntactic measures to be evaluated. Section 6 analyses the historical background and the design program of the case studies and elaborates the configurational analyses globally and locally. Section 7 discusses the results of syntactic measures and concludes about the nature of the patterns of order and structure in the two urban systems which influence the social life of the place. Some difficulties and limitations of the method are also presented in the last section.

2. PATTERNS OF ORDER AND STRUCTURE IN STREET NETWORKS: TREES AND SEMI-LATTICES

The way that the street networks are connected influences the live of cities. Places that are more connected and more accessible increase the number of encounters and interaction between people while more segregated and less connected spaces tend to have less people and activities.

To understand the nature of these two kind of spaces and structures in cities, Cristopher Alexander publish in 1965, a seminal article called "A city is not a tree". The objective of the article was to discover the abstract principle of ordering present in natural cities that makes them successfully alive and that the new modern concepts of town have not founded yet. The author just realized that the natural cities (traditional cities) have a *semi-lattice* structure while modern cities have a *tree* structure. In general, what Alexander argued was that natural

cities, (those created in a spontaneous manner over many years) maintain wealth, humanity and the variety of overlapping vital elements that worked in a complex way, (Figure 1, left). On the contrary, the modern city referred to the view that the elements of the city should be organized according to a strict hierarchy, according to which an element should always be contained in a larger element, and this in an element even broader, and so on (Figure 1, right and Figure 2). This tree view of the city reduces the possibility of combinations between the elements, reducing the possibilities of interaction and interrelationships in the city.

From the point of view of the experience of the cities, these two structures have profound implications. When a city has a tree structure, this rigidity and this discipline come into being in the city and its habitants. Examples of this tree structure are the neighborhood units of some garden cities designed to be self-sufficient and with few connections with other units, which would be connected only by major roads (Figure 2). In this type of structures, each end road relates only to the main road. Hence sets of buildings do not have any relation to each other. In some cases, they may be close geometrically, but topologically they are very far if we take into consideration the network of public spaces.

Figure 1 – Trees (right) and semi-lattices (left)
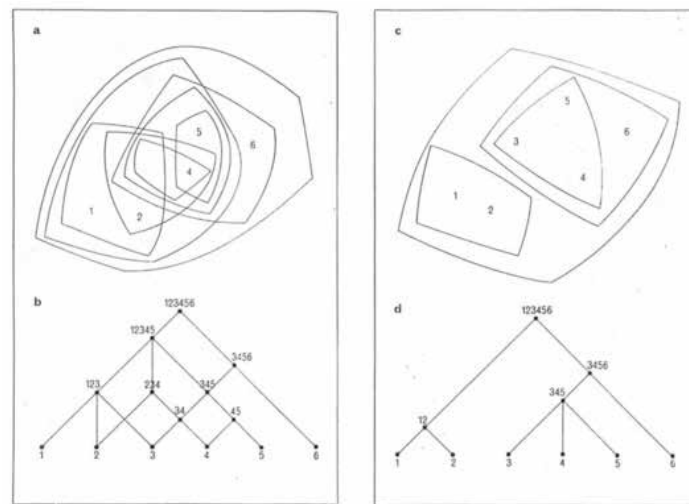
Source: Alexander, 1967:24

Figure 2 – The urban street network as a tree. Maryland garden city, United States of America
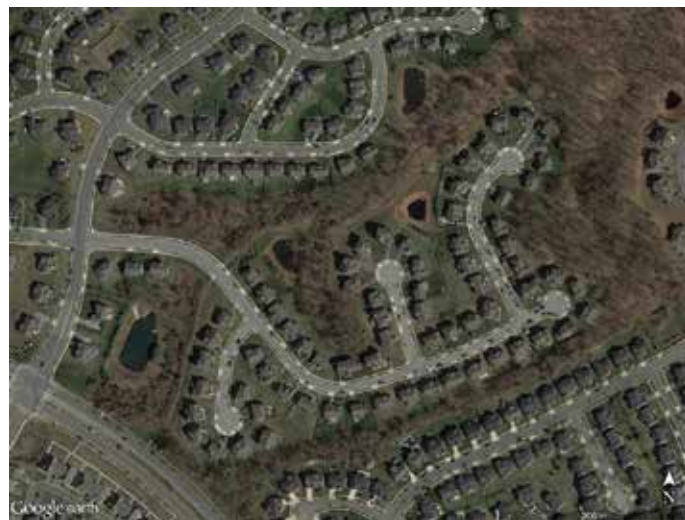
Source: "Maryland". 42°19'59.3"N 83°30'58.5"W. Google Earth 2016. June 10, 2016

This physical distance will have consequences on social distance. The tree structure order makes difficult to intercept the different units of the city. On the contrary, the units of natural cities overlap and have higher capacity of interception. The tree structure, according to Alexander, support only a small percentage of relations that occur in cities, since the possible combinations in such a strict hierarchy are smaller than in a structure with overlapping.

3. THE SPACE SYNTAX APPROACH

Space Syntax is a conceptual framework and a tool for analyzing patterns of space – or space configuration – in the built environment, which takes far more the Alexander's view of the 1965. These methods both uncover spatial structures in cities and relate them to the way people move, stop and interact. Space plays an important role in the way we live in cities, having direct relations in our social life, offering preconditions for the patterns of movement, encounter or restriction (Hillier *et al.*, 1984: x). In Space Syntax, spaces are understood as void defined by obstructions that might either constrain physical or visual access. The structural properties that comprise these spaces have an embedded social meaning that has implications on the overall behavior of human beings (Al_Sayed *et al.*, 2014: 7). Different parts of the space are therefore associated with different behaviors and conventions, thus being possible to recognize specific symbolic and cultural values in the individual parts (Bafna, 2003: 17-18).

"Cities are aggregates of buildings held together by a network of spaces flowing in-between the blocks" (Al_Sayed *et al.*, 2014: 7). This network of spaces shapes spatial and social patterns which constitutes our experience of the place. This spatial network is the structure of the city. It has their own architecture formed by patterns of connections.

Space isn't only a byproduct of buildings arrangement. Each space has at least one link to any other space. Therefore, it is also important to understand space as a network of interdependent spaces (configuration) and not just as individual parts. Space as configuration means *"the simultaneously existing relations amongst the parts which make up the whole"* (Hillier, 2005: 5). And the underlying principle is that spatial layout not only looks different but it is different seen from different parts off the spatial layout (*Ibid*: 6). Considering a building or a city, this means the number of steps which we must do from one space to all others. The differences can then be measured in terms of proximity, accessibility, discontinuity and separation. Observing these differences, we unlock patterns of space and see for example how much a space is integrated or shallow in a system – i.e. how close or far it is from every other spaces in a system. To reveal these patterns of space the spatial properties are measured and exposed by graph-based representations via Depthmap programme which is a software to perform spatial network analysis designed to understand social process within the built environment (Turner, 2011). The patterns of space might then be indicative of social organization.

4. THE REPRESENTATION OF URBAN SPACE: AXIAL AND CONVEX SPACE

The model of representation in space syntax is bi-dimensional. To process topological graph representations of space network in Depthmap software we have different techniques based on the definition of different spatial entities which have the capacity to produce different sorts of analysis on different scales. In this research we used axial and convex analysis as a powerful tool for predicting social and economic activity. Each one represents different spatial geometries in relation to the way we move, interact and see other people.

The axial line representation sets up the visualization of the way people move in space. Essentially it is the extension of a point in one dimension. In doing so, the axial map reduces space to the longest accessible lines that cover all spaces in a map, that is the axial lines or *"lines of sight"* (Al_Sayed *et al.*, 2014: 11). Since movement is essentially a linear activity, this representation set up the visualization of the global proprieties of the system in terms of permeability and accessibility. According to space syntax theory, this representation offers a good correspondence with pedestrian and vehicular movement in the city (Hillier *et al.*, 1993; Conroy, 2000).

The convex representation of urban space exposes the adjacency relationships by reducing the spatial complexity of an urban layout to the fewest and fastest convex spaces. A convex space is the portion of space which represents the maximum extension of one point in the second dimension, given the first dimension (Hillier & Hanson, 1984: 92). In each convex space, all pairs of points are inter-visible, hence creating opportunity for people gather together. Convex space is a distinctive entity which seems to acknowledge the local proprieties of the system, conveying the idea of a place of co-presence and events (Seamon, 1994: 40).

More recently the segment analysis has been developed by space syntax community. The segment map is always created by Depthmap from the axial map. It is still based on the line network, but its basic unit is the line segment between junction. This makes possible different types of analysis based on different ways of defining the distance between one segment and another. This technique was also used in this research to analyze the regional spatial context of the case studies.

These elementary components (axial lines, convex spaces or segments) and the relationships between them can be represented by a network of nodes and links. Once the space system is represented it can be analyzed as a system of syntactic relations - analyzing the relations in terms of the basic properties of symmetry-asymmetry and distributedness - nondistributedness (Hillier & Hanson, 1984: 93). Depthmap transcribes the system of elementary components into a graph; that is, a representation of nodes and links which represent their adjacency relationships. In other words, graph theory allows space syntax to quantify and measure the proprieties of space configuration as a result of space adjacency.

Spatial relationships between adjacent elements of space can also be represented through justified graphs using JASS tool (Koch, 2004). A justified graph reads the spatial network of axial lines or convex spaces from one space (root) to all others. It might be deep or shallow depending on the relationship of the root space to other spaces. Spatial relationships might form branching trees or looping rings (semi-lattices) which reflects different spatial structures and social organizations. Normally the tree-like shape reflects a deep and controlled spatial structure and the ring-like shape reflects interconnection and movement reducing the deep of the space layout. Therefore, spaces that are spatially closest to all spaces are the most integrated in a spatial network. Conversely, spaces that are located in deeper locations are the most segregated. Integration and segregation are global attributes of the spatial network (Al_Sayed *et al.*, 2014: 13).

5. SYNTATIC MEASURES

Starting from the map representations of elementary components it is possible to have an immediate understanding of the spatial pattern which quantify the syntactical relations between the elements of a spatial system. The number of syntactic measures is large and diverges considerable depending on the research question and the scale of analysis. Regarding this study and the analysis of spatial configuration of the two urban systems in Lisbon

region, the measures operated were integration, choice, metric mean depth, connectivity and intelligibility, which were selected and interpreted according to the scale of analysis: supra case-study-area, case-study-area or intra case-study-area (Heitor & Pinelo, 2015).

Connectivity is a local measure that quantifies the number of spaces which are directly linked with one space. In terms of linear representation means the number of connections that each line has.

Integration is the most important measure in space syntax. It is a global measure which quantifies how close a space (node) is from all others in the system. It measures the degree of accessibility or centrality of each space within a system of spaces. A space with high values of integration means that a few changes in direction as to be done to move from that space to any other in the system. The values of integration can also be measured for the local parts of the system, limiting the spaces in consideration. Integration is related with 'to movement' and the value of proximity for attraction. It has the capacity to identify the most significant places and their functionality in cities, like the center and sub-centers.

Choice is related with 'through movement' potential and it measures movement flows through spaces. A space with high values of choice are located on the shortest paths from all origins to all destinations. Choice measure has the capacity to forecasting pedestrian and vehicular movement potentials.

Metric mean depth is the average metric distance from each space to all others. Patchworks maps which pick smaller spots of dense local structures are normally highlighted by measuring the metric mean depth of the system within a certain metric radius (400, 800, 1000 meters). The larger the metric radius, the wider and larger this spots are (Al_Sayed *et al.*, 2014).

The coefficient correlation between connectivity and integration is a measure of second order called intelligibility. This measure gives the indication of how much an urban system is recognizable from their local parts to the whole. It helps identifying how easy it is for one in a local position to comprehend the global structure.

The syntactic measures performed turn the problem of description of spatial configuration mathematically manageable. The computation analysis of the urban systems of Areeiro and Portela, combined with the interpretation of the urban ideologies, allows a quantitative and qualitative description of the characteristics which informs the spatial patterns of the two urban systems.

6. THE URBAN PLANS OF AREEIRO AND PORTELA

6.1 Historical background and the design program

The urban systems of Areeiro and Portela have different historical background. Areeiro is situated in the north side of Lisbon city and is crossed by the main streets, which compose the early XX century urban structure of the city. The plan was developed by architect João Faria da Costa (1906-1971) and is dated from 1946. It was a public urbanization of previously expropriated property with an area of 44 hectares, foreseeing 10.800 inhabitants and a density of 196 inhabitants/hectare (Table 1) (Figure 3). The plan was destined for middle and upper classes. Mainly for residential use, it was provided with several public facilities: schools, church, theater, and local market.

Figures 3 – Figure/ground map of Areeiro (left) and Portela (right) urban plans. Buildings (black) and open space (white)
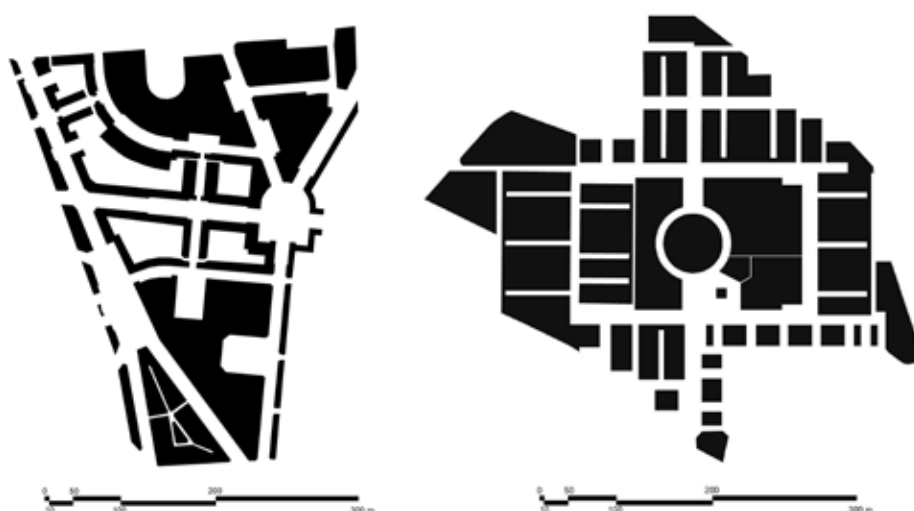
Source: Own Elaboration

Table 1 – Housing estates design program

URBAN PLAN	AREA (ha)	OPEN SPACE (%)	DWELLINGS	POPULATION DENSITY	INHABITANTS	TYPOLOGY	DEVELOPER	AUTHOR
AREEIRO (1946)	44	49	2160	196	10800	Housing blocks	City Council of Lisbon	Arch. Faria da Costa
PORTELA (1970)	54	39	4500	342	18500	Housing blocks and towers	Private Entrepreneur	Arch. Fernando Silva

Source: Own Elaboration

The plan layout presents a hierarchy of urban streets composed by three levels. The first level is composed by the three main axis which extend outside the plan area and are part of the global structure of the city: Av. João XXI, Av. Roma and Av. Almirante Reis. The secondary arteries don't continue outside de plan and have a more residential and local character: Av. Paris, Av. Madrid and Av. Guerra Junqueiro. Finally, the third level of streets are very short and establish the connection between the two previous levels.

Along with the street hierarchy, formal public spaces (Plazas of Areeiro, Londres, Pasteur, João do Rio and Afrânio Peixoto) implemented a strong control over the entire image of the city and reinforces the distinctiveness and symbology of this urban area associated with *Estado Novo* dictatorship. The buildings were very homogeneous, facing public space and ranging between four and six floors providing a strong identity of the whole.

An important feature of the urban plan of Areeiro was the establishment of public green spaces inside the urban blocks, which was traditionally private space. Regulations controlled plot division, size and typology of the building as well as uses and functions.

The urbanization of Portela (1965/1970) represents a very different approach towards the built environment. Portela is a suburban area of the city of Lisbon surrounded by heavy traffic lanes. Designed by the architect Fernando Silva (1914-1983), it was a private initiative and a speculative investment which transformed a rural area into a dominant residential and functional zoning for middle upper classes.

The area of the plan comprehends 55 hectares. The population estimated was 18.500 inhabitants with a density of 336 inhabitants/hectare - the housing estate with the highest population density identified in Lisbon region (Guarda, 2016), (Table 1), (Figure 3).

The plan is very regular with an orthogonal geometry dominated by north-south symmetry axis which centralize community facilities. Despite being an enclosed urban structure it reveals a formal geometry which embraces the surrounding environment. At the center of the orthogonal axes an expressive circular building dominates the whole plan. This strong geometry is also pursued by the scale of the buildings. Everything is regulated according to a unitary global order.

The urban model resembles the cosmic city described by Kevin Lynch (1981). Understood as a geometrical organization of static objects (buildings), it is a space to be apprehend at once; the principles of classical composition, such as symmetry, scale, monumentality and centralization are allusive. The influences of the modern movement are also visible: functional zoning, traffic separation, buildings with independent entrances from the street are common features of this period.

The repetition of tower-blocks with similar typology and density reinforces the notion of global order at all scales. The repetition of elements with similar relationships results in a deeply rational order, thus contributing towards the notion of a symbolic space where uses are strongly formalized by geometric attributes (Hillier, 1996: 186-187).

The arrangement of buildings and the space between them followed principles of separation and differentiation between public zones and semi-private areas. The design of space enunciates the separation between local inhabitants and visitors to avoid the attraction of the popular neighborhood nearby - Moscavide. This objective was clearly stated by the architect Fernando Silva in the memorandum of the plan (1970) with a proposal of nonexistent interface between buildings and the street.

Concerning the percentages of open space (Table 1), we notice major differences between Areeiro and Portela, with 49% and 39% respectively. In Portela, the public spaces correspond mainly with street network. There are no formal public spaces like plazas. Areeiro represents the opposite case where a clear hierarchy of public spaces are presented. Nevertheless, and despite the significante number of formal plazas, the percentage of open space is explained by the area inside the urban blocks which is for public use (Figures 3). These spaces have great importance for the social life of the neighborhood because they create diversity of activities and uses of public space.

6.2 The street network regional context: The dual structure of the city

Before we analyze space configuration of the urban plans of Areeiro and Portela we will look at the street network regional context within the city of Lisbon. Building on the axial map for the metropolitan area of Lisbon developed by Teresa Heitor and João Pinelo we constructed the segment map in Depthmap. The syntactic measures calculated with graph analysis were choice and metric mean depth (radius 1000) as described in section 4. The objective was to identify the dual structure of the city of Lisbon, made up of a dominant foreground network, marked by linear continuity and background network with less linear continuity: *"The foreground network is made up of a relatively small number of longer lines, connected at their ends by open angles, and forming a super-ordinate structure within which we find the background network, made up of much larger numbers of shorter lines, which tend to intersect each other and be connected at their ends by near right angles, and from local grid like clusters"* (Hillier, 2009: 8) (Figures 4). Each part of the duality exploits the relation between space and movement in a different way. On the one side there is a public space process which gives rise to the global structure of the city bringing people together and maximize movement and co-presence (foreground). On

the other side there is a residential space process, which uses space to restrain and structure movement in the image of residential culture of some kind, and how it seeks to structure relations between inhabitants and strangers (Hillier, 2005: 20).

Figure 4 – The dual structure of the city: *Foreground structure,* **T1024 Choice (right) and** *Background structure*, **metric mean depth R1000 (left)**
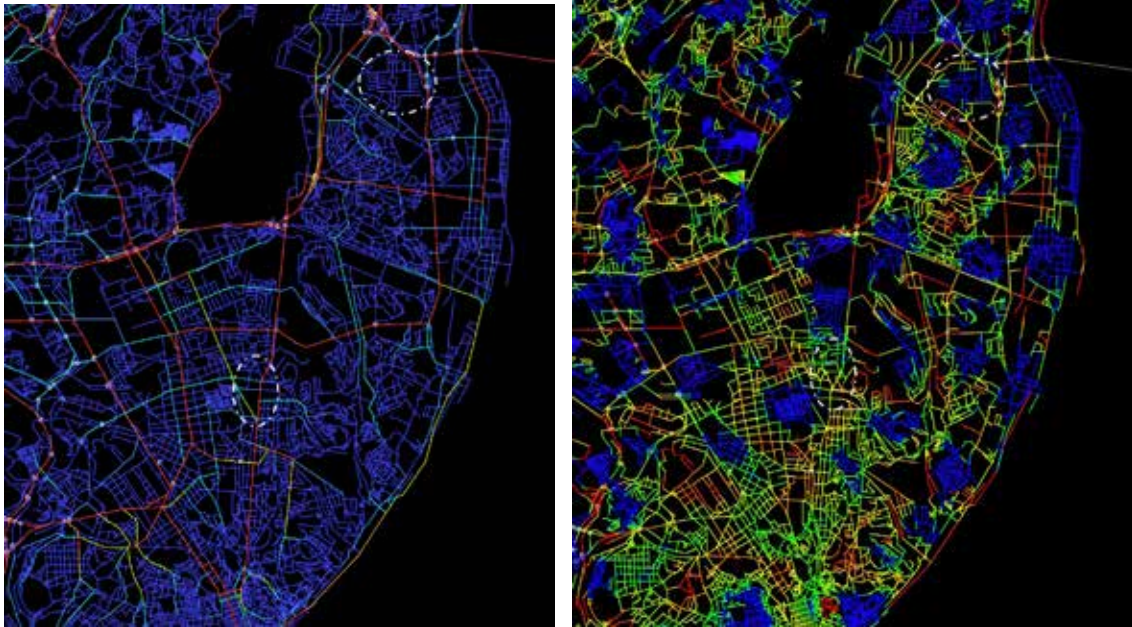
Source: Own Elaboration

As we can see the street network of Areeiro (mainly in the limits of the plan) belongs to the foreground structure (red, orange and yellow) which is the global structure of the city (Figure 4). Segment analysis processed for regional street network detects this structure using the measure of choice. Global structures in cities are recognized as continuous linear connections that afford shorter journeys from all origins to all destinations. This signifies that Areeiro is part of the natural growth process of the city. It is connected with the 'supergrid' structure of the city that tends to maintain the highest values for choice that measures 'through movement' potentials.

Portela doesn't participate in the foreground structure of the city. Instead, it belongs to the other side of the dual city - background structure (blue) which is formed by the local and residential structures of the city (Figure 4). Segment analysis of the regional street network also detects this structure using the measure metric mean depth with radius 1000. Local structures in cities are recognized as a discontinuity in the urban street network and this measure shows the effect of discontinuities that result from the block pattern and metric density showing distinct areas in cities. This means that Portela, as a residential area is part of the local structure which forms the patchwork of the city where the relationship between the inhabitants and the strangers is restrained. It is disconnected from the regional street network.

The understanding of the relationship of the case studies with the dual structure of the city gives us a clear impression of the character of the housing states and explains the different results we found at the next step of the analysis.

6.3 Convex and axial map analysis

The use of configurational analysis in the housing estates aims to identify spatial patterns related with social organization according to space syntax methodology. The analysis conducted was done according with the original plans and the figure/ground layout of buildings (black) and open space (white). First, we trace the convex map partition and the axial line map following the rules of the fewest number of fattest spaces and the fewest number of the longest lines which compose the open space in each plan. After the construction of these maps we calculated in Depthmap the syntactic measures of connectivity, integration HH and intelligibility, described at the section 5, both for convex and axial techniques. Finally, we also represented the network of convex spaces as a justified graph for better interpretation of the concept of "trees and semi-lattices" described in section 2.

Portela has a lower number of convex spaces (107) then Areeiro (151). However, the average size of those spaces are bigger in Portela (1.866 m2) then Areeiro (1.430 m2) (Table 2). This is a direct consequence of the spatial plans layout. The absence of formal public spaces in Portela diminish the number of convex spaces. Convex space partition follows street layout and creates elongated convex space units which difficult the creation of places for co-presence (Figure 3).

Table 2 – Convex spaces: Quantification of the analytical variables

HOUSING ESTATE	TOTAL AREA (m2)	OPEN SPACE (m2)	CONVEX SPACES	ISLANDS	ENTRANCES	TOTAL AREA/ CONVEX SPACES (m2)	ENT./ CONVEX SPACES	OPEN SPACE / ENT. (m2)	CONVEX BLIND SPACES (%)
AREEIRO	440 000	217 396	151	31	1153	1430	7.6	188.5	27.1
PORTELA	540 000	199 612	107	34	196	1866	1.8	1018	63

Source: Own Elaboration

Table 3 – Axial lines: Syntactic measures calculated with Software *Depthmap 10*

HOUSING ESTATE	AXIAL LINES	GRID AXILITY	CONECTIVITY max; min; aver.	INTEGRATION HH max; min; aver.	INTELIGIBILITY
AREEIRO	42	0.31	11; 1; 4.1	2.54; 0.82; 1.42	0.66
PORTELA	52	0.26	14; 1; 3.5	3.19; 0.89; 1.68	0.80

Source: Own Elaboration

The average number of entrances or space constitution of each convex space is also much lower in Portela (1,8) than in Areeiro (7,6). These fact is explained in part by the map of blind spaces (yellow spaces) presented in Figure 5. In Portela, 63% of the convex spaces are blind, while Areeiro has only 27,1% of those spaces.

Although the number of convex spaces be greater in Areeiro then in Portela, the number of axial lines (lines of sight) is smaller in Areeiro (31) then in Portela (34). These results from the fact that the size and shape of the urban blocks (islands) optimize the circulation and accessibility. Thus, a less number of lines to cross the street network is needed, (Figure 7).

Connectivity applied to axial line map measures the lines that are directly connected to a space. The average value for this measure is higher in Areeiro (4.1) than in Portela (3.5). Fourteen lines are connected to the most integrated street in Portela (Av. Descobrimentos)

while eleven lines are connected to the most integrated street in Areeiro (Av. Guerra Junqueiro / Av. Roma). However, many lines in Portela (16) have only 1 connection, while in Areeiro those lines are just a few (3).

Figures 5 – Convex map partition with information of blind walls (yellow)
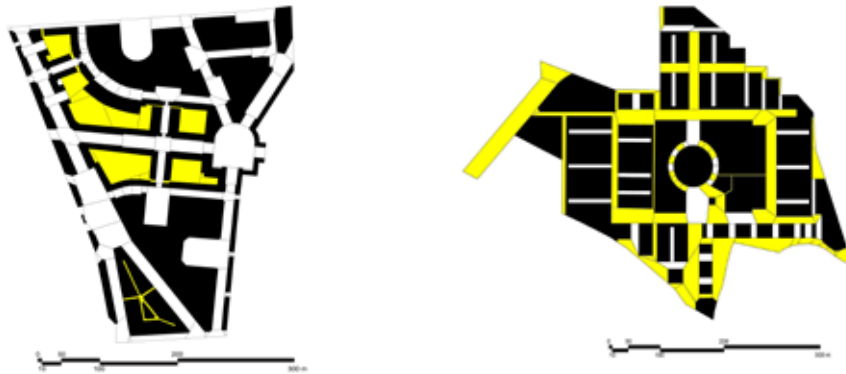
Source: Own Elaboration

Figures 6 – Integration map overlaid with the interface map (constitution of space)
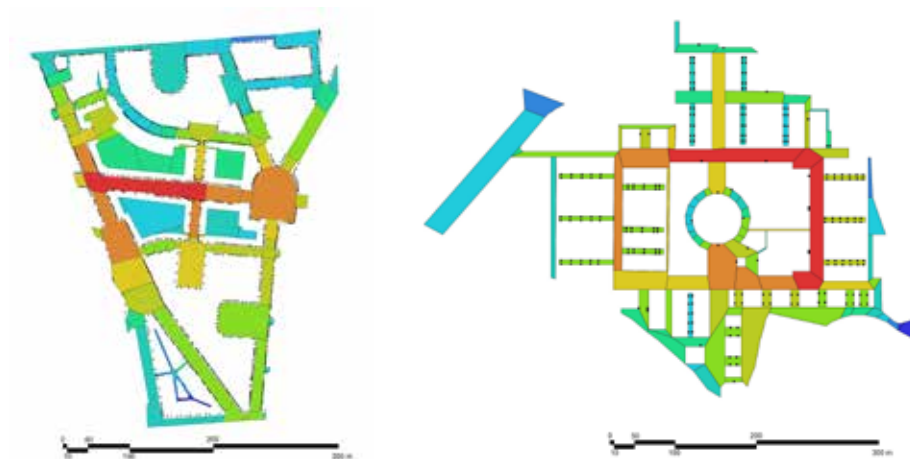
Source: Own Elaboration

Figures 7 – Integration map overlaid with the interface map (constitution of space)
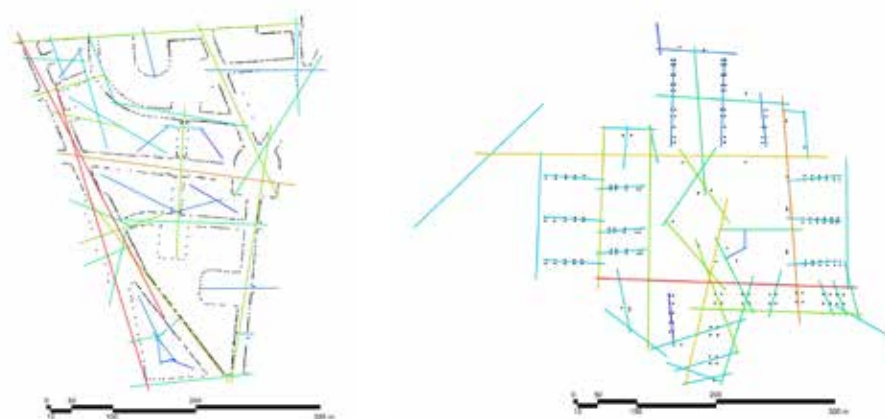
Source: Own Elaboration

Integration measures how deep or shallow a space is in relation to all other spaces in the system. In other words, how close each space is from all others. This measure is slightly higher in Portela (1.68) than in Areeiro (1.42). It follows the pattern of connectivity and illuminates the integration core (i.e. the highest 10% values) in both systems (Figure 7).

The relation between building entrances and the integration maps (convex and axial) highlights the previous findings. Figures 6 and 7 indicate that buildings access in Portela is always made by the most segregated spaces (green and blue). Unlike in Areeiro where the most integrated spaces (red, orange) are also the most constituted ones.

The intelligibility of the system (ranging between 0 and 1) is high in both cases: 0.66 (Areeiro) and 0.80 (Portela), meaning that from a local position it is easy to understand the global structure of plan.

Figure 8 shows other type of convex map representation - justified graphs using the software JASS (Koch, 2004). In this diagrams one can read the degree of ringness of each plan in order to identify patterns of order and structure in space networks. Areeiro have more spaces that are usually positioned on one or more rings of movement in the network. Portela has more spaces which are characterized as dead-end spaces (blue spaces) or that are connect to spaces in a graph without being part of any ring of movement (green spaces). Comparing these structures with the Alexander's model described in section 2 one can say that Portela is more tree like while Areeiro is more a semi-lattice.

Figure 8 – Justified Graphs with the root in the most integrated convex space calculated with JASS software: Areeiro (a. and c.); Portela (b. and d.)

a.

b.

c.

d.
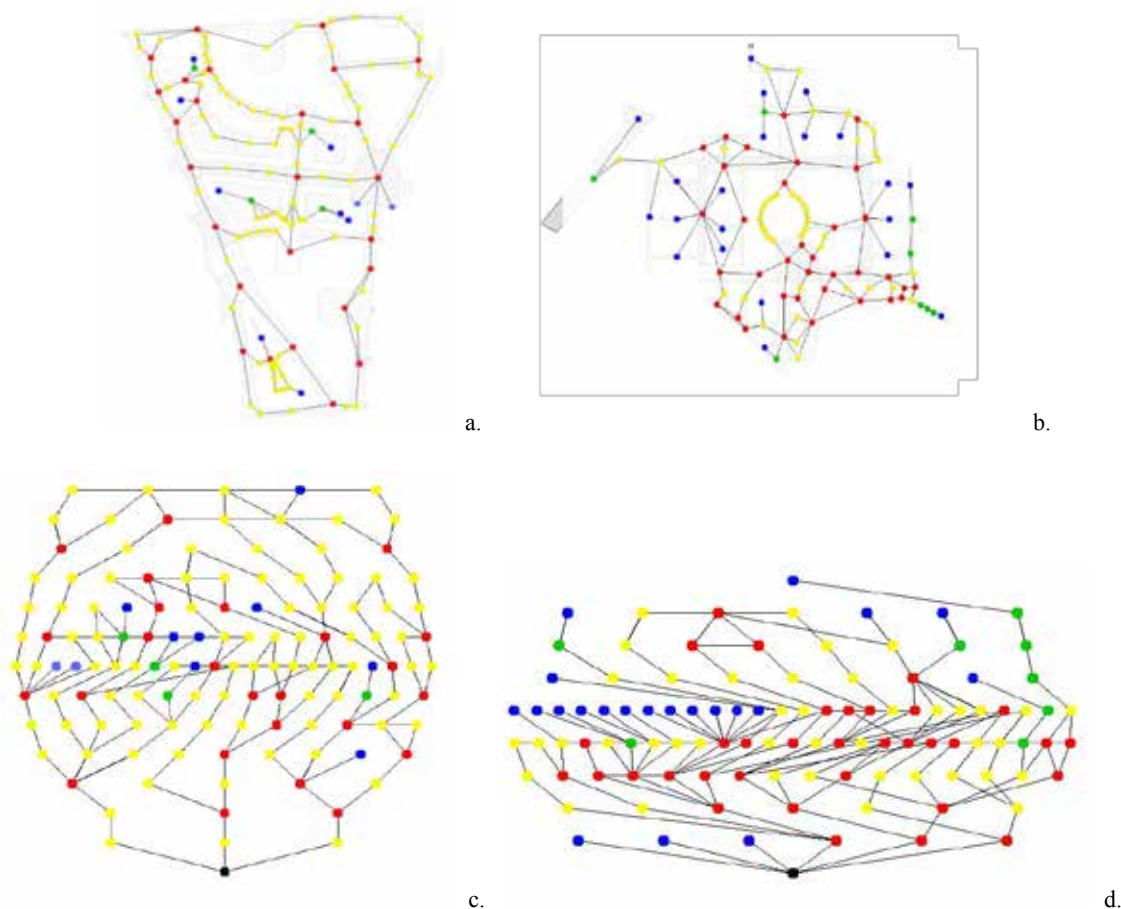
Blue spaces – spaces which are characterized as dead-end spaces and connect to no more than one space in a graph; Green spaces – spaces that connect to two or more spaces in a graph without being part of any ring of movement; Yellow Spaces – spaces that are usually positioned on one ring of movement; Red spaces – spaces that must be in a joint location connecting two or more rings

7. DISCUSSION AND CONCLUSIONS

A strength of this study is that it relied on objective data regarding a number of measures and variables of space, that helped to evaluate the spatial performance of two urban plans produced from two very different conceptual ideas of city - traditional vs modern. Although the sample is very discreet, it makes the point about the relation between these two kinds of city and two ways of thinking about space - holism vs rationalism.

Space syntax tools and techniques proved to be essential in understanding the configurational proprieties of the urban systems (housing estates) both in qualitative and quantitative way. Although the analysis was diachronic, giving particular acuity to the original plans, the detected configurational attributes demonstrate a set of spatial patterns and respective variations.

The graph representation of street networks through elementary components of space turns possible to interpret the plan layouts according with mathematical principals. While the plan of Portela is clearly a tree, the Plan of Areeiro follow the mathematical principles of a semi-lattice. As a consequence, the strict hierarchy of Portela supports only a small percentage of relations between the elementary components of space, while the overlapping structure of Areeiro supports more easily the relationship between the parts and whole turning this neighborhood much more alive.

Considering the space organization, the design options brings out evident implications in the social structure of the space. The study clearly shows that Areeiro possess a number of features that are likely to support social and public space activities while Portela was designed to segregate inhabitants from its neighbors (visitants). If the reason for any spatial system is to promote the relationship between the two social groups that use it (inhabitants and visitants) then we can conclude empirically that Areeiro is a more successful urban space than Portela.

The results have shown that although resulting from a single plan, they present big differences in terms of street life affordances, which are related with the way the plan addresses the structure of a tree (Portela) or a semi-lattice (Areeiro). In Portela the space is formalized to accomplish certain social conditions, and the functions of space are drawn therefore in the space in a centralized way. Areeiro despite following the same premises, encompass a more distributed structure, with multiple links between the local and global scale of the city and within the neighborhood plan, which configure a richer and livable urban system.

Despite the features of each plan layout the most important aspect which distinguish Portela and Areeiro is their relationship with the dual structure of the city which in turn influences the performance of each urban system. While Areeiro is an integrant part of the structure or skeleton of the city (foreground), Portela is a separate piece which compose the patchwork of the metropolitan region (background).

Finally, it is important to notice that space syntax analysis allowed the understanding of a virtual community and its social life by measuring the affordances of space. Future work should complement the syntactic analysis with direct observations of people and its behavior as well as the main activities in place. For now, we believe that good correlations between the direct observations and syntactic measures will be found.

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THE REFUGEE CRISIS ON TWITTER: A DIVERSITY OF DISCOURSES AT A EUROPEAN CROSSROADS

Estrella Gualda[1]
Carolina Rebollo[2]

ABSTRACT

In the last decade, the European Union has approved and launched measures to promote Intercultural Cities, Diversity Management and the Integration of Immigrants in Europe. Despite this European framework, we are now at a crossroads between solidarity and humanity and an important restriction of refugees' human rights across Europe. In this paper, we try to compare the international approaches to the refugee crisis in different countries in Europe. Data were extracted from Twitter. We obtained thousands of tweets about "refugees", using this word in six different languages (English, French, German, Italian, Portuguese, and Spanish) from end November 2015 to 27 February 2016 as search strings. We performed a discourse analysis, focusing on the comparison between countries. A qualitative analysis with the help of both Atlas ti and T-Lab software was performed. The results showed a diversity of current discourses in Europe about refugees and the refugee crisis (from solidary to xenophobic ones), some of them very characteristic of particular countries or of local events experienced in these countries. These results allow us to reinforce the idea that we are at a key moment for the future development of Europe, especially regarding aspects concerning living together in cities and villages.

Keywords: Refugees, Twitter, Social Media, Discourse and Content Analysis.

JEL Classification: I13, J68, J69, R59, Z12, Z13, Z18, Z19.

1. INTRODUCTION

Migration management, especially management of the so-called refugee crisis, has become one of the main issues of political agendas. To the position that defends a management system of migration flows, another perspective has been incorporated, the goal of which is to meet challenges to achieve citizenship and integration for immigrants, manage changes in public opinion and mediate in conflicts linked to immigration (Cachón, 2007). For the European Union, and specifically for the Department of Migration and Home Affairs, the main objectives are to introduce a policy that will ensure economic, cultural and social growth in Europe, giving priority to the development of a secure, stable and respectful environment within the law and creating a common asylum policy based on solidarity, responsibility and the relationships between immigration and integration. At the same time, the construction of a secure Europe needs to fight terrorism and organized crime, promote cooperation policies and prepare an appropriate response to emerging crises (European Commission, 2016).

In an attempt to manage the dramatic situation prevailing in the Mediterranean, where thousands of refugees have lost their lives, the EU set a resettlement and relocation quota in which each Member State should take a certain number of refugees, agreeing to a solidarity

[1] Estrella Gualda, University of Huelva, Huelva, Spain. (estrella@uhu.es)
[2] Carolina Rebollo, University of Huelva, Huelva, Spain. (carolinard91@gmail.com)

distribution between countries. Thus, the pressure on the places of entry, such as Greece or Italy, will be alleviated. Although this appeared to be the dominant strategy in some parts of Europe, months after this agreement, the slowness of procedures, the refusal of some States to not accept more refugees, the establishment of a harsh policy of border control, and the refugee deaths and precarious living conditions in the camps (such as Calais or Idomeni) have further aggravated the situation, leading to debate on the vulnerability of asylum rights of refugees.

Finally, the European Union and Turkey (one of the main countries that restrain the flow of migrants) have signed an agreement whereby Europe will return to Turkey asylum seekers who arrive on the Greek islands. In exchange, the EU will accept Syrian asylum seekers from Turkey and offer other benefits, including an agreement on visa policy and the opportunity to reopen debate on Turkey's entry into the European Union.

Public opinion has not been indifferent to these events, expressing itself in social networks against European policies, showing concern for the human rights of refugees or otherwise expressing a rejection of the conditions in which migrants reach Europe and warning of the possible dangers that can result. Thus, social networking sites operate as digital communication tools which review, discuss, denounce, interact and share these events with other users. One of the most important platforms of online communication is Twitter, a microblogging service that has seen its popularity increase in recent years thanks to its ability to transmit rapid and direct messages, generate debate and mobilization, and group common issues through tags (hashtags) that connect users. Users also interact and talk to other users in Twitter.

2. BRIEF DESCRIPTION OF THE LEGISLATIVE AND POLITICAL ISSUES IN THE EU FRAMEWORK ON REFUGEES AND IMMIGRATION

In the last decade, the European Union has approved and launched measures to promote Intercultural Cities, Diversity Management and the Integration of Immigrants in Europe. The Common Basic Principles for Immigrant Integration, agreed to in 2004, laid an important foundation. Integration and Refugees Funds were applied during these years through different programs. The latest policies have also given value to diversity management, which is an important framework through which to promote the integration of both refugees and migrants.

Diversity management is a broad concept and is not exclusively applied to migration studies. Several and very different studies have tackled this topic focusing on different approaches, such as gender, age, socioeconomic status, physical abilities, sexual orientation, religious or political beliefs, as well as race, ethnicity, or immigrant populations. Diversity management can be found within the framework of different kinds of organizations, from universities and schools to hospitals and other types of national and international companies. Some authors argue that diversity management is rooted in events that took place in the 1950s, '60s and '70s (social protests, civil rights, or liberation movements) (Brazzel, 2003). Others, such as Katrinli, Atabay and Gunay (2008), go much further back and find traces of diversity management in the Ottoman Empire. The current view is that diversity management was disseminated in the United States in the mid-eighties (Chinchilla & Cruz, 2011; Brazzel, 2003) in a context where important demographic and economic changes were taking place. The diversity management field was consolidated in the '90s (Brazzel, 2003). In Europe, the development of this concept can be traced to the late 1990s (Kamp & Hagedorn-Rasmusen, 2004).

Definitions of diversity management normally involve ideas such as recognizing and valuing of individuals, promoting the acceptance of individual differences (sometimes connected to our cultural background and family origin), and respect. Workplace diversity or managing diversity within organisations was developed through links to private companies, addressing the different benefits of managing diversity, especially those connected to productivity or 'the multicultural advantage' (Greenberg, 2004). Over time, other public and non-profit organisations became receptive to this idea and began to pay more attention to this topic. However, the approach was different in this case, being more directed towards achieving better inclusion and equity of diverse populations.

The introduction of concepts such as 'super-diversity' into the intellectual debate (Vertovec, 2007) underlines the importance of not reducing the idea of diversity to culture or ethnicity; indeed, in global societies, there is a continuous interplay between multiple axes of differentiation. Some of the factors cited by this author were: country of origin, ethnicity, language[s], religious tradition, regional and local identities, cultural values and practices, migration channel, legal status, migrants' human capital, access to employment, locality, transnationalism, responses by local authorities or services providers and local residents (Vertovec, 2007). When talking about refugees or immigrants in general, diversity has multiple origins, not only religious or ethnic.

A key issue concerning diversity management is posed by Giovannini (2004: 22), who addressed the importance of this concept as follows: *"Diversity is any dimension that can be used to differentiate groups and people from one another… Instead, the impact of diversity on group dynamics and productivity varies significantly depending on how well such diversity is managed".* His approach underlines the importance of the decisions and actions taken on by organisations and institutions. Other authors address the importance for organisations of legal obligations concerning diversity and underline the necessity of acquiring some kind of social conscience. In fact, lack of awareness of diversity has been addressed as a barrier to be overcome in this area of research, and it is within this context that ideas and experiences promoting cultural sensitivity and equality emerge and develop under the aim of achieving better social inclusion. Kamp and Hagedorn-Rasmusen (2004), for instance, wonder if the new concept of diversity management introduced and developed in Europe in the late 1990s would have an important role in influencing organisations to promote actions in favour of underprivileged groups. This could also be applied in connection to the refugee crisis. Furthermore, there are some studies that try to rethink and evaluate classical models for the integration of immigrants (assimilation, multiculturalism, etc.) as strategies for diversity management together with assimilation, multiculturalism or interculturalism (Moghaddam, 1993; Rodríguez-García, 2010).

Kamp and Hagedorn-Rasmusen (2004) also address the influence of context and strong institutions on diversity management. The recent relevance of diversity management in the European Funds for the promotion of research and actions (Eurofound, 2013) is noteworthy in this sense. The following quote is very explicit:

> *Valuing diversity is a core principle of Eurofound and one of the pillars of the European Union. Building a more inclusive EU is considered an essential element of achieving the Union's 10-year strategic goal of sustained economic growth, more and better jobs, and greater social cohesion. In its previous programs, Eurofound has undertaken work on combating discrimination, on the basis of gender, age, race and disability, both in and outside the workplace. In its ongoing work, the Foundation plans to focus on the identification of policies and concrete experiences aimed at: managing diversity from the perspective of competitiveness and productivity, and the improvement of working conditions for all workers: increasing social integration and, in particular, improving access to good quality employment, by promoting non-discrimination.*

European policies turned towards diversity management in the context of the Europe 2020 strategy (European Commission, 2014). Here, diversity management became an important feature of 'inclusive growth', which is understood as the inclusion in employment of workers who are marginalised or excluded from the labour market, for one or more of their characteristics which are not related to their suitability for work'. The EU's growth strategy was designed to overcome the current economic crisis, and encourage diversity management in the workplace in the form of a conscious set of policies and practices developed in order to value workforce heterogeneity as an instrument that can help increase productivity and competitiveness. This strategy conceives diversity as an asset for companies (Eurofound, 2013; European Commission, 2014). The EU must now face new questions as a result of the new refugee crisis, which has come hand in hand with shocking events throughout Europe in the form of expressions of hate and racism towards refugees. These events have forced us to think about the difficulties in taking on the challenge of "diversity management" in an atmosphere where sometimes there is a sizable rejection of refugees and sometimes, by extension, of immigrants in general.

3. FRAMEWORK ON REFUGEES: INTERNATIONAL APPROACHES

International research on refugees and asylum seekers in the world has a long tradition, and has addressed the various problems raised by their condition. The most researched aspects include identity issues (Langellier, 2010; Cheboud, 2001), concern for refugee children (Levine 2007; Diab, 2010) and economic effects of refugees on the country of destination (Vecchio, 2016). All of these studies are focused on different parts of the world and, of course, different nationalities, such as Southeast Asian (Dubois, 1993) and North Korean refugees (Kim, 2010). The bibliography gives account of past and present international and national conflicts, such as the conflict in Iraq (Munem, 2015) and Syria (Charles & Denman, 2013), among others.

According to the 1951 Refugees Convention, *the term "refugee" shall apply to persons that have well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it…"* (UNHCR, 2016: xx).

As stated in UNHCR (2015), in the event of mass displacement of refugees due to war or widespread violence, it is impossible to interview every individual for the recognition of refugee status; furthermore, it is senseless, because the causes of escaping from the country of origin are evident. In these cases, these groups are considered "prima facie" refugees, as is the case of Syrian refugees.

In fact, civil wars and violence in the Middle East have caused people of countries in conflict to leave their homes and move to neighbouring countries, such as Turkey or Jordan, to find shelter. However, the number of asylum seekers seeking refuge in Europe has been increasing and more and more people turn toward the old continent by land and sea to resume their lives or meet with relatives who are there.

The European Union is facing a decisive moment in which several policies must be mobilized to find a solution to this humanitarian crisis. In 2015 only, more than 300 000 people have risked their lives to cross the Mediterranean and over 3 000 have not survived the dangerous journey (UNHCR, 2015). This includes Aylan, a three-year-old child who died on the Turkish coast and whose photograph shocked public opinion. The photograph's

impact is still alive in the vindictive speech and support towards persons who are becoming refugees in a media spotlight that can no longer be ignored.

Since the appearance of that photograph, a series of events that have had a sizable influence on public discourse have occurred on the international scene. One of the most tragic was the November 2015 terrorist attacks in Paris, which killed more than 130 people and left more than 200 injured (Yárnoz, 2015) and the responsibility for which was claimed by the jihadist organization the Islamic State (Europe Press, 2015). International reactions of rejection to the attack and solidarity with the French was immediate and spread quickly through social networks such as Twitter, especially where the use of hashtags such as #JeSuisParis or #PrayforParis (in different languages) quickly became a trend. Recently we have had other similar reactions to terrorist attacks, such as #JesuisBrussels, #PrayforBrussels, or even #JesuisPakistan. In this climate of empathy for the victims, the finding of a Syrian passport near the location where one of the terrorists blew up his explosives belt further stoked tension on the reception of refugees in Europe.

After these and other events, public opinion has been divided, and in fact, in various European countries, demonstrations have taken place both for and against refugees. On the one hand, in Germany alone, there have been at least 1610 attacks against refugees and refugee shelters, including arsons and racist propaganda. In 2014, the number of attacks was 199 (Deutsche Welle, 2015). In addition, allegations of theft, threats and sexual abuse of nearly one hundred women in the city of Cologne by refugees on New Year's Eve again rekindled the debate on whether to accept more people into the EU. In Sonderborg and Haderslev (Denmark), several bars and clubs closed their doors to refugees for allegedly touting customers (Sputnik, 2016). And some political leaders have publicly expressed their rejection, even talking about an "organized invasion" by refugees (The Huffington Post/EFE, 2015).

On the other hand, there have been many initiatives of solidarity and assistance to refugees, many of them disseminated through social networks. Some initiatives have even involved major football teams that have decided to donate money to the cause. Other initiatives come from Spanish town councils that have decided to join a network of refugee cities, as cities offering to accommodate asylum seekers. Similarly, hundreds of volunteer workers have volunteered their time and efforts to help refugees both inside and outside their national borders. On Twitter, the hashtag #RefugeesWelcome accompanied thousands of messages clamouring for solutions and solidarity (El País Verne, 2015). Imaginative actions in support of refugees have also been recently developed, as is the case with Berlin Nightclubs organizing a Refugees Welcome party on Sundays to "raise money for pro-refugee organizations" (Telesur, 2016). These are just a few of the different strategies and mobilization actions trying to help refugees.

These events show that the refugee crisis not only matters to European policy makers. The European population also has a position on the matter, using communication tools that bring to use social media, specifically Twitter. An example of the ability to mobilize information on this social network was the demonstration on February 27, 2016, in over a hundred European cities. Known as the European March for Refugees Rights, it was organized with the aim of calling for routes and safe passages for refugees seeking to enter Europe due to public awareness of the drama that refugees carry on their backs. This march stands in stark contrast to the xenophobic attitudes that have appeared in some European countries (The Huffington Post, 2016). Under hashtags such as #27FPasajeSeguro or #SafePassage, thousands of groups, organisations and citizens have connected and interacted with other users thereby enabling wider mobilization. At the same time, discontent over the management of this humanitarian crisis was also spread via this tool, as was the desire for a more dignified and fair treatment for refugees.

4. OBJECTIVES

The aim of this paper is to compare international approaches to the refugee crisis in different countries in Europe through Twitter, and specifically, to identify the microdiscourses that appear around the string "refugees" in different countries. One main interest at this stage is the identification of the main public discourses disseminated through Twitter. What narratives and what kind of positive or negative images and social representations are transmitted to the audience? The implications of our results are clear for intervention and policy making.

In summary, we attempt to discover patterns in the recent discourses on refugees and delimit the types of messages that are disseminated through Twitter throughout Europe. Do the discourses, images and social representations disseminated by Twitter offer information that aids in the interpretation of the intervention of different actors (NGOs, politicians, activists, citizens and media) on Twitter? Do they allude to slogans, places, dates, people, or do they allude to something else? Additionally, through this research, we wish to obtain a better understanding of activity on Twitter in relation to social and political campaigns related to the defense of human rights.

5. METHOD

5.1. Data collection, filtering and data processing

Data for this article were extracted from Twitter, from which we collected more than 300,000 tweets about "refugees", using as search strings this word in six different languages (English, French, German, Italian, Portuguese, and Spanish) from 14 December 2015 to 27 February 2016. We mined data every day during the selected period with the help of NodeXL Professional[3]. The extraction of tweets for this article began on 14 December, 2015, after the Paris Attacks to 27 February, 2016, day in which an international campaign took place around the hashtag "SafePassage" and whose aim was to defend human rights for refugees. Two and-a-half months were covered. During that period, samples were collected every day.

As a step prior to the discourse analysis, we applied different strategies for filtering, transforming, and coding data, focusing on the comparison between countries. Qualitative analysis and some quantitative description with the help of Spss, Atlas ti and T-Lab software were also performed.

5.2. Basic description of final dataset

Our final dataset, which did not include retweeted messages, was composed of 82,573 original tweets. The initial extraction produced a very long list of tweets, including mentions and retweets (RTs), which were deleted for this analysis, considering that a Retweet repeats the content. Even though retweets give a better idea of the dissemination and scope of a tweet, the original tweet allows for a better identification of different discourses without this distortion. In future works, more focus on the scope of tweets will recover this information. A majority of tweets included pictures or links to URLs. The dataset included original tweets in German (31.467, 38.1%), English (29.191, 35.4%), Spanish (12.943, 15.7%), French (7.003, 8.5%) and Italian (1.969, 2.4%) in particular, perhaps because these languages are more widespread in the world (English-Spanish), because there is a greater centrality of Germany surrounding the decisions and events concerning the refugee crisis or maybe due to the interest or lack thereof by communities in Twitter.

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[3] NodeXL Pro Website: https://nodexl.codeplex.com/.

6. IDENTIFICATION OF INTERNATIONAL DISCOURSES ON REFUGEES

The refugee crisis and the events surrounding it have captured great attention in Europe and other places around the world. An initial analysis of the discourses disseminated through Twitter allows us to distinguish among several orientations. Globally, the idea of "refugee crisis" is associated in the discourse to contents related to human rights or campaigns such as #safepassage, which are widespread globally.

In addition, the discourses around refugee crisis incorporate the actions and decisions that European governments are taking to confront the crisis during the studied period: countries' decisions, agreements, etc. The main political leaders (especially Merkel) surrounding these events are also mentioned, as are places in border areas or in areas of conflict (Turkey, Greece). The refugee crisis is presented as a great challenge for Europe, but it is also seen as an important crisis with unpredictable consequences.

> The following is a list of some of the discourses representative of the hashtag #refugeescrisis:
> - 17/12/2015. #MigrantCrisis is pushing #Germany to brink of #CivilWar and #anarchy #refugees #terrorism #immigration
> - 19/1/2016. #Refugees crisis in #Europe is fake; European Govs are looking for a reason to send them back home! Then STOP supporting #ISIS refugees europe isis
> - 16/12/2015. How is anyone able to stand by and watch this #humanitarian crisis unfold? #refugees humanitarian refugees
> - 29/12/2015. "#Shameful #Denmark plans to take jewellery from #refugees as "only way to afford resettling them in asylum centres""
> - 26/2/2016. La respuesta racista contra los #refugiados es la verdadera crisis de la vieja Europa.

The discourses are also critical towards European governments, considering that they are not doing their best to solve the refugee crisis, especially regarding their passivity and slowness in welcoming refugees. In addition, there is a very critical focus on the violation of human rights. The drama is also reported through the history of people that died during their journey to Europe, comparing this crisis to the Second World War.

The following figure, built with T-Lab 9.1.4, presents a summary of hashtags contained in the 82,573-tweet corpus under analysis, and it is a first presentation of how some discourses are interconnected and how others follow a different dynamic. Below, we clarify some of the discourses contained here with the complete series of tweets, not only the hashtags. The figure shows how the hashtag #refugeecrisis is linked to other discourses on human rights.

Figure 1. Hashtag Map, classified by Coseno, as an association indicator of co-occurrences
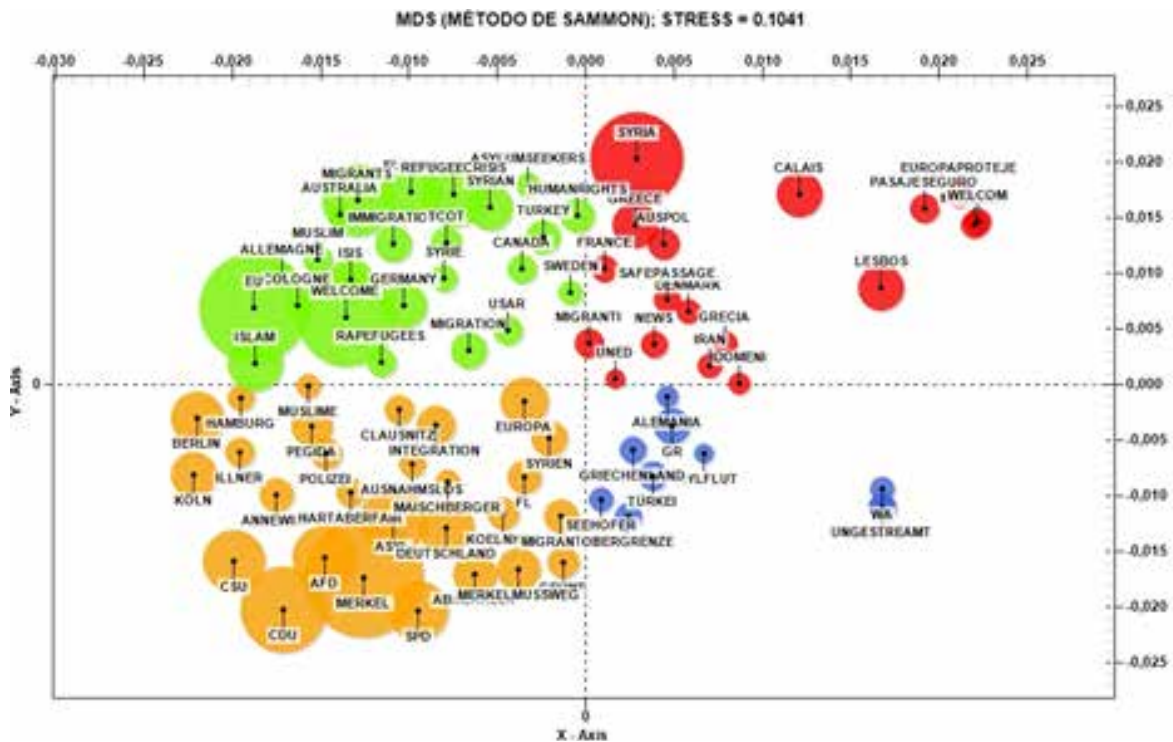
Source: Authors, dataset described in methods.

Map built based on association indexes used to analyse co-occurrence of lexical units in their context.

7. POSITIVE DISCOURSES ON REFUGEES: #SAFEPASSAGE, #HUMANRIGHTS, AMONG OTHERS

Public discourses found in Twitter present refugees in a positive and negative light. Some of the most positive ones are channelled through specific campaigns in support of refugees. This can be clearly observed through several closely related hashtags at the top right part of figure 1. In addition, considering the complete series of tweets, other keywords extracted after a qualitative codification through Atlas ti were found sharing a same context and positive discourse:

SafePassage - Pasaje seguro – EuropaProtege – Welcome – refugees crisis
Siria – Calais – Lesbos…

SafePassage represents the solidarity discourse supporting refugees and claiming social justice and the application of human rights. This label was disseminated through the European March for Refugees Rights on 27 February, 2016, with #safepassage (in different languages) as the slogan created to involve citizens with the cause, claiming safe passages for refugees. A similar discourse is found in other similar labels such as "#humanrights", "#europaproteje", "#welcome", "#diversity", "#humanity", "#refugeeswelcome", all of them interconnected and sharing similar ideas such as empathy and solidarity with refugees. In the case of #humanright, this hashtag is also a denunciation for the violation of refugees' rights and also a strong criticism towards Europe for not giving appropriate and timely responses to this crisis, allowing the infringement of the rights of refugees.

Associated labels, from T-Lab

The following are additional examples of this type of discourse:

- 01/02/2016. It's not just Britain. Europe's response is morally unacceptable. #refugees #safepassage
- 01/02/2016. Cuanto tiempo más seguiremos mirando a un costado? Se necesita en forma inmediata un #pasajeseguro para #refugiados
- 17/12/2015. The EU is supporting the racist and murderous policies of Greece and Turkey who refuse #safepassage to #refugees. #RefugeeLifeMatters
- 19/1/2016. "The asylum seekers are detained and have not been given the possibility to appeal the decisions" Happens in #Norway! #refugees #humanrights
- 17/12/2015. Refugees won't destroy public services, but austerity will #refugeecrisis #WelcomeRefugees #HumanRights 4 #refugees
- 24/2/2016. Sumémonos y seámos la voz en #Europa de los #refugiados Por los #DerechosHumanos Por una #vidadigna
- 26/1/2016. #Europa empieza a dar un asco tremendo #DerechosHumanos #refugiados #DDHH #refugeeswellcome

8. OUR RESPONSABILITY TOWARDS CHILDREN: VULNERABILITY AND PROTECTION

The most impressive image associated with the refugee crisis was that of a child dead on a beach. #safepassage is also connected to this event. We found thousands of tweets referring to children (enfant, niños, kinder, etc.). We found lots of displays of concern connected to children. Somehow, all of them have to do with their vulnerability. Other arguments point out that they are the most affected by the crisis and that they are the main refugee crisis

victims, especially when they travel alone. Other concerns found in Twitter had to do with sex and organ trafficking. The death and disappearances of children are also issues of great concern.

We furthermore found discourses and declarations by NGOs as UNICEF showcasing their actions and activities geared towards the protection and education of children. The discourses regarding minors have a great sentimental component, including frustration, sorrow, anger and other emotions due to Europe's passivity:

- 16/2/2016. Dans l'affaire des 10.000 #enfants #réfugiés disparus, les États européens sont les premiers coupables.
- 01/02/2016. Es tan doloroso. Niños. No números. NIÑOS. Dónde está la ONU? #refugiados.
- 21/12/2015. 70 years on from World War II, the situation for children on the move through Europe looks eerily familiar.

Nevertheless, we also found negative discourses about refugees arguing that adult refugees are sometimes married with children in their countries of origin. Cases of children raped by refugees are also mentioned.

- 16/12/2015. #Muslim #Pedophiles Posing As #Refugees Bringing Their Child Brides Into #Europe.
- 01/01/2016. "#Sweden Accepts #Muslim ""Children"" as Old as 40..#Muslim adult #refugees pose as unaccompanied children. A farce.
- 29/12/2015. #Refugees in #Germany housed together. Men n #women n #children in same places. #Rape is rife. #SAVETHECHILDREN!

9. THE NEGATIVE AND WORRISOME SIDE OF DISCOURSES ON REFUGEES

Unfortunately, Twitter is full of negatives messages about refugees that erode the possibilities of integration and create a very negative image of them based on unfounded generalizations and racist orientations. Some of the discourses in the observed period have to do with Muslims and the Islam (religion) and attempt to stop their entry into Europe. There is also a metaphorical discourse concerning "invasion", which includes messages such as "hordes of #Muslim" that at the same time are "Illegals" or sometimes even "terrorists". This type of discourse clearly rejects refugees. Sometimes these discourses are supported by politicians such as Donald Trump or other organisations in Europe. These messages intend to generate a rejection towards refugees, and promote their expulsion or the prohibition to entry.

- 17/12/2015. The West must think twice before accepting thousands of Muslim #Refugees from Middle East.
- 02/01/2016. #Europe and #Britain still under invasion by hordes of #Muslim #IllegalImmigrant #Islamist "#refugees" in 2016…

- 16/12/2015. Temporary ban on Muslims is correct. ISIS promised 2 infiltrate #refugees. They don't bluff. #trump is RIGHT! #GOPDebate #trump2016

Enemies signify the possibility of invasion, fear and being in a state of alertness about something bad that will supposedly happen. In support of these ideas, we found the hashtag #islamistheproblem. Religion is currently mixed with a humanitarian situation where people are escaping from war. In this case, all refugees are supposed to be an Islamic collective. There is, furthermore, an essentialist idea of Islam at play, as something that cannot change. Islam is described through tweets as a religion that does not respect European values and as a religion that does not promote the peace. The problem, thus, is the religion, not the people. At the same time, however, refugees are classified as Muslim.

#islamistheproblem has a direct connection to the discourse surrounding **#RefugeesNotWelcome** (criminality, rape, invasion, etc.). However, it adds terrorism to the mix as it conflates terrorism and refugees and thereby introduces suspicion. There are also some hashtags such as **#ISIS** that contribute to this sentiment.

Central to the discourse about **#refugeesnotwelcome** is the idea of expelling refugees from Europe, not only for being refugees but for being Muslims in particular. The two components are thrown into the same box. Fears regarding a hypothetical invasion or *reconquista*, and the idea of losing control of the situation also play a role. Some tweets suggest that refugees behave in an uncivilised way (they are criminal, rapists) and show false passports. They are also seen as a burden for the country. The majority of these tweets are in German and include #PEGIDA or other messages and hashtags against Islam, such as #BanIslam, #Islamistheproblem, or those directed to politicians, such as #Merkelmussweg. Regarding **#raperefugees,** there is another series of tweets that do not contribute to pacific coexistence in Europe. These are messages that elicit over-alertness, stereotypes, as well as anger directed towards refugees and are well documented in Twitter.

10. CONCLUSIONS

After 27 February 2016, the date for which our data series ends, news and tweets about the refugee crisis have continued and the challenge for Europe of finding a solution to the crisis within a human rights framework continues. The latest news on the refugee situation is not especially good for them. Furthermore, social conflicts are still at play. We need to think more deeply on the consequences of this crisis for Europe.

Our results showed a diversity of current discourses in Europe about refugees and the refugee crisis (from solidarity to xenophobic ones). Some of them were very characteristic of concrete countries or local events that took place in these countries. However, we also

discovered commonalities in the discourses, both in the humanitarian and the rejection side. Maybe the most distinctive thing that we found through this approach is the frequency of negative discourses in the German language. As a next step to our study, we will try to localize these negative orientations, attempting to ascertain their origin. These results allow us to reinforce the idea that we are at a key moment for the future development of Europe, especially with regard to aspects concerning coexistence in cities and villages. Thus, a new idea for diversity management that explicitly takes into account what is happening with regard to the refugee crisis seems to us of great importance. On the other hand, there are direct and also frequent religious attacks through Twitter, specifically towards Islam, frequently connecting religion to terrorism, which are very different things. This particular behaviour on Twitter is a clear reflection of what is happening in society, if we pay attention to everyday news. If European cities and villages look to a peaceful coexistence, respecting diversity, they will need to take all these events seriously and adopt measures, as racism and xenophobia emerge and consolidate very easily from these types of scenarios.

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INNOVATION ACCELERATORS AS ENTREPRENEURIAL AND INTERDISCIPLINARY ENGINES: THE PORTUGUESE CASE

Silvia Fernandes[1]

ABSTRACT

Today's competition is tough, due especially to emergent information systems (IS) and information technology (IT) support. Managers must continuously cope with challenges to keep their businesses innovative and sustainable. They take most of their decisions based on considerable amounts of data. An important step is to employ strategies based on open innovation: partnerships with people who know the technology better, or how to conceive or run a certain activity, product or process. All these issues and potentials have been explored and supported in the so-called innovation accelerators or 'boot camps', either for launching new businesses or supporting their IT/IS platforms. These initiatives are based on a dynamic entrepreneurial and interdisciplinary ambience, which introduces the candidates (mainly start-ups, spin-offs) to consultants, investors, managers, designers, innovators, etc. This study determines where Portugal stands in terms of innovation in general, open innovation (cooperative or firm-based), venture capital adherence and innovation sustainability. It then discusses the results of some Portuguese innovation accelerators (such as 'Beta-i' and 'Cria') from the point of view of target sectors/markets and the sustainability of accelerated firms over time.

Keywords: Innovation Accelerators, Entrepreneurship, Partnerships, Open Innovation.

JEL Classification: O31, O32, O33.

1. INTRODUCTION

Today's competition is tough and global, and this is especially true for information systems (IS) and information technology (IT) offerings. Meeting and mastering this challenge is essential to maintaining a long-term competitive edge. Managers make most of their decisions based on a considerable amount of data to that helps them know what products they should offer, in which quantity, from which supplier, the best means of distribution, the best location for stores and how to organize the transport. An important step in building more dynamic and creative businesses is to employ innovative strategies based on the use of modern information and communication technologies. These have led to new features for sustaining business competitiveness: integrated systems, interactivity, mobile platforms, creative design, etc.

These responses require IT-based tools, increased information content and creative teams. Any enterprise that wants to optimize its success in the information society must have a basic awareness of, and a strategy for, dealing with this new environment. With the shortening of life cycles and time to market, this has to evolve at a pace that approaches the need for its real time creation (Philipson, 2008). For example, the internet brings critical

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[1] Silvia Fernandes, University of Algarve, Faculty of Economics, Research Centre for Spatial and Organizational Dynamics, Faro, Portugal. (sfernan@ualg.pt)

new functionalities for enterprises through real time business dynamics and relations. If they don't constantly improve the process of managing this, they will quickly become paralyzed.

1.1. The IS/IT 'battle field'

Building custom software systems can become so complex that the software requires an 'army' of engineers and consultants to manage it. Small to medium businesses need a way to organize their data on a smaller scale and without the expense of hiring costly consultants or paying for maintenance contracts. The approach of building and managing a custom software solution is financially out of reach for small- and medium-sized companies, and therefore companies are moving to web-based software, as it can eliminate the need to purchase and manage computer servers, firewalls and software servers just to run the application. A broadband connection to the internet is recommended to sustain a design in a very modular way, which allows for tremendous flexibility in building platforms that meet the needs of a particular activity.

These trends, as well as being key for business performance, can be a means of knowledge-base enhancement (Gudas, 2008; Fernandes, 2013). Figure 1 illustrates this through the main lines of information system support and the resulting enterprise knowledge expansion (the last blocks allow answers to questions like how/why and when/where).

Figure 1. Main lines of information systems' support and knowledge-base enhancement
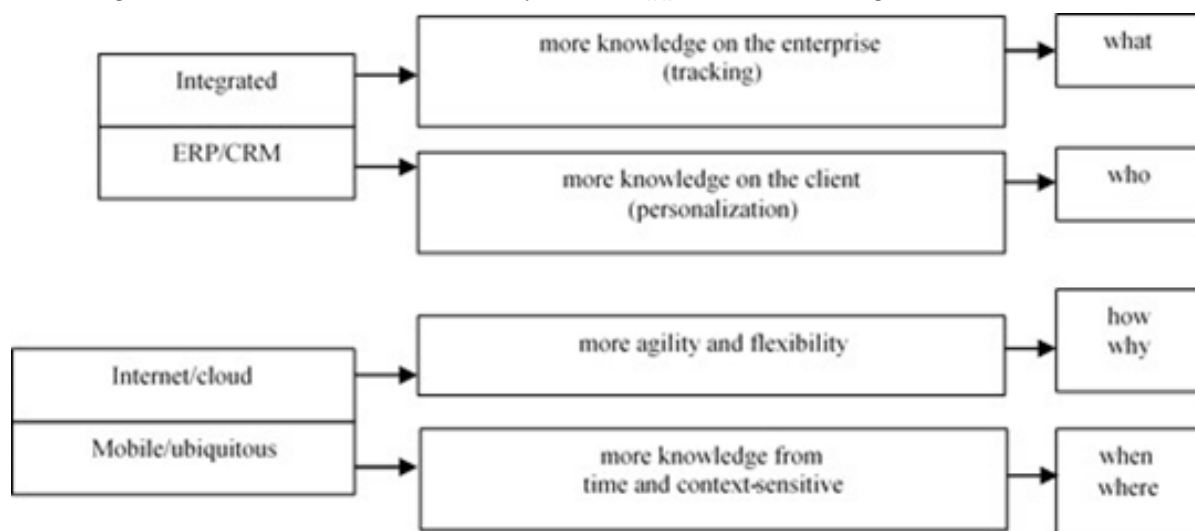
Source: own elaboration

One relevant trend is the widespread use of mobile platforms, and their ubiquity (concept of being everywhere at the same time, through combining pervasive devices, i.e. time and context-sensitive). These attributes have to do with the critical role that time and place play in today's communications. Facing the increasing geographical scope and time-sensitiveness of services (real-time response), their development is making a difference. One result is the controlled execution of activities by creating processes that resolve many problems related to punctual delivery to the requested location. Ubiquitous systems provide mechanisms for the selection and alignment of processes that meet the issues of a context and accurately reflect its constant changes. This pervasive nature, related to the capacity of different integrated devices to function together, has changed ways of conducting activities and interacting with workers or customers at various locations. When this penetrates all activities and institutions, many aspects of management and organizational structure will change radically. The speed and extent of connectivity that it allows enables the creation of new processes.

Figure 2 shows another trend in emergent IT, the semantic web (or intelligent web) related to semantic databases whose data can be from different platforms (such as social networks) . These can perform or shape tasks with clients/ users.

Figure 2. The third generation of the web is coming

Source: http://www.novaspivack.com/articles
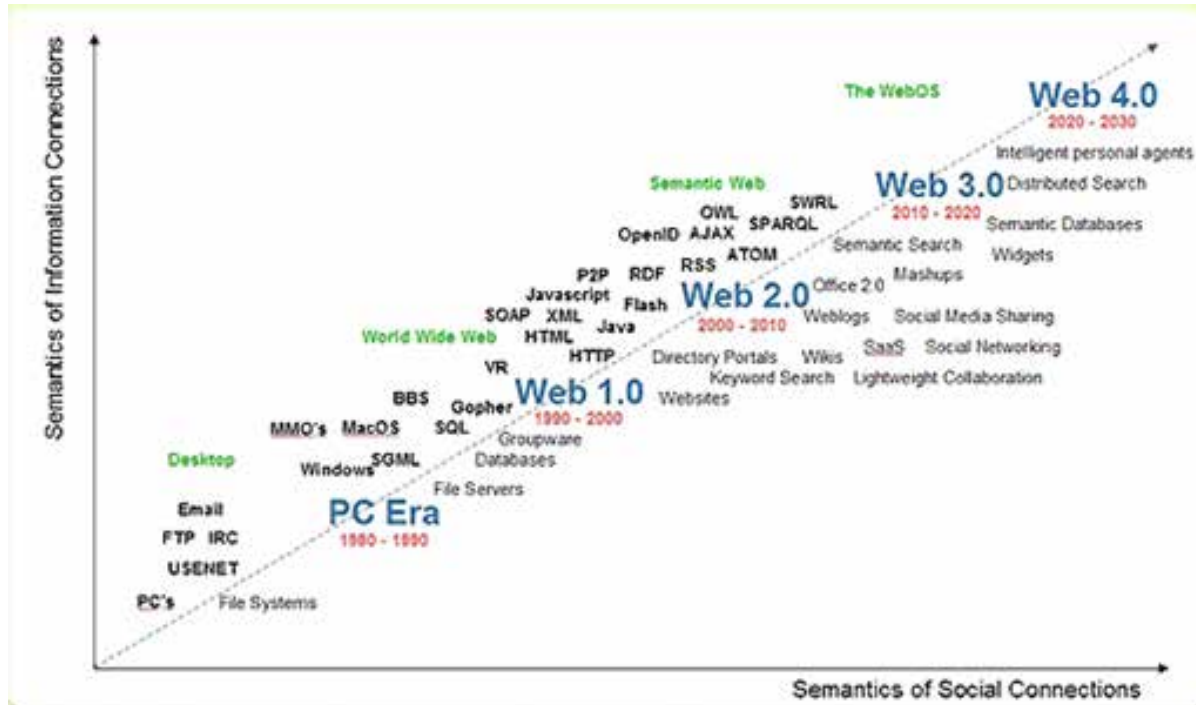
Shaping users to enterprise goals will put these ahead of client perceptions and aspirations, as enterprises can use social networks for customer research. Firms can create scenarios for interacting with customers as they know more about business, marketing, management and entrepreneurial issues. Social networks are very important when studying and exploring client perspectives. These platforms can capture clients/users in many segments and regions/ countries. They can even build a social network's CRM (Customer Relationship Management) system. Microsoft's (2009) white paper has already approached this integration, a powerful tool for online data to increase customer engagement and business creativity.

All these challenges and potentials have been considered and explored by the so-called innovation accelerators or 'boot camps', either for launching new businesses (mainly start-up generation) or supporting their IS/IT platforms.

2. INNOVATION ACCELERATORS: CONCEPT AND POTENTIAL

An innovation accelerator is an intensive business program (usually three months) which includes mentorship, educational components, and networking, and aims to help business grow rapidly. It is an open, entrepreneurial and interdisciplinary environment. Usually the entrepreneur moves into a shared space with other new founders to work under the tutelage of advisors and experts. In exchange for the expert mentoring, exposure to investors and a cash investment from the accelerator, the entrepreneur gives a portion of their company's equity to the partners of the program, and for this reason it is often called a 'seed' or 'venture' accelerator. Other elements are:

- The accelerator program consists of five elements (Christiansen, 2009): 1) funding, typically to the seed level; 2) company founders, small teams with technical backgrounds; 3) each group supported for a defined period of time; 4) an education program, focusing on business advice and/or product advice; and 5) a networking program, to meet other investors and advisors. Accelerator programs may include office space (whether free or subsidized) and a demonstration day for funded companies;

- An accelerator program model comprises five main features which set it apart from other approaches to investment or business incubation (Miller & Bound, 2011): 1) an application process, open to all yet highly competitive; 2) provision of pre-seed investment, usually in exchange for equity; 3) a focus on small teams, not individual founders; 4) time-limited support, comprising programmed events and intensive mentoring; and 5) groups or 'classes' of start-ups rather than individual companies;

- Seed accelerators are fixed-term, cohort-based programs that include mentorship and educational components and culminate in a public pitch event or demonstration day. While traditional business incubators are often government-funded and focus on biotech, medical technology, clean tech or product-centric companies. Accelerators can be either privately or publicly funded and focus on a wide range of industries.

3. INNOVATION ACCELERATORS IN PORTUGAL

3.1. The innovation scene in Portugal

Recent innovation metrics for countries can be found in an important secondary dataset, the CIS-2012 (DGEEC, 2014). The Community Innovation Survey (CIS) is the main statistical survey (mandatory for EU member states) on innovation in companies. The European Union employs this statistical instrument to monitor Europe's progress in the area of innovation, as conducted by national statistical offices. In Portugal, following the recommendations of Eurostat, the CIS aims to directly collect information on innovation (product, process, marketing, and organizational) in companies. Data collection, corresponding to the period of 2010-2012, was performed during 2014 through an online electronic platform. It contemplates Portuguese companies with ten or more employees belonging to several NACE codes (economic activities). Among the 7995 companies in the corrected sample, 6840 valid answers were considered, corresponding to a response rate of 86%.

The CIS instrument also provides useful information about how firms are interrelated in its surrounding external environment in order to access information considered important for the development of new innovation projects or the completion of existing ones. Firms may use external agents as information sources or engage in more formal cooperation activities, meaning their active participation with other enterprises or institutions on innovation accomplishments. But which sectors innovate the most? Is it cooperative or firm-based innovation? The following figures will help to analyze factors that explain the level and nature of innovation in Portugal.

In terms of products/services, the most innovative sectors are computer and information, followed by health, machinery and finance (Figure 3).

Figure 3. Product (goods/services) innovation metrics
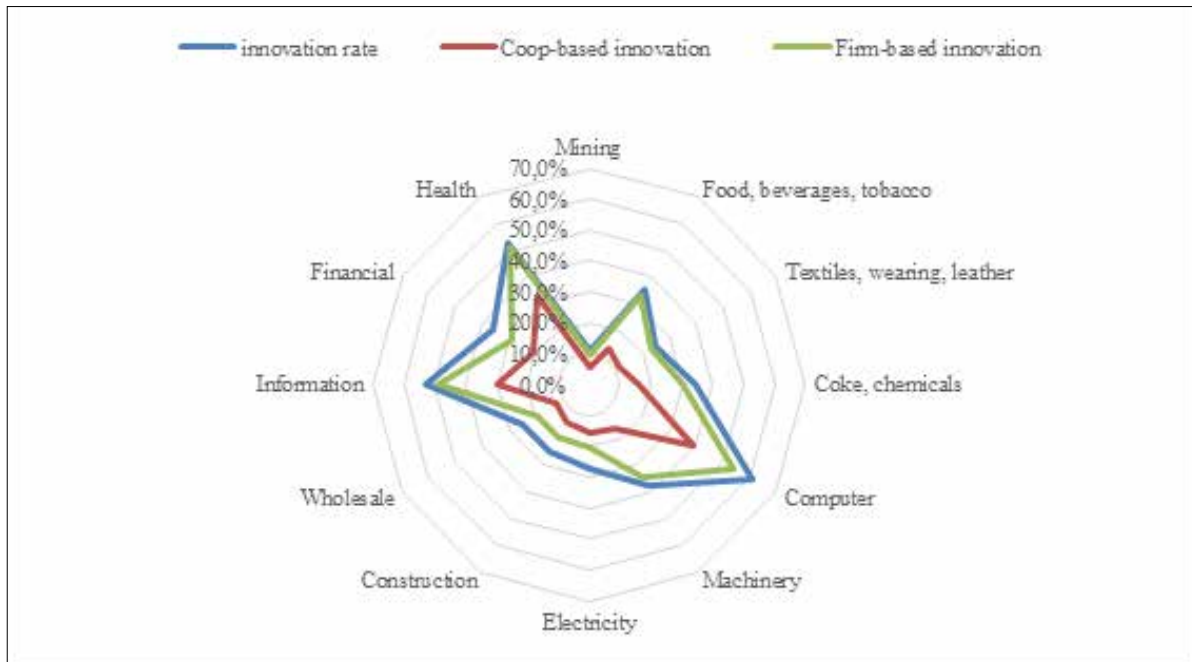
Source: Own elaboration based on CIS 2012 data

In terms of process innovation, the most innovative sectors are computers and health, followed by construction, electricity and information (Figure 4).

Figure 4. Process innovation metrics
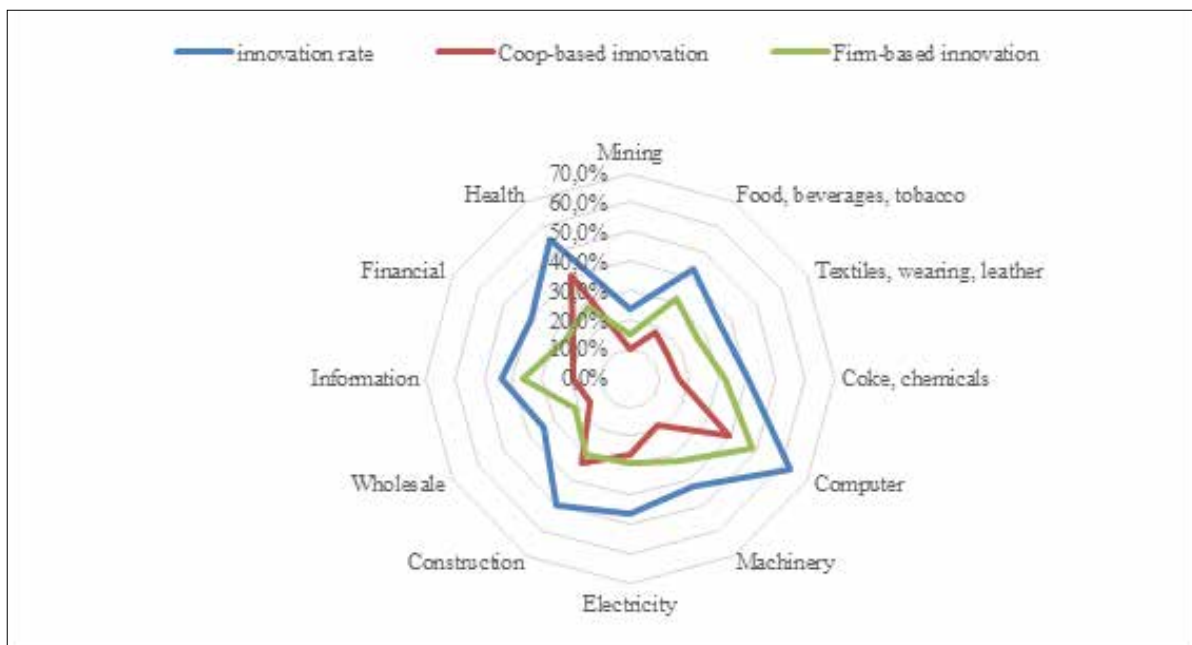
Source: Own elaboration based on CIS 2012 data

The following table (Table 1) shows the percentages obtained for cooperative and firm-based innovation by sector and type of innovation. The chosen sectors were those with the highest global innovation rates (product and process innovations). According to this data, firm-based innovation is higher than cooperation-based innovation for the majority

of sectors in both types, especially in product innovation. Portuguese firms tend to be more open to cooperating with others when there is no new product involved.

Table 1. Cooperation vs. firm-based innovation by sector and type

NACE code	Sector	Product Innov - Coop based	Process Innov - Coop based	Product Innov - Firm based	Process Innov - Firm based
26	Computer manufacturing, electronic and optical products	45.3%	41.5%	62.3%	50.9%
42	Civil engineering	12.0%	40.0%	16.0%	32.0%
47	Retail trade, except motor vehicles and motorcycles	46.7%	46.7%	40.0%	60.0%
65	Insurance, reinsurance and pension funding, except compulsory social security	50.9%	47.3%	58.2%	49.1%
72	Scientific research and development (R&D)	40.0%	30.0%	56.7%	46.7%
86	Human health activities	33.0%	40.4%	51.1%	38.3%

Source: Own elaboration based on CIS 2012 data

External sources and interactions are of great importance to small and medium-sized firms, particularly those belonging to knowledge-intensive sectors (Rothwell, 1992; Smith, 1993; Shapira *et al.*, 1995; Malecki and Tootle, 1996). In the process of developing new products/services it becomes essential to perceive the significance of external agents as a source for successful innovation projects. In present economies, firms cannot rely solely on their own resources, they need to balance internal sources and capabilities with ideas from outside, and interact with a large number of players (Szulanski, 1996; Laursen & Salter, 2006; Lundvall, 2010). This can lead to opportunities for more quick and effective technology to catch up, the main strength of the open innovation model (Chesbrough, 2003a, b).

3.2. Innovation challenges

External knowledge connections are a vital factor in the open innovation model (Cohen & Levinthal, 1990; Veugelers, 1997; Chesbrough *et al.*, 2006). Firms that are internally centered need to open their boundaries to external partners, otherwise numerous opportunities are missed (Chesbrough, 2003a; Laursen & Salter, 2006). Several studies support the idea that a firm's boundary requires porosity in order to absorb knowledge and abilities from the environment (Shan *et al.*, 1994; Leonard-Barton, 1995; Powell *et al.*, 1996; Chesbrough, 2003b). This can provide an extensive variety of novel ideas and innovation opportunities (Powell *et al.*, 1996; Laursen & Salter, 2006) and access to complementary resources that turn an innovation into a market success (Cohen & Levinthal, 1990).

Figure 5 compares Portugal to other European countries, and shows that Portugal has a low level of cooperation-based innovation. In 2012, the countries with the highest levels were the United Kingdom and Belgium, followed by Austria and Denmark. The indicator decreases from 2008 to 2012 in the majority of countries, including those with the highest values.

Figure 5. Percentage of cooperation-based innovation firms[2]
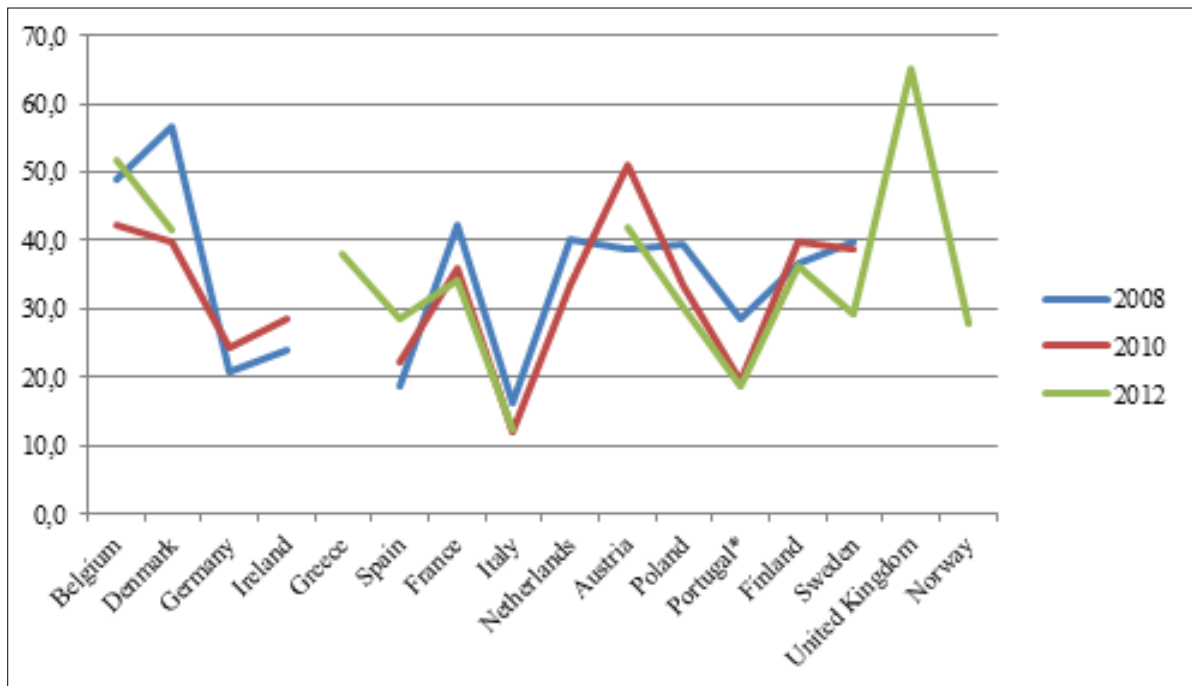
Source: Own elaboration based on Eurostat data

In terms of exports of high tech products, this percentage has increased in general, however, Portugal and Greece still have the lowest levels (Figure 6).

Figure 6. Percentage of exports of high tech products
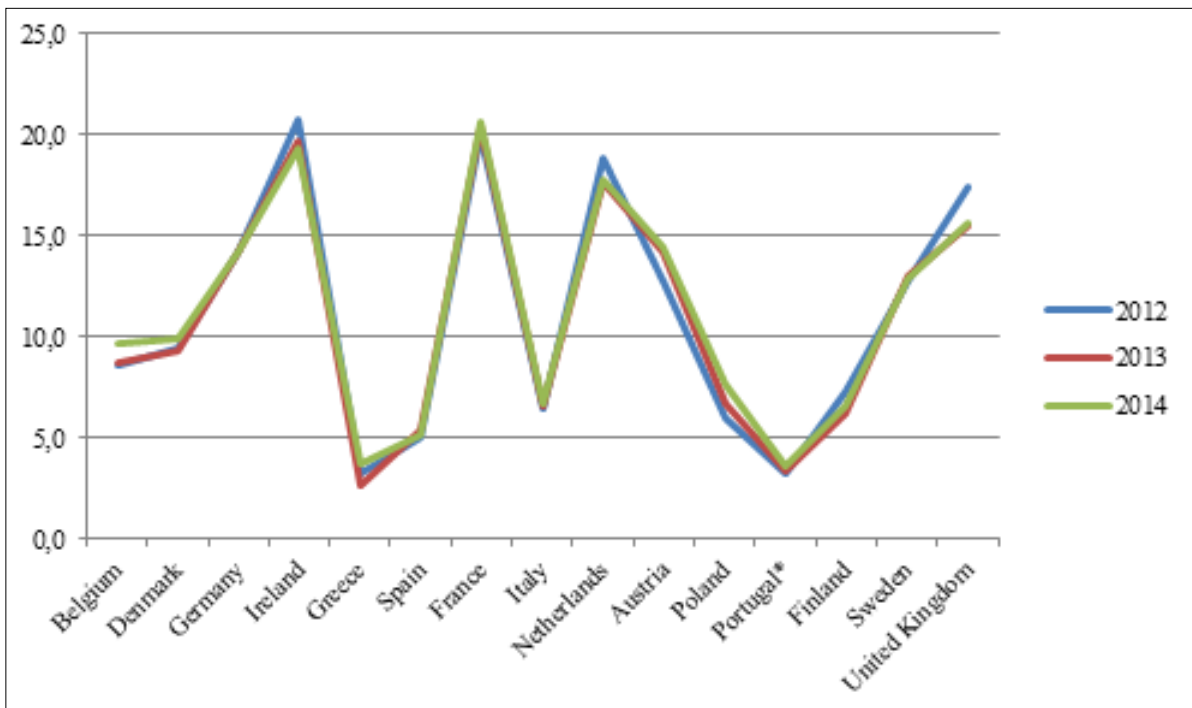
Source: Own elaboration based on Eurostat data

Another relevant indicator is venture capital investment, and Portugal also has a low level (Figure 7).

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[2] Line cuts in this chart correspond to data not available for the respective countries/years.

Figure 7. Venture capital investment
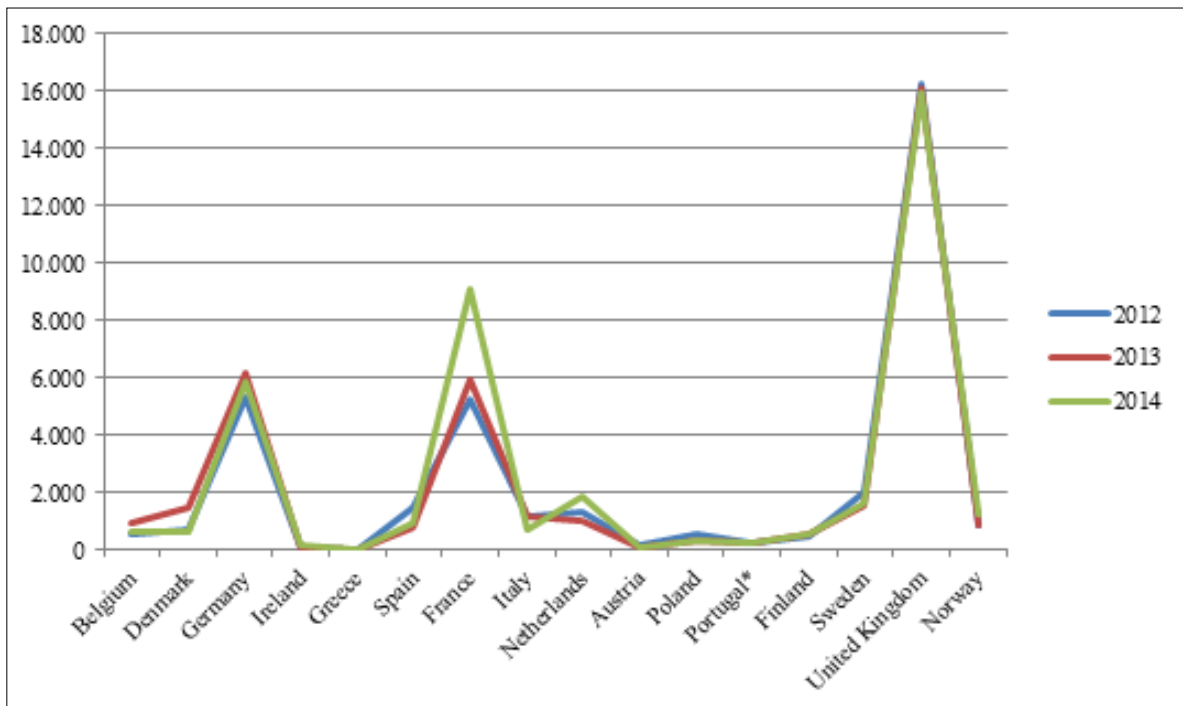
Source: Own elaboration based on Eurostat data

These three indicators - cooperation-based innovation, exports of innovative products and venture capital investment - which can be related to open-innovation propensity, suggest that Portugal still has a long way to go. The Global Entrepreneurship Monitor (GEM) suggests that about 8 in 100 people are entrepreneurs in Portugal (involved in startups) and that 1 in 2 entrepreneurs do it out of necessity. Reasons include: the low incomes characterizing this country, missing early collective entrepreneurial culture (path-dependent), difficulties obtaining finance and poor adherence to risk (Sarkar, 2014). These issues may be related to the 'maturity level' of innovation acceleration in Portugal and the sustainability of the resulting innovation.

3.3. Innovation acceleration potential

A question emerging from previous assessment is how the open-innovation challenge should be addressed and overcome. Innovation accelerator environments can be real open innovation engines, due to their entrepreneurial and interdisciplinary ambience.

One of the best startup accelerators in the world is Techstars in Boston, USA (http://www.techstars.com/). Fewer than 1% of the companies that apply to it are accepted. One of the few Portuguese startups accepted was DoDOC. This company, established in February 2014 by three students on the MIT doctoral program, was chosen from among 1500 candidates around the world. DoDOC is focused on enterprise solutions for document management, enabling the automation of steps where text outputs require the management of several documents obeying strict rules. The company focuses its market on pharmaceutic and biotech firms, hospitals and universities as these organizations generate high volumes of documents and require a secure and organized way of accessing the information. It has developed a platform that optimizes such processes. DoDOC was one of the 10 finalists of the Lisbon Challenge and is a great example of the growth of the Portuguese entrepreneurship ecosystem in recent years. Some successful innovation accelerators in Portugal are 'Fábrica

de startups' and 'Beta-i' (Figures 8, 9). Other recent Portuguese innovation accelerators are 'ASA' (Anje Startup Accelerator); 'Startup Pirates'; 'Startup Braga'; and 'CRIA startups'.

Figure 8. 'Fábrica de startups'

Source: http://www.fabricadestartups.com/landing
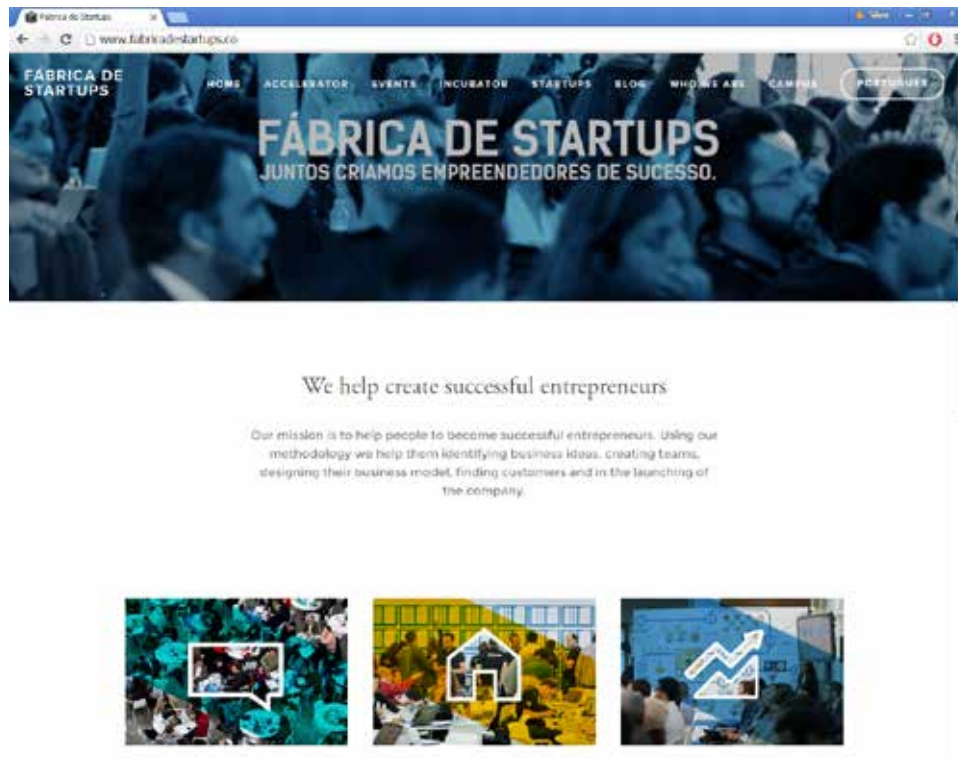
Figure 9. 'Beta-i'

Source: http://beta-i.pt/betai-2/
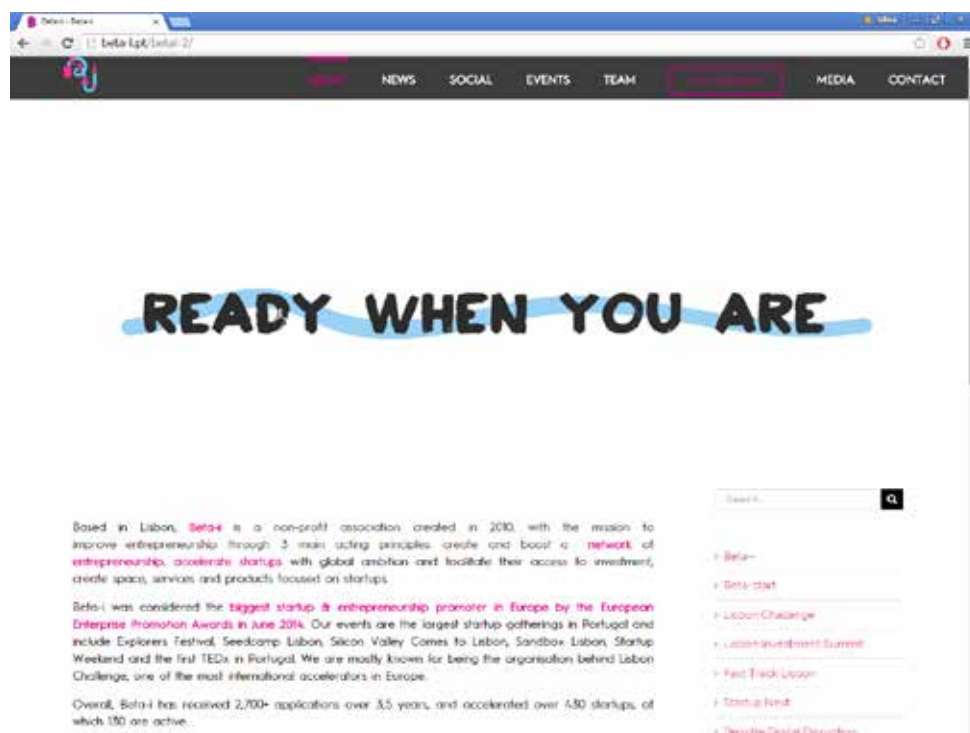
The statistics about the activity of these accelerators raise another issue, which is about the sustainability of the accelerated firms in time. Table 2 shows the case of Beta-i in terms of the number of accelerated startups (period from 2013 to 2015) and the percentage of those still active.

Table 2. Beta-i accelerator results by sector/market

Sector/market	Nº
Agriculture & Farms	2
Analytics	3
Biotechnology	3
Business & Productivity	23
Construction	1
Creative Industries	5
Education	13
Electronics	5
Energy & Clean Tech	4
Entertainment & Leisure	14
Fashion	1
Finance	11
Food, Beverages & Tobacco	4
Health & Healthcare	9
Marketing & Advertising	16
Pets	2
Real Estate	3
Retail & Distribution	9
Sports	7
Telecommunication	4
Tourism	19
Transportation	2
Total	160
Percentage of startups still active: 68%	

Source: Data from an interview with Isabel Salgueiro, startup manager at 'Beta-i'

In Beta-i, the sectors/markets with more accelerated startups (in descending order) are: business and productivity; tourism; marketing and advertising; entertainment and leisure; education, and finance. Another case that provided data is CRIA (CentRe for Innovation in Algarve). Table 3 shows its number of accelerated startups and again the percentage of those still active (period from 2011 to 2013). Here, agro-food, tourism, information technology and environment/energy are the sectors/markets with more accelerated firms. These results (in Tables 2, 3) may reflect the specialization and university research in the areas included (Lisbon-Center in Beta-i and Algarve in CRIA) in spite of the increasing number of international firms. Other accelerators were contacted, such as 'Fábrica de startups', but did not provide any data.

Table 3. CRIA accelerator results by sector/market

Sector/market	Nº
Agro-food	10
Tourism	8
Information Technology	6
Design and Communication	6
Sea sciences	5
Environment and Energy	5
Biotechnology	4
Health	4
Engineering	3
Other	9
Total	60
Percentage of still active startups: 70%	

Source: Data from figures provided by CRIA's coordinator, Hugo Barros

An issue that emerges from these tables is the sustainability over time of the accelerated firms through their innovations. Both percentages of startups that are still active (68% in Beta-i and 70% in CRIA) are significant. But how do these figures evolve over time? The next section discusses this issue and proposes directions through the innovation management matrix (Kastelle, 2012).

4. INNOVATION SUSTAINABILITY

A recent study by Allmand Law found that more than 90% of all tech startups fail (Dalakian, 2013). What causes failure? One issue is related to confusion about what the added value actually is. Some firms fail to understand the changing needs of their users. It is important feature to have a feedback structure for users and analyze the resulting information.

In Portugal, startups represent 6.5% of businesses and 18% of new jobs (Faria, 2013). On average, 74% effectively start their activity. Startups involve an average of 46,000 people and 2,600 companies per year. Services, retail and accommodation are the sectors with more new companies. There is a decrease in the percentage of companies in the real estate and construction sectors. Once the survival rate decreases as age advances, the first years are especially important for startups. After three years, less than 50% exhibit activity. By the fifth year, the survival rate is 40%. The number of jobs significantly increases until the fourth year and usually stabilizes in the fifth year of activity.

The next matrix (Figure 10) helps to analyze and discuss some of the reasons behind the decrease of innovation sustainability and, therefore, behind the decrease in the percentage of startups that are still active[3].

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[3] Procter & Gamble, Using Open Innovation to Become a World Class Innovator (http://timkastelle.org/blog/2012/05/procter-gamble-using-open-innovation-to-become-a-world-class-innovator/).

Figure 10. Innovation management matrix

Unicorns	Stars (at Risk)	World Class Innovators
Accidental Innovators	Fit for Purpose	Potential Stars
Not Innovating Very Much	Thinking about Innovation	Bewildered

Innovation Competence (vertical axis) — **Innovation Commitment** (horizontal axis)

Source: Tim Kastelle, http://timkastelle.org/blog/
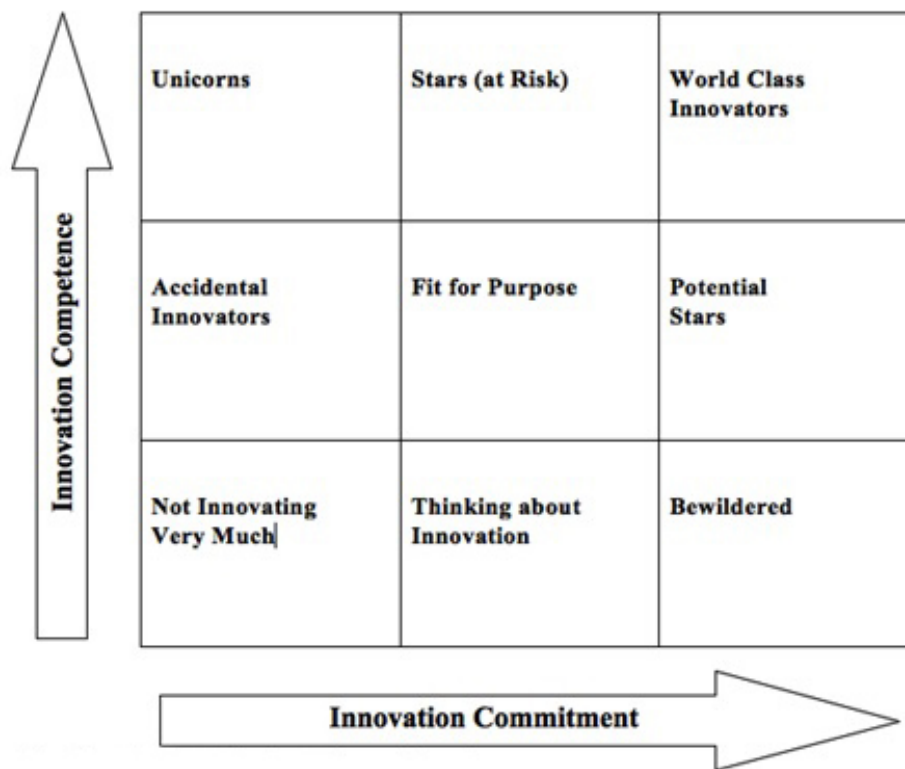
This innovation management matrix illustrates two increasing dimensions (Kastelle, 2012):

1. 'Innovation Commitment' is increasing across the horizontal axis. This can include issues such as the importance of innovation, including it as a core value, putting in systems to support and improve innovation and explicitly earmarking time, money and other resources for innovation. This means measuring innovation input or top-down innovation initiatives;

2. Going up the vertical axis means an increase in 'Innovation Competence', which relates to the ability to generate and execute new successful ideas. This can include the actual number and nature of the innovations implemented, the organization's effectiveness across all phases of the idea management process, the breadth of innovations and output across an innovation portfolio. This measures innovation output and is all about execution.

We can use this matrix to help us understand how the innovation capability of firms evolves over time. A great case study in this regard is Procter & Gamble (P&G). Its problem was that a considerable R&D spend didn't improve their performance – a classic case of 'Innovation Commitment' increasing without a corresponding increase in 'Innovation Competence'. By 1999, R&D expenditure had increased from around 4% to nearly 7% but the new product success rate was stuck at 35%. P&G had developed a considerable collection of patents, but fewer than 10% were being used in actual products. At this point, P&G was "Bewildered" as it was sinking a huge amount of resources into innovation, but without a good return on the investment.

They then initiated the 'Connect & Develop' program, designed to use open innovation to improve their innovation outcomes. This meant that P&G's first move was to decrease their innovation infrastructure. They significantly reduced their R&D spending: they cut

back on activities that were not leading to the kinds of outcomes they needed. With the right partners, the next step was to get more ideas out into the world: they moved into the Fit for Purpose phase. P&G got better at executing ideas and was learning about how to use their resources more effectively. They improved their idea selection process, and their 'Innovation Competence' took a jump forward. These initiatives led them to the following results:

- They have extensive research networks (both proprietary and open ones) that regularly lead to the development of new ideas;
- The percentage of patents in use in products has increased from less than 10% to more than 50%;
- Their new product success rate has increased from 35% to more than 50%;
- The percentage of new products that include elements developed outside the firm has increased from 15% to over 35%.

The end result is that P&G is now considered one of the most innovative companies, and is a world leader in open innovation. If a company is "Bewildered" a step backwards can thus help. When things are not going well, it does not make sense to increase what is currently done. P&G realized that it was not effective through the entire idea management process. The 'Connect & Develop' program enabled P&G to bring its ideas to market in collaboration with partners better equipped to deal with the relatively smaller returns. This also led to more experimentation, and these moves improved both its selection and diffusion processes.

5. CONCLUSION

The environment of innovation acceleration programs has been helping firms to cope with the tremendous open innovation challenge. Innovation networking/sharing capability facilitates the development of knowledge-intensive products/services and allows firms to identify and exploit performance opportunities in international markets. Entrepreneurial and interdisciplinary cooperation of ideas and activities is really motivating and differentiating.

The resulting partnerships or teams shorten and accelerate a firm's learning processes. These dynamic entrepreneurial engines deal with a startup's need for resources and the availability/access to network resources in the various stages of firm development. Sá and Lee (2012) note that their central features are the provision of innovation consulting and networking opportunities for entrepreneurs to establish collaborative relationships with other creative agents. A recent study has emphasized the crucial role of multifaceted relationships between accelerated firms and how they can develop through different processes (Pellinen, 2014).

Most firms exchange knowledge and experiences related to the various phases and processes in developing a business. Even though they have different products and technologies and target a different market from other firms, they evolve through the same stages of emergence and growth. The challenges they face and the experiences they gain are similar and transferable, in addition to the generic resources that they are able to share (such as accounting and auditing tips, cost reduction schemes, etc.). Inter-firm networking is thus mostly related to the general challenges that most startups face in the early growth stage: managing technology transitions, preparing for investors, taxation and auditing, and negotiating with customers and other critical stakeholders.

The fear that information is not treated confidentially can be a barrier to collaboration and a sharing culture. Oakey (2007) noted that some entrepreneurs are reluctant to discuss

their new product ideas with other entrepreneurs for fear that their intellectual property will be copied. Indeed a large exhibition is accompanied by the increased risk of unwanted disclosure of the idea to potential competitors, but the more an idea is exposed, the greater the chance of a potential investor/partner recognizing its business potential. These programs can include registers or patent consulting, as a means of idea protection. Open innovation contracts also have to actively safeguard these issues, where both parts are linked to a legal agreement that must be met under penalties for damages. A very interesting level of the sixth generation innovation model is, in addition to the tacit knowledge value, the strategic cooperation with competitors at some stages (Chaminade & Roberts, 2002).

The seed accelerator ecosystem in Portugal is still taking its first steps, although the 'Lisbon Challenge' is a great example of its growth. There is also upcoming important governmental strategic support, called 'Startup Portugal'. Portuguese startups represent 6.5% of businesses and, on average, 74% effectively start their activity. After three years, however, fewer than 50% exhibit activity and by the fifth year the survival rate is 40%. Lessons from the innovation management matrix show us that successfully innovative firms have been cutting back on activities that were not leading to the outcomes needed. With the right partners they had more ideas invested, executed and diffused. In that way they are able to learn how to use their resources more effectively. This kind of management for innovation sustainability must reside in a balance between innovation commitment and competence.

ACKNOWLEDGMENTS

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CLASSIFICATION OF THE FINANCIAL SUSTAINABILITY OF HEALTH INSURANCE BENEFICIARIES THROUGH DATA MINING TECHNIQUES

Sílvia Maria Dias Pedro Rebouças[1]
Daniele Adelaide Brandão de Oliveira[2]
Rômulo Alves Soares[3]
Eugénia Maria Dores Maia Ferreira[4]
Maria José Baltazar dos Reis de Pinto Gouveia[5]

ABSTRACT

Advances in information technologies have led to the storage of large amounts of data by organizations. An analysis of this data through data mining techniques is important support for decision-making. This article aims to apply techniques for the classification of the beneficiaries of an operator of health insurance in Brazil, according to their financial sustainability, via their sociodemographic characteristics and their healthcare cost history. Beneficiaries with a loss ratio greater than 0.75 are considered unsustainable. The sample consists of 38875 beneficiaries, active between the years 2011 and 2013. The techniques used were logistic regression and classification trees. The performance of the models was compared to accuracy rates and receiver operating Characteristic curves (ROC curves), by determining the area under the curves (AUC). The results showed that most of the sample is composed of sustainable beneficiaries. The logistic regression model had a 68.43% accuracy rate with AUC of 0.7501, and the classification tree obtained 67.76% accuracy and an AUC of 0.6855. Age and the type of plan were the most important variables related to the profile of the beneficiaries in the classification. The highlights with regard to healthcare costs were annual spending on consultation and on dental insurance.

Keywords: Data Mining, Logistic Regression, Classification Trees, Health Insurance.

JEL Classification: C55.

1. INTRODUCTION

The health sector in Brazil is composed of a public state-funded system called Sistema Único de Saúde (Health Unified System – SUS), and a private system usually called the supplemental health system, run by health maintenance organizations (HMO). The latter began a fast expansion, ranging from 15 million users in the beginning of the 1980s, to over 49 million users in 2015 (ANS, 2016).

The supplemental health system has been the focus of recent attention in society in general. The financial balance of operators becomes increasingly delicate every passing year. Silva (2007) notes that operators are mainly threatened by the exaggerated increase

[1] Sílvia Maria Dias Pedro Rebouças, Federal University of Ceará, Brazil. (smdpedro@gmail.com)
[2] Daniele Adelaide Brandão de Oliveira, Fanor Devry Brazil, Brazil. (danieleadelaide@hotmail.com)
[3] Rômulo Alves Soares, Federal University of Ceará, Brazil. (romuloalves61@gmail.com)
[4] Eugénia Maria Dores Maia Ferreira, University of Algarve, Faculty of Economics, Research Centre for Spatial and Organizational Dynamics, Faro, Portugal. (ecastela@ualg.pt)
[5] Maria José Baltazar dos Reis de Pinto Gouveia, University of Algarve, Faro, Portugal. (mjgouveia@ualg.pt)

in healthcare costs. The survival of the operators depends on a reduction of the speed with which these costs have increased.

This reality shows the need for operators to develop efficient management mechanisms in order to become more competitive, in order to cope with a natural tendency, which is the increase in costs spent on the assisted population. One way to deal with this problem is to analyze the usage history and the profiles of beneficiaries, in an attempt to identify patterns in these high welfare costs, allowing operators to create measures to ensure their livelihood.

The usage history of beneficiaries of health plans can be used for data analysis, using statistical tools to search for patterns that can be used in decision making, however, health care providers generally have tens or hundreds of thousands of beneficiaries, forming very large databases. Given the difficulties inherent in statistical analysis when dealing with such datasets, the information present in the data is often undervalued and underused. In an increasingly competitive market, the efficient use of this information represents a fundamental advantage in the decision-making process.

The use of data mining is thus recommended, which is the analytical process of exploring large datasets, which aims to find patterns and systematic relationships between variables, and to validate them using new data, via statistical techniques and artificial intelligence (Tufféry, 2011).

One of the main data mining techniques is supervised classification. Typically, in supervised classification, the dependent variable is qualitative (define groups), which is intended to be predicted using a set of independent variables.

This study aims to apply different data mining techniques to predict the financial unsustainability of the beneficiaries of an operator of health insurance, using data about their previous use of the insurance, and social characteristics. Beyond that, this study also tries to identify adequate classification techniques applied in this context and the most relevant predictors.

In order to compare the adequacy of the techniques, the accuracy of the classification obtained was taken into account, measured through ROC curve analysis. Its main measure is the area under the curve (AUC). This type of analysis is based on the relationship between the sensitivity and specificity of binary classifiers (Tufféry, 2011). The behavior of the independent variables in the classification process was also examined. According to Olden *et al.* (2004), the accuracy of statistical techniques employed has a direct relationship to the importance of the variables considered.

2. THE HEALTH INSURANCE MARKET AND ITS REGULATION

The 1988 Brazilian Constitution states that health is the right of all people and the state's responsibility. Actions and public health services integrate a regionalized and hierarchical network, providing a unified health system (SUS). The Constitution does not grant exclusivity to the state, however, allowing the private sector free access to the provision of health care services.

The Constitution defines the basis of the SUS, as consolidated in Law No. 8080 of 19/09/90, in order to solve the main problems of the Brazilian health system, but historically, there have been difficulties in the system, particularly as related to access to health services, poor conditions of service, physical facilities, and difficulties in keeping teams trained to offer a quality service.

Cechin (2008) explains that the Brazilian health sector is atypical, because, unlike countries such as Canada or European nations, where the state dominates health management,

or in the United States and low-income countries, where private healthcare companies predominate, both segments are of paramount importance in Brazil.

The health insurance sector consists of companies from the private sector which develop work provision for health services, although there is no consensus in the literature on such a term and designations such as additional medical care and supplementary medical care can also be used, among others (UNIDAS, 2005).

The supplementary health system comprises the services provided by insurers specializing in health insurance, group medicine companies and dentistry, cooperatives (specializing in health care plans and/or dental), philanthropic entities, self-management companies and managers.

Between 1987 and 1992 there was an average increase in the number of private medical beneficiaries of 7.4%. It was in this context of a great expansion of additional medicine that SUS was created. In the following years, the good performance of health insurance continued. The number of beneficiaries increased from 32 million in 1992 to just over 41 million in 1997 (Cechin, 2008).

The sector was consolidating with the improvement of people's income, the increase in demand of enterprises by good medical care for their employees and, from the 1990s, with the fall in the quality of public health services. In the late 1990s, the prospects for supplementary health were positive. In 1998, it was estimated that the sector would have, in five years, 80 million health plan beneficiaries in the country, compared to the just over 40 million in that year. The regulatory outlook led analysts to predict that the entry of foreign companies would contribute to the expansion of health insurance (Cechin, 2008).

Analyzing the relationship of the operators and the beneficiaries, it is noted that regulation led to a number of obligations for contract plans after 1999, including the establishment of a minimum list of assistance procedures; the prohibition on interrupting hospital internments; periods of grace; the need for prior authorization for price rises; the limited value for beneficiaries of a higher age; the maximum adjustment percentage of fees for the plans of individuals and the impossibility of an operator canceling such a plan.

3. FINANCIAL SUSTAINABILITY

The term 'sustainability' has been defined by many authors (Liverman *et al.*, 1988; Dovers & Handmer, 1993; Moore & Johnson, 1994; Bartuska *et al.*, 1998). Conway's (1986, p.82) definition is simple and short, defining sustainability as the ability of a system to maintain productivity when it is subjected to intense stress or change.

The key feature of the concept of "sustainability" lies in the quality of keeping something forever (Valadão *et al.*, 2008).

This characteristic is the same as that used by Araújo (2003), who considers sustainability to be the ability to be able to maintain more or less constantly or stably for a long period. This stability involves institutional, technical, political and financial aspects.

Broadening the concept to the context of financial sustainability from the perspective of beneficiaries, it is important to discuss how this issue will be consolidated by health plan operators regarding the increasing cost of incorporating new technologies, materials and health medicines and more human resources, and taking into account the longevity of the population, which increasingly needs health services as it ages and which will be reflected in the cost of the plan to the user in the present and in the future, and whether this cost is sustainable in the long term for future generations.

It is important to note that the Brazilian scenario suggests a worrying growth in health care costs. The main causes of this growth are aging of the population; the introduction of

new technologies, materials and medicines; moral hazards; adverse selection risk; expansion by the ANS of the list of mandatory procedures and adjustments in the remuneration of service providers. The increasing intervention of ANS in increasing procedures to be provided by operators ensures users greater security of health care, but it may be unsustainable in the long term for operators and beneficiaries. The cost of the supply of these procedures may make it unfeasible to maintain a portfolio of smaller plans, and when the costs are passed on to consumers, they, in turn, may experience difficulties in honoring payments. These are questions to be analyzed in the light of sustainability.

4. METHODOLOGY

This study is characterized as descriptive and analytical. The exploratory research was aimed mainly at the improvement of ideas and therefore allowed consideration of various related elements. This research also has an applied nature, as it seeks to generate knowledge for practical application and specific troubleshooting (Gil, 2002).

The procedure used in this study is predominantly quantitative, using statistical analysis methods in accordance with the objectives. Data analysis began with descriptive and inferential statistical techniques. This was followed by an adjustment of risk models for the financial unsustainability of beneficiaries, using two methods of supervised classification: logistic regression and classification trees. The independent variables were related to socio-demographic characteristics, the relationship with the operator and the welfare costs of history. The performance of the models was evaluated through classification tables and ROC curves.

4.1 Population, sample and variables

The population of this research was the customer portfolio of a particular health plan operator. To obtain the sample, active beneficiaries were chosen between the years 2011 and 2013, with all the necessary data available. The final sample consisted of 38875 customers. The data was extracted using Microsoft SQL Server software 2008. This data was tabulated in Microsoft Excel 2010 software and then analyzed using the R software - A Language and Environment for Statistical Computing (R Development Core Team, 2014). The sample was randomly divided into two subsamples: the training subsample (used to adjust the models) and the validation subsample (used to assess the predictive ability of the models).

The dependent variable is sustainability. Beneficiaries with a loss ratio (ratio between costs and revenues) greater than 0.75 are considered unsustainable. This variable was obtained for the year 2013.

For independent variables, the database used some quantitative (age and plan time) and some qualitative (gender, region, plan type, type of beneficiary and financial participation) variables from the profile of the beneficiaries, all collected for the year 2012. The database also includes the revenue of each beneficiary and the respective annual costs of consultations, hospital daily care expenses, support diagnosis and therapy services (SADT), fees, materials, medications, taxes, dentistry and others, for the years 2011 and 2012.

4.2 Data analysis

A descriptive analysis was initially made. It is possible, using descriptive statistics, to organize, summarize and describe key aspects of the characteristics of a data set. At this stage, measures of central tendency and of dispersion were calculated for quantitative variables and frequency tables were constructed for qualitative variables.

The analysis of the data was followed by inferential statistics, including t tests for independent samples to compare the means of quantitative variables in both groups (sustainable and unsustainable) and chi-square tests to assess the associations of the groups with the qualitative variables. When all the qualitative variables of this research were binary, chi-square tests were applied with Yates' correction.

After these steps, we proceeded to the adjustment of supervised classification models, using logistic regression and classification trees.

Logistic regression is applied to a dichotomous dependent variable and the value estimated by the model is the probability that the event under study will occur (success, encoded with 1).

Hair *et al.* (2006) noted that because of its nature, logistic regression does not depend on assumptions of multivariate normality of the data, the equality of the matrices of variance and covariance and linear relationship between the dependent and independent variables, verifying the linearity in the logit, given by the natural logarithm of the chance of success.

The classification and regression trees algorithm (CART) can be used for both classification, if the dependent variable is categorical, and regression, if the dependent variable is continuous (Tufféry, 2011). This method is based on the binary division of a progressive set of data based on the sampling results of independent variables, seeking the creation of subsets that are more homogeneous.

Classification tables and ROC curves were used to evaluate the performance of the models adjusted by logistic regression and classification trees. The main measure of a ROC curve is the area under the curve (AUC), which represents the probability that a random observation extracted from the sample is assigned to the correct class.

5. RESULTS

This section presents the results of the study, including a brief descriptive analysis of the data, the comparison of sustainable and unsustainable beneficiaries through inferential statistics (t tests and chi-square tests) and classification models of the risk of unsustainability.

5.1 Descriptive statistics

There is a predominance of sustainable beneficiaries in the plan, totaling nearly two-thirds of the total sample (64.01%). Women are the majority of the sample (57.89%) and the majority of beneficiaries live in the capital cities of the states (71.88%). The operator customer base, almost entirely, is concentrated in the northeast, with 99.30% of its beneficiaries. The percentage of users who have individual plans totals 83.96% and those with a family plan comprise 16.03% of the beneficiaries. The more balanced percentages are associated with the type of user, where 50.77% are contracting, and 49.23% are dependent. Finally, the major difference was between patients with and without financial participation, where the first group comprised 93.78% of the sample and the other, only 6.22%.

The costs associated with consultations and support diagnosis and therapy services (SADT), which includes the costs of activities that help diagnostics and therapies, are the most common, being the only costs with nonzero first quartile. By contrast, the expenses associated with hospital daily care and odontology are less frequent, with the third quartile equal to zero (at least 75% of the sample beneficiaries did not have these types of expenses in the period studied).

5.2 Inferential statistics

The second step of the analysis was based on inferential statistics. Table 1 presents the means and standard deviations of the quantitative variables segregated into groups, the statistical t tests performed and p values associated with those tests. It is clear that the various average costs are higher in the unsustainable group, while revenue is higher for the sustainable group. The t-tests show statistically significant differences between the two groups for all variables.

Table 1 – Comparison of quantitative variables between groups

Variable	Group	Mean	Standard deviation	t statistic	df	*p* value
Age	Sustainable	33.89	20.57	34.54	35225.17	0.0000
	Unsustainable	27.43	15.87			
Plan time (months)	Sustainable	88.07	37.63	7.64	27515.81	0.0000
	Unsustainable	84.90	40.04			
Revenue	Sustainable	8063.90	8821.04	34.36	38658.15	0.0000
	Unsustainable	5591.37	5351.39			
Consultations	Sustainable	905.80	682.07	-30.64	24153.55	0.0000
	Unsustainable	1162.92	850.71			
Hospital daily care expenses	Sustainable	109.38	471.30	-5.63	24771.04	0.0000
	Unsustainable	141.28	569.49			
SADT	Sustainable	1716.85	1811.30	-17.84	25460.89	0.0000
	Unsustainable	2095.98	2115.84			
Fees	Sustainable	554.95	1199.72	-12.93	23799.70	0.0000
	Unsustainable	748.52	1524.81			
Materials	Sustainable	351.56	1627.97	-2.77	26831.56	0.0055
	Unsustainable	402.28	1785.09			
Medicaments	Sustainable	172.85	534.81	-7.24	24013.53	0.0000
	Unsustainable	220.78	671.99			
Taxes	Sustainable	159.09	359.76	-9.74	25357.57	0.0000
	Unsustainable	200.35	422.34			
Dentistry	Sustainable	63.58	247.92	-15.02	27613.49	0.0000
	Unsustainable	106.27	295.12			
Other costs	Sustainable	45.05	155.46	-18.52	23888.94	0.0000
	Unsustainable	80.83	196.64			

Source: Authors

The dependent variable associations with qualitative independent variables were evaluated using chi-square tests with Yates correction, as the contingency tables used were of the type 2x2. The results, presented in Table 2, show that for all variables except those related to the type of beneficiary, the null hypothesis of independence must be rejected: there is a dependent relationship between the independent variables and the group in which the beneficiary falls (sustainable or unsustainable).

Table 2 – Comparison of qualitative variables between groups

Variable	Category	Sustainable	Unsustainable	Total	χ^2	df	*p* value
Gender	Female	13946	8286	22232	37.00	1	0.0000
	(%)	62.73%	37.27%	100%			
	Male	10939	5704	16643			
	(%)	65.73%	34.27%	100%			
Region	Interior	6462	4468	10930	157.61	1	0.0000
	(%)	59.12%	40.88%	100%			
	Capital	18423	9522	27945			
	(%)	65.93%	34.07%	100%			
Type of plan	Individual	22071	10569	32640	1148.16	1	0.0000
	(%)	67.62%	32.38%	100%			
	Family	2814	3421	6235			
	(%)	45.13%	54.87%	100%			
Type of beneficiary	Dependent	12296	6843	19139	0.87	1	0.3515
	(%)	64.25%	35.75%	100%			
	Contracting	12589	7147	19736			
	(%)	63.79%	36.21%	100%			
Financial participation	No	23501	12956	36457	51.07	1	0.0000
	(%)	64.46%	35.54%	100%			
	Yes	1384	1034	2418			
	(%)	57.24%	42.76%	100%			

Source: Authors

5.3 Classification models

The classification models were adjusted for the beneficiaries of the modeling subsample, using the logistic regression and classification trees methods. The analysis of their performance in the validation sample was made through classification tables and ROC curves. This section presents the results obtained with these techniques.

5.3.1 Logistic regression

The first classification technique applied was logistic regression. The stepwise method was used to obtain the best combination of independent variables, able to distinguish the two groups of dependent variables. The adjusted logistic regression model is shown in Table 3.

Table 3 – Logistic regression adjusted model

Independent variables	β	Exp(β)	Wald	*p* value	VIF
Age	-0.0094	0.9906	-6.6500	0.0000	2.1362
Gender (Male)	-0.0888	0.9150	-2.6500	0.0000	1.0481
Region (Capital)	-0.1313	0.8770	-3.5100	0.0081	1.1197
Type of plan (Family)	0.7022	2.0182	14.6500	0.0004	1.3118
Plan time	0.0006	1.0006	1.4200	0.1566	1.1775
Consultations	0.0006	1.0006	17.9100	0.0000	2.0488
SADT	0.0003	1.0003	22.6200	0.0000	2.5665
Fees	0.0001	1.0001	9.4500	0.0000	1.4073

Medicaments	0.0002	1.0002	4.4000	0.0000	1.2494
Dentistry	0.0010	1.0010	9.9000	0.0000	1.0761
Revenue	-0.0002	0.9998	-25.9300	0.0000	3.6281
Intercept	-0.6376	0.5286	-10.4300	0.0000	-
Nagelkerke R²	0.2080	-	-	-	-

Source: Authors

It can be seen from these results that all variables, except for the plan time, were considered significant for the estimation of sustainability of the beneficiary state for the next year. Age and revenue have negative impacts on the probability of a user becoming unsustainable in the following year. The behavior observed for the variable age in this sample can be considered unusual, since the age usually has a positive impact on cost.

According to the procedures described in the methodology, a cutoff point was determined in which the correct classification of the two classes were the most balanced possible. Figure 1 shows the precision rates for the sustainable and unsustainable groups for all possible cutoff points.

Figure 1 – Cutoff points for the logistic regression
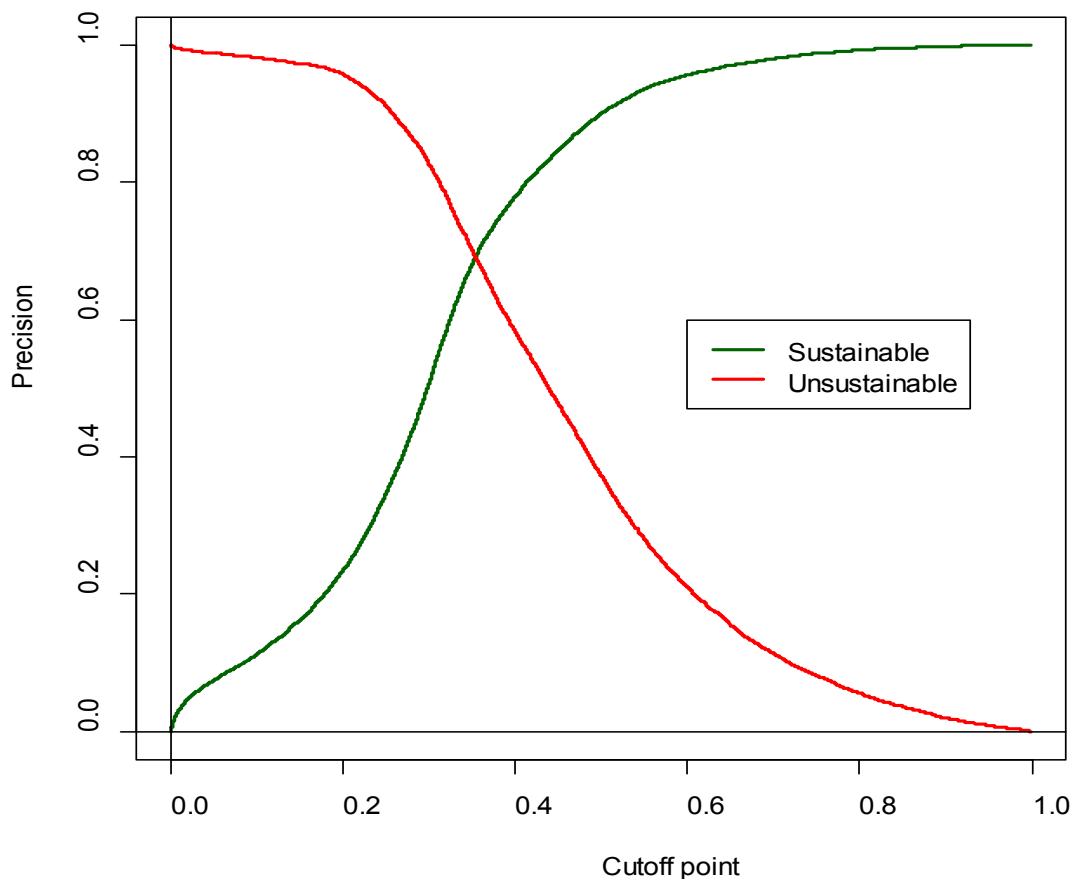
Source: Authors

The point with the best balance between the two classes, that is, the one in which the precision is the same to sustainable and unsustainable, represented graphically as the meeting

of both curves, is thus approximately 0.3487. Using this cutoff point, the classification shown in Table 4 is obtained for the beneficiaries of the validation subsample.

Table 4 – Classification table of the logistic regression model

Sustainable		Predicted class		Total
		Unsustainable		
Observed class	Sustainable	8474	3910	12384
		68.43%	31.57%	100.00%
	Unsustainable	2227	4826	7053
		31.57%	68.43%	100.00%
	Total	10701	8736	19437

Source: Authors

The logistic regression model was able to correctly classify 68.43% of the validation subsample, and the predictive ability was the same in both classes of beneficiaries.

5.3.2 Classification tree

The second method used was the classification tree. Unlike logistic regression, it is not necessary to use any technique to choose the best predictor variables since that the algorithm itself chooses them, discarding all others that are not important for prediction.

Figure 2 is a visual representation of the tree constructed for the training subsample. It can be seen that the variables considered important for this classification were age and the type of plan for defining the user profile, and consultation, SADT and dentistry for costs and revenues.

Figure 2 – Representation of the classification tree model adjusted
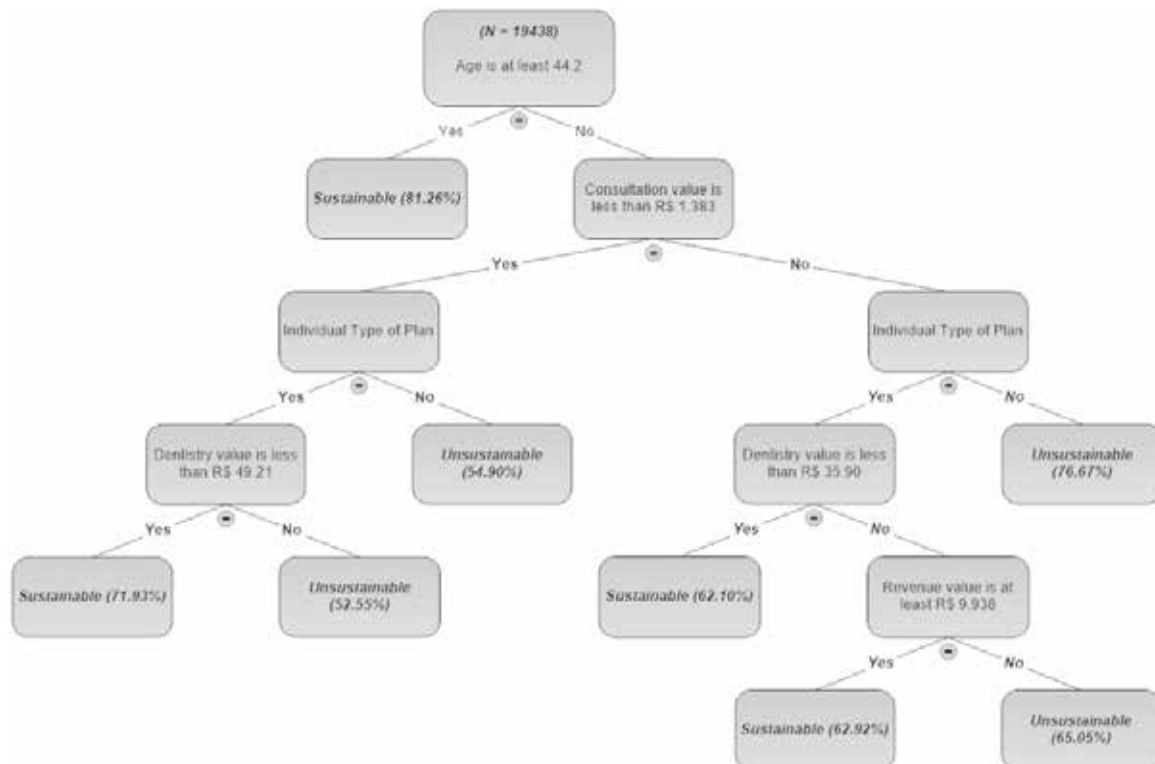
Source: Authors

The age variable presents behavior similar to that observed in the logistic regression. In this case, beneficiaries who are 44.2 years old or more were all classified as sustainable. As the logic of classification trees algorithm is to divide the group into subsets with greater internal homogeneity and heterogeneity among them, age is the variable with the greatest power of segregation between sustainable and unsustainable users.

The method assigns the age variable to 28% of importance, while type of plan and revenue were assigned 16% of relevance for classification. Consultation and dentistry had 14% of importance and SADT had 5%. When comparing the results obtained in the classification tree and the logistic regression, it is concluded that the variables considered important in the tree are those with the greatest impact on the risk of unsustainability measured in the logistic regression. Table 5 summarizes the rules that form each terminal node of the tree.

Table 5 – Summary of nodes' characteristics

Terminal node	Rule	Sustainable (%)	Unsustainable (%)
1	1. Age is at least 44.2	81.26	18.74
2	1. Age is less than 44.2 2. Consultation is less than 1383.00 3. Type of plan is Individual 4. Dentistry is less than 49.21	71.93	28.07
3	1. Age is less than 44.2 2. Consultation is less than 1383.00 Type of plan is Individual 1. Dentistry is at least 49.21	47.45	52.55
4	1. Age is less than 44.2 2. Consultation is less than 1383.00 3. Type of plan is Family	45.10	54.90
5	1. Age is less than 44.2 2. Consultation is at least 1383.00 3. Type of plan is Individual 4. Dentistry is less than 35.90 5. SADT is less than 1510.98	62.10	37.90
6	1. Age is less than 44.2 2. Consultation is at least 1383.00 3. Type of plan is Individual 4. Dentistry is less than 35.90 5. SADT is at least 1510.98 6. Revenue is at least 9937.63	62.92	37.08
7	1. Age is less than 44.2 2. Consultation is at least 1383.00 3. Type of plan is Individual 4. Dentistry is at least 35.90 5. SADT is at least 1510.98 6. Revenue is at least 9937.63	34.90	65.05
8	1. Age is less than 44.2 2. Consultation is at least 1383.00 3. Type of plan is Individual 4. Dentistry is at least 35.90	36.59	63.41
9	1. Age is lesser than 44.2 2. Consultation is at least 1383.00 3. Type of plan is Family	23.33	76.67

Source: Authors

Following the same procedure adopted previously, the cutoff point that best approximates the accuracy in test subsample of classes was verified. Unlike the logistic model, which associates a probability for each observation, all observations of a node in classification trees are given the same probability of belonging to the positive class (unsustainable). All possible cutoff points and accuracies in sustainable and unsustainable groups are shown in Figure 3.

Figure 3 – Cutoff points for the classification tree model
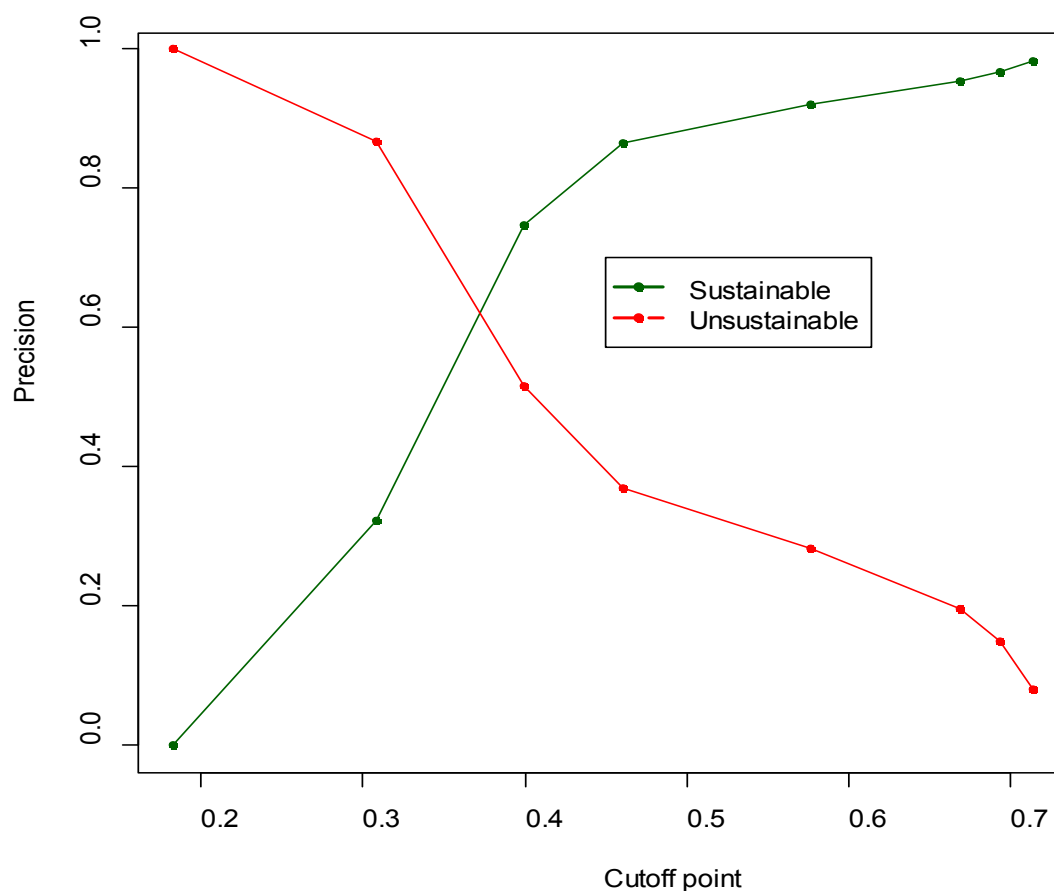
Source: Authors

Due to the limited number of possible cutoff points, there is no restriction to a single ideal point; instead there is a range of possible points in which the classification in the two classes is more balanced. This interval ranges from 0.28145 to 0.36975, approximately. The percentages of accuracy in the validation sample, presented in Table 6, were obtained for a cutoff point of 0.3458.

Table 6 – Classification table of the CART model

Sustainable		Predicted class		Total
		Unsustainable		
Observed class	Sustainable	9363	3021	12384
		75.61%	24.39%	100.00%
	Unsustainable	3246	3807	7053
		46.23%	53.98%	100.00%
	Total	**12609**	**6828**	**19437**

Source: Authors

The adjusted tree was able to classify 67.76% of the total sample, with a precision of 75.61% for sustainable beneficiaries and 53.98% for unsustainable beneficiaries, in the test subsample.

The ROC curves obtained for the logistic regression and CART models, using the validation subsample, are presented in Figure 4.

Figure 4 – ROC curves for logistic regression and CART models
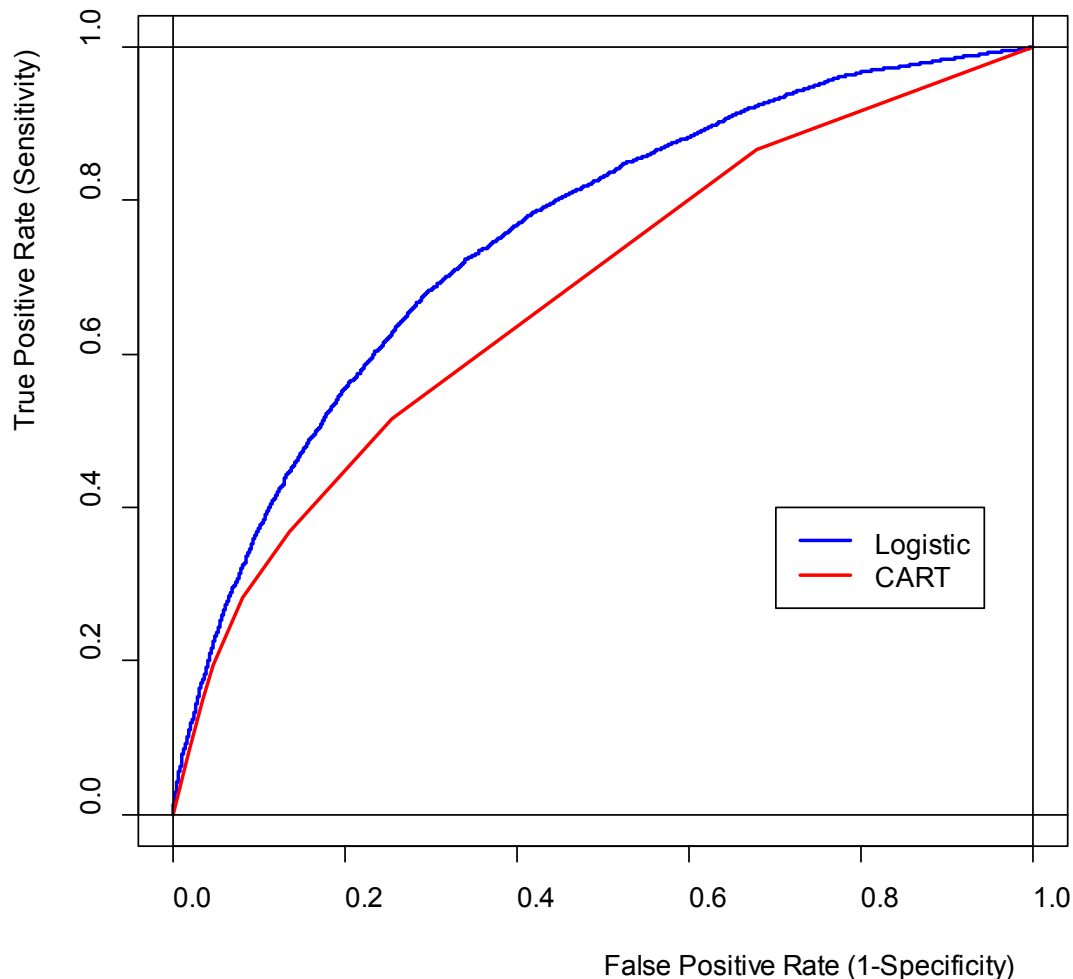
Source: Authors

Figure 4 shows that the logistic regression model performed slightly better than the CART model. The area under the ROC curve (AUC) of the CART model is 0.6855, lower than that obtained for the logistic regression (0.7501).

6. CONCLUSION

The administrators of Health Plan Operators face the challenge of economic and financially balancing a business embedded in a complex environment, and that is well supervised, with strict regulations and a consumer class that needs better guidance on the use of services. In this context, health care costs are gradually increasing for several reasons: the growth of new medical technologies, increased use of examinations, and an aging population, among others. These high costs in health care will not tend to reduce in the coming years; instead, they will increase more and more. The results of this research have improved our knowledge about the behavior of healthcare costs.

The results showed that most of the sample is composed of sustainable beneficiaries. The adjusted classification models showed good adjustment abilities, managing to correctly classify nearly 70% of the beneficiaries. These models are an added value for operators in strategic decisions involving the evaluation of the risk of unsustainability of its beneficiaries.

The most important predictors of classification were: age, type of plan, revenue, annual spending on consultation and on dental insurance.

A limitation of the study is that the sample, although large, was limited to employees of one company and their families. It was also limited to the northeast, especially the states of Ceará, Pernambuco and Bahia, which may reduce the power of generalization of the results. Another limitation identified is the lack of other profile variables of the beneficiaries, such as income and education, which could impact their risk of unsustainability.

It is suggested that future studies apply other sorting methods, such as neural networks, random forest and support vector machines. The inclusion of other sociodemographic variables of the beneficiaries is also recommended, as is the use of a more heterogeneous sample, so that the results can be generalized.

It is noteworthy that health promotion and disease prevention are aspects of health care that have not been considered among the health indicators proposed by the ANS, or by some operators. Preventive medicine may be a cost-reduction solution. It is also important to raise the awareness of beneficiaries about the need for rational use of the plan. Their joint participation in payments could encourage responsible use of the plan and strengthen the role of consumer oversight as to the transparency of healthcare costs included in Brazilian legislation and in use.

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MANAGING A COMPLEX ADAPTIVE ECOSYSTEM: TOWARDS A SMART MANAGEMENT OF INDUSTRIAL HERITAGE TOURISM

Maria Concetta Perfetto[1]
Alfonso Vargas-Sánchez[2]
Angelo Presenza[3]

ABSTRACT

This paper is focused on the concept of business ecosystem, which is a relatively new field in management research. Furthermore, there is a second emerging research approach in social sciences named "complexity theory" that considers ecosystems, and business ecosystems, as complex adaptive systems. The main aim is to connect both by bringing new insights under the basis of a smart vision of tourism. In particular, we propose a theoretical discussion of the aforementioned concepts by applying them to the specific context of Industrial Heritage Management. The Industrial Heritage (i.e.: mining sites, old infrastructures, museums and historic places related to industry…) is chosen because it appears well representative: it is characterized by a complex and dynamic structure which consists of an interconnected population of stakeholders and several tangible and intangible resources to recover, organize and then manage. It follows that the management of this ecosystem should take into account many factors simultaneously. Based also on the emergent initiative of Smart Tourism, a conceptual model is presented, in which each component is explained and the focal complexity aspects appearing in this business ecosystem are highlighted. We conclude with a set of propositions for recommending new paths for future studies.

Keywords: Business Ecosystem, Complexity Theory, Industrial Heritage Management, Smart Tourism.

JEL Classification: Z31, M19, M29.

1. INTRODUCTION

The increasing importance of the recovery of Industrial Heritage (IH) has highlighted the depth and the distinctiveness of the work places that belong to complex systems and complex mechanisms. Such complex systems which, according to the importance of the factories and their productive specialization, are articulated in space, connoting entire cities, entire territories and, consequently, entire destinations. All of this has contributed to make visible the importance of existing assets (archives, machines, buildings, infrastructure, etc.) and, at the same time, to affirm the necessity of a working specialist, scientific and unified methodology to manage this complex system. Since the second half of the 1990s there has been an increasing awareness of management scholars and the issues related to the management of IH and the reflexes that the reinforcement of this sector can have in ensuring the development of the area by increasing tourism and the involvement of many actors.

[1] Maria Concetta Perfetto, University "G. D'Annunzio" of Chieti-Pescara, Italy. (mariaconcetta.perfetto@unich.it)
[2] Alfonso Vargas-Sánchez, University of Huelva, Huelva, Spain. (vargas@uhu.es)
[3] Angelo Presenza, University of Molise, Italy. (presenza@unimol.it)

Starting from the need to proceed with unitary projects - which include the set of all the components present in the perimeters concerned - the central problem is that of a recovery and management approach in a smart vision. Working in this direction means taking attitudes that must be accompanied by a set of interdisciplinary skills. The panorama becomes even more complex when a mix of other disciplinary approaches is involved, such as environmental and urban studies, humanities, sociology, and others. Thus, the revitalization process involves economic, social and cultural transformations that require sophisticated management strategies (Lashua, 2013).

Projects of IH retraining and subsequent management involve complex forms of connection between the plethora of involved stakeholders. It requires an approach in which stakeholders do not create value in isolation (Hakansson & Snehota, 1989), but are involved in processes of value creation and cooperation (Prahalad & Ramaswamy, 2004). It follows that the value is not simply exchanged within a transaction, but it is created by everyone who takes part, in an interactive ecosystem view as a complex adaptive system, to a process that involves all stakeholders, each with his own perspective and his aim.

For these reasons, the main aim of this paper is to contribute to the definition of a conceptual model of Smart Tourism based on Industrial Heritage Management (STIHM). The chosen research method is conceptual analysis with a model proposal. Data is gathered through literature research, which takes into account articles written about complexity in the field of management, business ecosystems and smart tourism. Finally formation and reasoning of our own interpretation in the field of Industrial Heritage Management are shown.

In this line, this work has been structured as follows: the first section on complexity theory in the field of management; the second on the concept of business ecosystem as a new form of organization; the third on the concept of smart tourism; and the last one, on the base of this theoretical approach, is on our contribution related to the STIHM conceptual model. The work concludes with a set of propositions for recommending new paths for future studies.

2. THE COMPLEXITY THEORY IN THE FIELD OF MANAGEMENT

The complexity theory, relatively new in science in general and in the social sciences in particular, specifically addresses the phenomenon of "complexity" and explains the behavior of complex systems (Johnson, 2011).

Early approaches to complexity arise with studies on Cybernetics in 1942, during the World War II and many of the concepts developed in its field have merged in maturing theoretical corpus of complexity. In 1984, a diverse interdisciplinary group of researchers spanning physical, biological and social sciences were brought together to study complex systems based on nonlinear thinking from the cellular level to human society (Gell-Mann, 1994). In fact, the complexity theory draws on diverse fields, such as meteorology, mathematics, physics, chemistry and biology and the field of research has grown over the last two decades bringing together a variety of associated models, theories and institutional research programs (Burnes, 2005). It has also been identified (Manson, 2001) that the field builds upon a variety of earlier research including: the philosophy of organism (Whitehead, 1925); neural networks (McCulloch & Pitts, 1943); cybernetics, as we said (Wiener, 1961); cellular automata (von Neumann, 1966); and General Systems Theory (von Bertalanffy, 1968).

Within these scientific disciplines, took place an array of transformations, known as chaos, complexity, non-linearity and dynamical systems analysis. There is a shift from

reductionist analyses to those that involve the study of complex adaptive ("vital") matter that shows ordering but which remains on "the edge of chaos" (Urry, 2005).

Widely recognized as the leading institution on complexity is the Santa Fe Institute, composed by a diverse group of researchers: biologists, physicists, economists, computer scientists, chemists and mathematicians. Over the past 30 years, the work of the Santa Fe Institute and others have shaped our understanding of complexity with a rapidly growing body of literature that examines the characteristics of complex systems and complexity approaches (Waldrop, 1992; Kauffmann, 1993; Lewin, 1993; Gell-Mann, 1994; Casti, 1994; Capra, 1996; Flake, 1998).

The Santa Fe Institute developed the initial framework from which most other research evolved and it is from the premise and basic work of Santa Fe that the other major contributors in this area started their work on Complex Adaptive Systems (CAS) to describe a system that adapts through a process of "self-organization" and selection into coherent new behaviors, structures and patterns (Dann & Barklay, 2006). Many disciplines involved copious research of Santa Fe: all, however, revolve around concepts such as emergency, non-linearity, self-organization, adaptation, co-evolution, experience, learning, multiple equilibrium and margin of chaos. Wanting to trace a common unit of analysis, this could be recognized in the complex system, expression with which researchers denote any phenomenon that emerges from the interaction of the elements that it consists of.

The complexity arises because many elements interact simultaneously and self-organize locally (i.e. from the *bottom-up*); the complexity is, therefore, in the organization of the elements of the system, or better in their self-organization; it is the system that selects, that opts for one of the countless combinations in which its members can interact: it is the system that chooses one of the possible models of orderly and coherent interaction, without the intervention of any external agent in the selection. Complex systems are characterized by the following properties (Cilliers, 1998; Manson, 2001; Norberg & Cumming, 2008; Mitchell, 2009):

1. Non-linear relationships between entities which are most often from the immediate surrounding; thus lacking an overarching control or unified purpose. These interactions are mostly local and rather simple. What this implies is that given this large number of non-linear relationships, it is very unlikely that there is a unified purpose of the system (Cilliers, 1998; Manson, 2001; Mitchell, 2009).
2. Internal structure to dictate that sub-systems of close entities are formed within the system. Manson (2001) describes internal structure as being formed by tight connections between components, thus forming sub-systems. This means that relationships of varying strengths dictate which components will be close together forming sub-systems within the system;
3. Open systems that interact with their environments.
4. Learning and memory to process information concerning their environment, storing it as to survive (Cillier, 1998; Mitchell, 2009).
5. Self-organization in order to change and adapt when necessary; specifically self-organization refers to the changing of internal structure to better adapt to its environment, thus change and evolution are inherent in complex systems. Complex systems organize from within, responding and adapting collectively to stimuli external to the system boundary (Johnson, 2011).
6. Emergence as a result of non-linear relationships between a system's components and a form of synergism between them (Mihata, 1997).

Since the open-systems view of organizations began to diffuse in the 1960s, complexity has been a central construct in the vocabulary of organization scientists (Anderson, 1999). As argued by Anderson (1999), the first article published in Organization Science suggested

that it is inappropriate for organization studies to settle prematurely into a normal science mindset, because organizations are enormously complex (Daft & Lewin, 1990). It means that the behavior of complex systems is surprising and is hard to predict, because it is nonlinear and one or two parameters can change the behavior of the whole system. Complex systems change inputs to outputs in a nonlinear way because their components interact with one another via a web of feedback loops (Anderson, 1999).

During the 1990s, there was an explosion of interest in complexity as it relates to organizations and strategy. Complexity theory offered a number of new insights, analytical methods, and conceptual frameworks that have excited many scholars of management in recent years. It suggests that simple deterministic functions can give rise to highly complex and often unpredictable behavior, and yet this complexity can still exhibit surprising order and patterns. It may offer a synthesis of two competing perspectives on how organizations adapt to their environments, organizational adaptation and population ecology (Levy, 1992).

If we consider the nature of the organization, the classical model considers the organization as a "one mind" system typical of organic models, while in the complex model is considered as a "many minds" system. This is what Gharajedaghi (1999) defines "social model" as follows: in a perspective of self-organization, the individual elements contribute to the absorption of the complexity through a *bottom-up* process. Thus, applying the typical approaches of complexity to management implies the adoption of "complex" managerial models as opposed to the "classic" managerial models. Significantly, complex theory challenges both the source and characteristics of order in complex systems, traditionally associated with linear relationships and incremental progression governed by globally optimized decision making.

Economic and social systems are not only evolving, for example, because of technological innovation, but are also governed by the actions of intelligent, cognizing, strategy forming individuals and organizations. In seeking a new basis for understanding and making decisions, we should therefore look at complexity theory and its insights when looking at creative, evolutional, and strategic behavior.

We have to consider that the complexity theory is also a broad-based movement that contains new tenets about a type of system, referred to as Complex Adaptive Systems (CAS). According to Holland (2002), a scholar of the Santa Fe group, the CAS add to features already described for complex systems a key one: adaptation or learning. He argued that the CAS not only denote mostly a non-linear behavior, but they are adaptive, in the sense that do not simply react passively to events, but shall endeavor proactively to turn any circumstances to its own advantage (Holland, 2002).

Actors, with their various roles and becoming increasingly important, often prove to have the ability of a greater understanding of the external variability. Instead, complexity theory argues that adaptive strategies not dependent on rational choice or full information hold sway. The consequences are emergent changes or self-organization as a result of localized decisions by operating agents in the system, which deny the traditional prediction capacity, since in CAS *"small inputs can lead to dramatically large consequences and very slight differences in initial conditions produce very different outcomes"* (Lewin, 1993: xx). This is the so-called "butterfly effect", which basically means that small causes can have large effects because of such complex interactive feedback-driven nonlinearities; in other words, small changes of one variable in a CAS can produce major differences in the system's behavior over time (Waldrop, 1992; Lorenz, 1993; Coveney & Highfield, 1995; Holland, 1995; Kauffman, 1995; Capra, 1996; Flake, 1998; Lewin, 1999; Selten, 2001). Therefore, the eventual outcome of a system's behavior is highly responsive to very minor variations in its initial state and therefore, again, inherently impossible to predict.

There is at present no generally agreed definition of what counts as a CAS. However, four traits are commonly found in the literature.

- First, CAS consists of agents (e.g., cells, species, social actors, firms and nations) assumed to follow certain behavioral schemata.
- Second, as no central control directs the behavior of agents, self-organization occurs when agents are acting on locally available information about the behavior of other nearby agents.
- Third, as a result of this, co-evolutionary processes driven by agents' attempts to increase individual it gives rise to temporary and unstable equilibriums, which in turn generate the shifting system behavior with limited predictability (often denoted emergent properties) associated with CAS (Holland & Miller, 1991; Levin, 1999; Anderson, 1999).

Thus, each CAS is formed by a network of many agents that operate in parallel: each of them is located in an environment determined by its own interactions with the other agents of the system. Each agent acts and reacts continuously based on the actions and reactions of others; in a word, it co-evolves, or rather it tries to adapt constantly.

CAS are unique and desirable in their ability to adapt rapidly and creatively to environmental changes. Complex systems enhance their capacity for adaptive response to environmental problems or internal demand by diversifying their behaviors or strategies (Holland, 1995). Diversification, from the perspective of complexity science, is defined as increasing internal complexity (number and level of interdependent relationships, heterogeneity of skills and outlooks within CAS, number of CAS, and tension) to the point of, or exceeding, that of competitors or the environment. Adaptive responses to environmental problems include counter-moves, altered or new strategies, learning and new knowledge, work-around changes, new allies, and new technologies. By increasing their complexity, CAS enhance their ability to process data (Lewin, 1992), solve problems (Levy, 1992), learn (Levy, 1992), and change creatively (Marion, 1999).

In CAS, governance systems have been characterized by five elements (Vargas, 2016):

1. An adaptive system embraces an undefined set of interrelated agents or elements. These agents influence each other in mutual and multiple ways. At the same time, all agents are assumed to have relative autonomy. This means that each agent is capable to respond to external events and pressure in an individual way (Eldelson, 1997; Chiva-Gómez, 2003).
2. CAS are nested, in the sense they have a hierarchy of embedded layers, which are, however, hard to define. The layers and subsystems co-evolve with each other.
3. The external context can be of great importance for the evolution process. Adaptive system development depends upon the interaction between the composing agents and their surrounding systems. The interaction between a nested governance system and its context can be visualized as a set of negative and positive feedback loops.
4. A complex system will normally develop in a non-linear pattern. The interactions between agents will be changing over time and this will create a whimsical pattern. It is almost impossible to predict the dynamics in interaction, because each agent can decide to change course.
5. The course of development of complex systems depends upon the initial conditions of each new step of action. Relatively small changes in those conditions may generate a significant system leaps.

In this sense, applying CAS theory to management not only will have consequences for the analysis of stability and change, but also for the view on leadership. Traditionally, leadership is about one person and one single actor in charge. In CAS, we have an adaptive leadership. It is an emergent, interactive dynamic that produces adaptive outcomes in a social

system (Uhl-Bien *et al.*, 2007). Adaptive leadership is a collaborative change movement that emerges nonlinearly from interactive exchanges, or, more specifically, from the "spaces between" agents (Bradbury & Lichtenstein, 2000; Lichtenstein *et al.*, 2006). That is, it originates in struggles among agents and groups over conflicting needs, ideas, or preferences; it results in movements, alliances of people, ideas, or technologies, and cooperative efforts. Adaptive leadership is a complex dynamic rather than a person (although people are, importantly, involved); we label it leadership because it is the proximal source of change in an organization (Uhl-Bien *et al.*, 2007).

In addition to suggesting new ways to model nonlinear, dynamic behavior in organizations, CAS theory has rich implications for the strategic management of organizations; CAS models afford exciting new opportunities for analyzing complex systems, as business ecosystem, without abstracting away their interdependencies and nonlinear interactions, and this is particularly important for our research. For these reasons, the conceptual leap to be taken in the next section is to define the concept of business ecosystem to highlight how different complexity aspects appear in it.

3. COMPLEXITY AND A NEW FORM OF ORGANIZATION: THE BUSINESS ECOSYSTEM CONCEPT

In today's increasingly competitive world, organizations compete and interact among each other through innovative and unexpected ways and they need each other to survive. In it, a distributed, inter-connected, self-motivated and self-activated intelligence is critical. As we argued above, decision-making processes implemented according to the classical model are determined, following a specific procedure, whereas in the complex model they are unknown, constantly challenged and modified in real time. We should also consider that in an innovative economy, organizations do not act in isolation, but mature as a result of interacting with each other within a network (Davenport *et al.*, 2006; Amaral & Figueira 2016). This definition is known as the new world of business ecosystems, which indicate interactions among various actors (Chesbrough, 2007). Even if several academics have already commented on this concept, there is still a lot of work to be done to establish it, starting for example from the definition that is still vague (Shang & Shi, 2013). However, business ecosystem is a highly descriptive expression for the complex business environment which is the reality for most organizations nowadays.

The term "Business Ecosystem" was first used by Moore in 1993 and was subsequently developed by various scholars who studied it from different perspectives (i.e.: den Hartigh *et al.*, 2006; Anggraeni *et al.*, 2007; Wan *et al.*, 2011). The origins of the concept can be traced in the theory of ecology. In fact Moore (1993) analyzed and defined the concept based on the analogy with biological ecosystem. As biological ecosystems, business networks are characterized by a large number of loosely interconnected participants who depend on each other for their mutual effectiveness and survival (Lewin, 1999).

Therefore, biological analogy is the starting point in defining business ecosystems and in the scientific literature a variety of business ecosystems' models have been developed, from which the most important are the ones of Moore and Iansiti and Levien's.

According to Moore (1993) the business ecosystem is an economic community supported by a foundation of interacting organizations and individuals – the organisms of the business world. Organizations, similar to biological organisms, operate within a rich network of interactions, forming the local economy on a local scale and the global economy on the global scale. Consequently, a business ecosystem is composed by different types of species (market players, government, customers, etc.) that develop strong relationships in a

friendly environment based on specific activities and business networks (Moore, 1993). It can be considered as small business initiatives or vast collections of enterprises, where the boundaries can be fuzzy and include huge, inter-connected networks that interact with each other. As a result, organizations are simultaneously influenced by their internal capabilities as well as complicated interactions inside the ecosystem (Karhiniemi, 2009).

In the business ecosystem context, Moore (1993) described also the co-evolution as the complex interplay between competitive and cooperative business strategies. Moore (1996) emphasizes the evolutionary stages of the ecosystem and its evolvement, and describes the challenges in each stage. It follows that business ecosystem has its own life cycle. The analogy with biological ecosystem provides the most important findings for business ecosystem life cycle development. It evolves from *"random collection of elements to a more structured community"* (Moore, 1993: 76). From this point of view, four distinct stages of development have been identified: birth, expansion, leadership and self-renewal of business ecosystem.

1. Birth is the stage where the future value delivered by the product or service is defined and where the channels for value delivering are declared. New members are recruited into business ecosystem through cooperation (Moore, 1993). Also it is at the evolution level where new opportunities are identified in order to satisfy and create value for customers (Peltoniemi, 2004; Rong, Liu & Shi, 2011).

2. In expansion stage the innovation and creative thinking are the most important features for value creation for new customers (Peltoniemi & Vuori, 2004). The importance of scaling the potential opportunities and creative value creation were emphasized as two main conditions for this stage (Moore, 1993).

3. Leadership requires high profitability and growth of the companies from a business ecosystem. The key aspect of this stage is stability. This is the stage where control function is enabled, and, as a result, companies try to dominate most of the value elements.

4. Self – Renewal or Death is characterized by high threats from new business ecosystem arising (Peltoniemi & Vuori, 2004) and new innovation development. Moore (1993) compared this stage to an earthquake and concluded that it is defined by major changes. In this case the future success of business ecosystem consists in its ability to gain long-term progress and to renew itself.

The same approach as Moore was adopted by Iansiti and Levien in 2004 who also tried to compare the business ecosystem with a biological one. As they suggest, the biological ecosystem can provide a powerful metaphor for understanding the business networks: a business ecosystem is a non-homogeneous community of entities, made up of a large number of interconnected participants with different interests, which depend on each other for their mutual effectiveness and survival, and so they are bound together in a collective whole.

While Moore (1996) thinks that a business ecosystem consists of different levels of organizations and business environment, Ianisti and Levien specifically divide those organizations into four types, all of them with specific functions and strategies (Iansiti & Levien, 2002, 2004a, 2004b), which are: keystone player, niche player, dominator and hub landlord.

The keystone players set up a platform in order to involve contributions from other players (Ianisti & Levien 2004b; Quaadgras 2005). A keystone *"acts to improve the overall health of the ecosystem and, in doing so, benefits the sustained performance of the firms. It does this by creating and sharing value with its network by leveraging its central hub position in that network while generally occupying only a small part of that network"* (Iansiti & Levien 2004b: 72).

Niche players develop specialized capabilities to add value to business ecosystem. Niche strategies can be pursued by the much larger number of firms that make up the bulk of the ecosystem, focusing on unique capabilities and leveraging key assets provided by others. The

keystone players and niche players contribute to ecosystem health and sustainability (Ianisti & Levien, 2004b).

The dominator *"acts to integrate vertically or horizontally to directly control and own a large proportion of a network"* (Iansiti & Levien, 2004b: 74) capturing most of the value created by the network and leaving little opportunity for the emergence of a meaningful ecosystem.

The hub landlord extracts as much value as possible from its network without directly controlling it. A hub landlord, the most anti-social species of dominator, *"eschews control of the network and instead pursues control of value extraction alone,"* providing little new value to its network, leaving a "starved and unstable" ecosystem around it (Iansiti & Levien 2004b: 74).

Another difference between Moore and Ianisti and Levien is that the second ones went further and have paid special attention to ecosystem's health: if an ecosystem is healthy, then its community will flourish. Three are key-elements in an ecosystem's health: productivity, robustness and niche creation (Iansiti & Levien, 2002; Davenport *et al.*, 2006; Den Hartigh *et al.*, 2006).

Productivity is understood as the efficiency with which an ecosystem converts inputs into outputs (Iansiti & Levien, 2002). It reflects the ability of actors to transform existing resources into significant results and to create value for business.

Robustness is the capability of an ecosystem to face and survive disruptions (Iansiti & Levien, 2002). It has the meaning of achieving sustainability: a healthy ecosystem should adapt easily to environmental changes so that it can meet the conditions of sustainable development (Iansiti & Levien, 2004a).

The final determinant of the health measurement is niche creation that is the capacity to create meaningful diversity and thereby novel capabilities through two factors: the variety, related to the number of new options, technological building blocks, categories, products, and/or businesses being created within the ecosystem in a given period of time; and the value creation, related to the overall value of new options created (Iansiti & Levien, 2002).

Business ecosystem has also various characteristics: inter-dependence of its components, cooperative evolution, simultaneous existence of competition and cooperation, the existence of numerous role players, dynamism and flexibility, shared fate, contribution to making innovations and achieving business successes (Peltoniemi, 2005; Hearn, *et al.*, 2006). Whereas the organizing principles are: interconnectedness, that involves the type of relationships established between ecosystem's actors and aims to reveal the bilateral relationships between them, through cooperation between different organizations (Iansiti & Levien, 2004a; 2004b); diversity, that represents the existence of business ecosystem through different type of species (SMEs, governmental organizations, etc.), cooperation and data; and complexity, a principle emerged as a result of a complex and systemic analysis based on interactions between business ecosystems elements (Peltoniemi, 2005).

As suggested by Iansiti and Levien (2004), a business ecosystem can be understood as a nonhomogeneous community of entities, made up of a large number of interconnected participants with different interests; they depend on each other for their mutual effectiveness and survival, and so they are bound together in a collective whole.

The ecosystem analogy, based on this review, has been widely used for describing different kinds of structures and processes. These analogies emphasize different aspects of biological ecosystem and are applied in business fields. As argued by Peltoniemi and Vuori (2004), they can offer insights for using the ecosystem analogy but they cannot be drawn together to form a theory of ecosystem in social sciences and economics. However, treating business ecosystems as complex adaptive (or complex evolving) systems, it is possible to understand the principles of their formation, evolution and interdependence in a broader context and exploit the research made in other sciences.

4. SMART TOURISM

The term "Smart Tourism" comes, by analogy, from the term of "Smart City" that represents an environment where technology is embedded within the city. In fact, the Smart Cities concept has typically been associated to technology embedded ecosystems that attempted to build synergies with their social components in order to enhance citizens' quality of life and to improve the efficiency of the city services (Egger 2013). This technology will synergize with the city's social components in order to improve citizens quality of life while also improve the efficiency of city services (Vicini *et al.*, 2012). Indeed, Information and Communication Technologies (ICTs) support cities in addressing their societal challenges. The development of Smart City also facilitates seamless access to value-added services both for its citizens and tourists as city visitors, such as access to real-time information on public transportation networks (Buhalis & Amaranggana, 2013). In this sense, a city could be categorized as smart when sustainable economic growth and high quality of life were achieved through investment in human capital, adequate level of government participation and infrastructure that support proper dissemination of information throughout the city (Caragliu *et al.*, 2011). Thus, Smart Cities should base their smartness on three main pillars, namely: human capital, infrastructure/infostructure, and information (Komninos *et al.*, 2013). Furthermore, the city should therefore directly involve citizens in the co-creation process of products or services (Schaffers *et al.*, 2011; Bakıcı *et al.*, 2013). To this end, Smart Cities are not only considered as the outcome of innovative process but also as innovation ecosystems that empower communities' co-creation for designing innovative living resulting in constant dynamic innovation and engagement with all stakeholders (Schaffers *et al.* 2011).

From a tourist perspective, as argued by Buhalis and Amaranggana (2013), the new era of ICTs has also opened a wealth of new tools for the tourism industry. ICTs could contribute in terms of generating value-added experiences for tourists, efficiency and supporting process automation for the related organizations. Thus, the development of Smart City could also encourage the formation of Smart Tourism Destinations. With technology being embedded within the destinations environment, it can enrich tourist experiences and enhance a destination's competitiveness (Buhalis & Amaranggana, 2013). The Smart Tourism Destination initiative was officially coined by China's State Council of Chinese Central Government in 2009 (Wang *et al.*, 2013). Wang *et al.* (2013) illustrate how the notion of smart destinations has changed the way some Chinese destinations support tourism experience creation, communicate with consumers and define and measure destination competitiveness, suggesting that service-dominant logic permeates the smart tourism destination. Lopez de Avila (2015: xx) defined the smart destination as "an innovative tourist destination, built on an infrastructure of state-of-the-art technology guaranteeing the sustainable development of tourist areas, accessible to everyone, which facilitates the visitor's interaction with and integration into his or her surroundings, increases the quality of the experience at the destination, and improves residents' quality of life". Buhalis and Amaranggana (2014) describe the smart tourism destination as requiring stakeholders to be dynamically interconnected through technological platforms to collect, create and exchange information that can be used to enrich tourism experiences in real-time. Lamsfus, Martin, Alzua-Sorzabal and Torres-Manzanera (2015) describe this technological platform or digital ecosystem that makes tourism destinations smart as encompassing intelligent systems, cloud computing, Linked Data, Social Networks, the Internet of Things and mobile applications. Context-awareness of mobile systems has also been emphasized in connection with smart destinations (Lamsfus, Xiang, Alzua-Sorzabal & Martin, 2013). Presently the concept may be considered to still be emerging, and the work of conceptualizing it and defining it still in progress (Del Chiappa & Baggio, 2015).

As stated by Gretzel, Sigala, Xiang and Koo (2015), *"in practice 'smart' has become a very fuzzy concept often utilized to drive specific political agendas and to sell technological solutions. This is especially true in the case of Smart Tourism, where it is frequently used in the context of open data initiatives or for rather trivial projects such as promoting free wifi or the development of mobile applications"* (p.180). However, they continue "while these technologies and new approaches to data collection, management and sharing are important stepping stones in implementing smart tourism, they do not provide the full picture of what smart tourism encompasses" (p. 180). From this starting point and in agreement with Höjer and Wangel (2015), smart is not so much the individual technological advances but rather the interconnection, synchronization and concerted use of different technologies that constitute smartness. Based on these considerations, always Gretzel *et al.* (2015) define Smart Tourism as *"tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment"* (p. 181). Thus, generally speaking, Smart Tourism aims to develop information and communication infrastructure and capabilities in order to:

- improve management/governance;
- facilitate service/product innovation;
- enhance the tourist experience;
- improve the competitiveness of tourism firms and destinations.

Recently, Gretzel *et al.* (2015), in another article, have also conceptualized the smart destination within the broader idea of a Smart Tourism Ecosystem, formed, also and jointly, by smart technologies and smart cities. Thus, according to them and considering also the theoretical background of our work, a Smart Tourism Ecosystem can be defined as *"a tourism system that takes advantage of smart technology in creating, managing and delivering intelligent touristic services/experiences and is characterized by intensive information sharing and value co-creation"* (Gretzel, Werthner, Koo & Lamsfus, 2015: 560). Moreover, it includes a variety of "species": touristic and residential consumers, tourism suppliers, tourism intermediaries, support services, platforms and media, regulatory bodies and NGOs, transportation carriers, travel technology and data companies, consulting services, touristic and residential infrastructure and companies typically assigned to the other industries (Gretzel *et al.*, 2015).

This highlights how the ecosystem nourishes new business models, new interaction paradigms and even new species of tourism businesses, making the delineation of its boundaries very hard. For instance, touristic consumers have resources and because of their ability to tap into the digital ecosystem can organize among themselves or mingle with the closely related residential consumer species and act like producers (a phenomenon often referred to as the sharing economy). In addition, tourism suppliers and/or other business-focused species (with lines among industries becoming increasingly blurred in an open system) can connect through smart technology and create new service offerings (in medical tourism, for example) (Vargas, 2016).

If Smart Tourism requires an ecosystem approach, and this calls for complex, adaptive systems supported by intensive technological endowments which interact in multiple ways and on multiple levels to create value and foster innovation, leading, supposedly, to smarter decisions, the foundations of the complexity theory could be applied for a better understanding of this phenomenon and this approach can be presented as innovative, as no evidence has been found on the application of this theoretical framework to tourism destinations and its smartness (Vargas, 2016).

5. CONCEPTUALIZING THE INDUSTRIAL HERITAGE ECOSYSTEM AS A COMPLEX ADAPTIVE SYSTEM

5.1. The Industrial Heritage Business Ecosystem (IHBE)

Taking note that the process of industrialization is a complex phenomenon that combines physical and environmental, technical and economic, cultural and institutional factors, it follows that the elements characterizing the industrial heritage are multiple and especially of a different nature (e.g.: tangible and intangible assets). In fact, factories and infrastructures are closely related, and brownfield sites typologically varied in relation to sectors and temporal, spatial and organizational characters of the production.

Behind this most visible part there is another that, although not easily identifiable of great importance, is defined by the following elements: technical-productive knowledge (tacit and encoded); drawings, models, documents and archives; machinery, plant and equipment; communication and energy networks; residential, training, welfare, cultural and recreational infrastructure; territories and landscapes shaped by industrialization (Vargas, 2014).

Most historic industrial sites continue to be administered by museums, enthusiast groups, or private industrial companies themselves rather than large institutions. This nevertheless has had profound consequences for industrial heritage management, which usually receives secondary status to more established thematic research (Rautenberg, 2012).

The success of a cultural project of Industrial Heritage (IH) is intrinsically linked to the ability to generate a dense network of relationships. As stated by Iansiti and Levien (2004), each element should establish bilateral relationships with other elements. These relations represent the grade of cooperation and contribution of each element to a mutual development.

The large number and variety of the elements ask for a process of capitalization of the industrial heritage that translates in a set of practices the allocation of new meanings and cultural and economic values to the different components (Presenza & Perfetto, 2015). In other words, it would be to revive the industrial landscape (often ignored or little known sites, disused and hidden), starting mechanisms aimed to the revival of resilient places through creative and innovative uses that, preserving the memory of the places, lead to the creation and maintenance of spaces aimed at the realization of exhibitions and other tourist and cultural events (Mansfeld, 1992; Jones & Mean, 2010). This process of capitalization strongly binds to economic, social and cultural transformations of a territory, and possible reuse decisions of goods derived from industrialization imply interpretations and, above all, strategies that involve both abandoned areas and the industrial tradition (Lashua, 2013).

The recovery of IH involves choices that have a profound effect on the environment (regenerate without spoiling), the society (regenerate without distorting) and the economy (regenerate to create welfare). In this complex system of factors, it becomes necessary to better understand the characteristics and modus operandi of organizations devoted to the regeneration and management of IH. Therefore, before deepening the discussion about the IHBE it would be suitable to consider that a series of actions supporting the strategic intent have to be developed and shared with all the stakeholders.

All these elements together define the shape and behavior pattern: how the ecosystem "lives". Also the time variable is important: the relationships amongst the constituent elements may change the ecosystem structure. So, understanding the ecosystem means not only drawing the shape and relationships amongst the constituent elements in a certain moment in time, but also understanding how it evolves by monitoring evolutionary trends (Battistella *et al.*, 2013). It is thus important that organizations establish monitoring processes for their ecosystem, both from a static and dynamic point of view, and they analyze

IHBEs by investigating how the relationships and the dynamics can potentially positively and/or negatively impact their businesses. Clearly, these analyses need to be supported by appropriate tools and methodologies to work on.

Interventions for the protection and regeneration of the industrial heritage should take account of many factors simultaneously: on the one hand, the historical and technical value, the social content, the recovery mode, the architectural and artistic value of an industrial good; and, on the other hand, the economic and financial management, the organization of the resources involved, the enhancement of competencies and skills, and finally, the appropriate promotion (Presenza & Perfetto, 2015). Making connections and celebrating the texture of the entire social, cultural, and natural network in this way permits the industrial landscape to incorporate multiple value systems, and recognize the dynamic blend of the old and the new. For this reason the value aspects that will be looked at in IHBE are economic value, functional value, and cultural and historical value; social value showed much overlap with both cultural and historical and functional value aspects. These aspects were found to be the most relevant for revitalizing and management of industrial heritage values, which play out in different ways at different levels of industrial heritage management. Thus, the IHBE becomes especially important to local communities who, despite their best efforts, may not be able to sustain an industrial heritage management project on a large scale. It may be easy to preserve a component of an historic system, but it is difficult and costly to manage an entire system (Quivik, 2007).

Finally, the studies on industrial heritage management have analyzed also the subject of Destination Governance (Wilkey, 2000; Smith & Couper, 2003; Xie, 2006; Landorf, 2009; Duarte-Alonso *et al.*, 2010; Alberti & Giusti, 2012; Otgaar, 2012). Moore (1996) mentions that the most used ways of governing business ecosystem relationships are community governance systems and quasi-democratic mechanisms. He mentions that the ecosystem internalizes the systems of firms and the markets that connect them under the guiding hands of community leaders. Iansiti and Levien (2004b) mention that business ecosystems are governed by shared fate, but they do not intensely discuss this guiding mechanism. In IHBE governance emerges the interest for the analysis on who are the most active stakeholders involved in the management processes and on the main methods of involvement and participation of stakeholders in decision-making processes. In particular, the collaboration between public and private sectors is the dominant theme in the analysis of the stakeholders. In this sense, there are several forms of governance and the constitution and management of ad hoc organizations. As argued also by Vos (2006) describing business ecosystem governance, the IHBE governance provides network members with an incentive and vision to strive for a common goal, giving them the freedom to reach that goal on own initiatives so that their motivation is not hampered by obstruction, while using steering mechanisms to ensure that their activities will reach this common goal, in an effort of improving the business ecosystem's capability of coping with exogenous changes and the internal pace of innovation.

5.2. Conceptual model: the Smart Industrial Tourism Business Ecosystem (SITBE)

The IH, as we have seen in the previous section, is not only an urban regeneration driver but also a key resource for economic development of a destination through the development of industrial tourism. The context is characterized by numerous areas rich of IH in the territory, by an infinite number of highly specialized operators and a wide variety of agencies, associations and institutions responsible for the management of these resources. For these reasons, there are difficulties in bringing a common vision from the individual strategies of the actors.

Thus, the IH can be considered as a driver for the tourist attraction, but it is also true that the availability of heritage in itself does not seem a sufficient condition to attract an adequate number of visitors to create wealth from the economic point of view. Furthermore, one must take into account a typical dualism of this sector: on the one hand the presence of IH allows the destination to be different than other territories proving to be a source of capital from which to draw income to the destination and to the various operators; on the other, the possibility of transforming the attractiveness in the economic wealth is conditioned by the size of the destinations, because institutions that manage the assets have to sustain very high costs and require a certain mass of visitors in order to contribute to cover costs of structure. The investment on the IH regards not only its physical preservation, but also its presence in the collective memory which results in costs for cataloging, digitization, promotion and communication aimed at consolidating the value of the industrial heritage to the community's eyes. The knowledge of IH, in fact, increases the attractiveness to tourists, allows adequate tourism market segmentation and enables the development of promotion and awareness campaigns on different targets, strengthens the sense of belonging and cultural roots, it stimulates the development of new knowledge and helps to increase the opportunities to valorize it.

Following our theoretical background, for an "industrial tourism destination" becomes smart and overcomes the difficulties listed above, the governance system should be perceived as a living organism and not as a mere instrument that should be made suitable for business climate adaptation. The focus of this study is on link between Complexity Theory, Business Ecosystem and Smart Tourism, considering that the evolution of the model progresses inductively beginning with a few broad assumptions and concepts. For these reasons we propose a conceptual model that arose out of a coalescence of several research activities and ideas; it starts on the adaption from Moore (1993).

To define the content of a SITBE, its structure is displayed in Figure 1. Consequently, it is necessary, for its evaluation, to identify the perimeter and constituent parts of the ecosystem; develop a representative model of it; analyze the behavior of the ecosystem in the past and in the present; and study the possible evolutionary scenarios.

Figure 1. Conceptual model of the Smart Industrial Tourism Business Ecosystem, SITBE
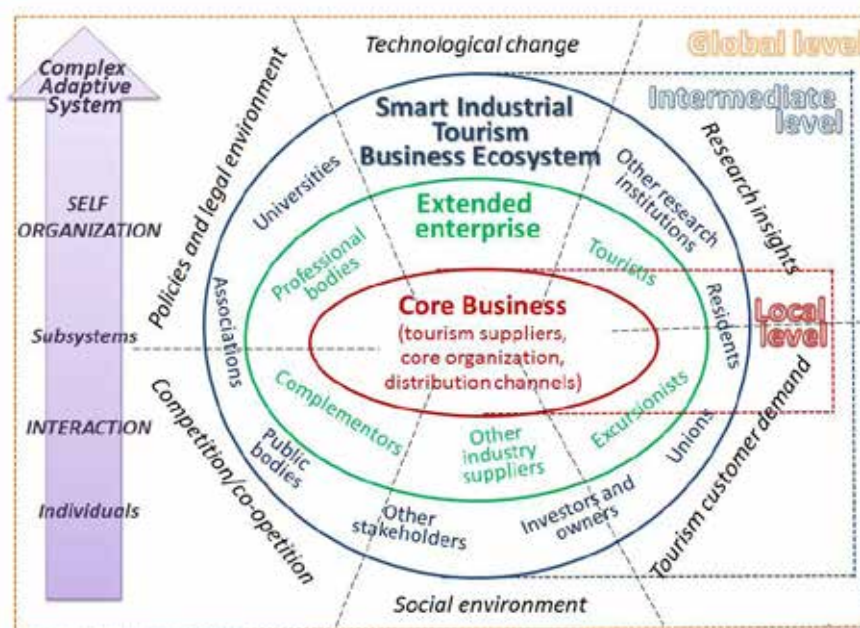
Source: (our elaboration)

255

5.2.1. Levels

To understand better its development process and looking at elements that could be included, there should be a defined elements hierarchy. In the SITBE there are 3 levels: local level (core element – core organization), intermediate level (related elements inside the business ecosystem: stakeholders, markets, competition, governmental agencies), and global level (external influencing elements on the ecosystem: international competition and international markets). It is, therefore, important to acknowledge the emergence of power relationships and hierarchies as a direct consequence of the mediation of social interactions; and to devise a governance process that can maintain the dynamics of the community. It is important to assign or to establish the roles that each element performs: keystone, niche players or dominators.

5.2.2. Core business

Moore (1993) describes a business ecosystem as consisting of layers, which correspond to differing levels of commitment to the business. The core business layer consists of the parties forming the heart of the business. In traditional business, this layer would be run by a single company or the supply chain would be coordinated by the focal company. Alternatively, it can also be formed by a network of several organizations, each taking care of parts of the core business.

In our case, at the basis of successful projects of IH management there is an activator (Ratclif, 2014), which can be a person, a small group of people, an organization or many organizations. It is the driving force of the entire process. It means that all the other elements have to be related to the core organization and share the same mission and vision. Thus, the presence of an activator and a cohesive group are the base for the creation of cultural projects. In turn, a cultural project should be sustainable in environmental, social and economic terms.

The activator is usually a "cultural industry". Throsby (2001: 112) says that this is a subject that produces or distributes goods and services that include creativity in the production and incorporate a certain degree of intellectual property and transmit a symbolic meaning. The activator displays various institutional, organizational and entrepreneurial forms.

In the case of tourism suppliers or other business-focused actors, they can connect through smart technology and create new service offerings to enrich industrial tourism experiences and to ensure the "longevity" of the SITBE. In this sense, it is also clear that the system is open to players from other industries/ecosystem being able to tap into resources or form beneficial relationships.

5.2.3. Extended enterprise

The next layer, the extended enterprise, widens the view of the business supply chain to include the customers, complementors and second-layer suppliers, as well as standard-setting bodies in the particular field of tourism or related to it. For example, tourism consumers in STIHM have resources and can organize by themselves or mingle with the closely related residential consumer actors and act like producers. So, touristic and residential consumers should produce data and consume data produced by other actors or the physical environment. While other industries suppliers are important predators in the SITBE, they also feed the system with critical information and should offer opportunities for enhanced value creation.

5.2.4. Smart Tourism based on Industrial Heritage Management

The IH has the potential to attract the interest of different players. The last layer adds trade associations, unions, universities and other research bodies, investors, and stakeholders to the business ecosystem. Even though they are perhaps not directly involved in the business operations, these parties may have a significant effect on the success of the business.

The SITBE model starts to address this issue on a regional scale by integrating private, local, regional and national stakeholders into a coalition to define their own preservation goals, themes, and practices. Incorporating value systems into landscape preservation provides a platform for preservation to truly serve the changing nature of historic industrial resources, their users, and ultimately, the public trust. The stakeholders in industrial heritage, from government bodies and historic preservation professionals to amateur archaeologists and local communities concerned about the history and quality of place, can interact with each other through sophisticated models of both collaboration and competition. It means that a SITBE comes in a broad array of shapes, sizes, and varieties; and it also captures three core characteristics that are generally present:

First, it enables and encourages the participation of a diverse range of (large and small) organizations, and often individuals, who together can create, scale, and serve markets beyond the capabilities of any single organization.

Second, participating actors interact and co-create in increasingly sophisticated ways that would historically have been hard to formally coordinate in a "top-down" manner.

Third, participants—often including customers—are bonded by some combination of shared interests, purposes and values which incent them to collectively nurture, sustain, and protect the ecosystem as a shared "commons".

5.2.5. SITBE subsectors

The challenge in boosting the growth of the SITBE is how to recognize who are the next actors or areas that should be contacted and involved in collaboration. To overcome this challenge, it is useful to divide the SITBE map into differing subsectors as we have done in Figure 1. The sectors are recognized as external forces that affect the success of the industrial tourism destination. These forces include competition/co-opetition, policies and the legal environment, social or technological change, research insights, and changes in customer demand. Each of the subsectors shown in Figure 1 is described below, in the form of implementation advice:

1. Technological change: a SITBE model should be built on a tourism system able to take advantage of smart technologies or information technologies. Decreasing information and communication costs make totally new processes and ways of working possible. In addition to proving new business possibilities, it also challenges the existence of current ones. Therefore, it should identify the potential of smart technologies and contact the suppliers.
2. Research insights: In addition to the business aspects, the SITBE should attract research. Reading major research articles or best practices studied on the topic of industrial Heritage Management (IHM) and contacting those researchers can help to locate suitable collaborators within the universities or other research bodies.
3. Changes in tourism customer demand: Consumption patterns and "fashion" are examples of changes in tourism customer demand. High adoption rates of social media could be a good example of social change that might provide new possibilities. Customer co-creation is increasingly adopted to gain knowledge on the changing demand.
4. Competition/co-opetition: One of the main pressures comes from competitors. In order to survive, product or service must be cheaper, better, or quicker than that

of competitors. In the SITBE the collaboration with competitors might be needed to execute the business model. Competitors, for instance, might have some specific knowledge or capabilities and it should try to turn the competitors into co-opetitors.

5. Social change: Changes in work practices, processes, culture, and social mood in general might have an effect on the SITBE. Changes in attitudes on environmental issues, technology adoption, social/political life can affect the business. Collaboration with various kinds of associations and societies helps to keep track of social change.

6. Policies and legal environment: Legal issues are something that you must always take into consideration. Many times, it pays to find out the legal restrictions at the beginning to take them into account when building the SITBE.

5.2.6. Self-organization and interaction

The core Complexity Theory concepts extracted from this model were above all self-organization and interaction as shown in Figure 1. The phenomenon of self-organization is central for the understanding of the behavior of complex systems, in our case of a SITBE. Self-organization means that there is no 'external controller' and that the SITBE organizes from within itself in response to its external environment. However, a SITBE is an open system and therefore the observer defines the boundaries of any system. It is nested in larger systems in which they interact and respond to the influence of the behavior of either the larger or smaller system. In this sense the characteristics are:

- Open systems fluctuating.
- No centralized control.
- It evolves in a self-organizing interaction of co-operation and competition between actors connected within the system.
- It adapts to influences within and beyond its boundary.

5.2.7. Interaction

Interaction (feedback) in a SITBE is the bidirectional transfer of information from one decision making agent (individual human) to another. This information can be enhanced, suppressed or altered leading to an impact of this effect overall on the system. These interactions will be non-linear (asymmetric) and paradoxically, large changes can have a small effect, whereas small changes can have a large effect. However, greater interaction creates greater system complexity. The transformative process of human communication and relations underlies social interactions and organization of social systems. In this sense the characteristics are:

- Interaction, feedback, continual transformation.
- Interaction results in emergent structures that have causal influence on the individuals.
- Interaction through communication in a continual evolution.

6. CONCLUSIONS AND FUTURE OF RESEARCH

The SITBE proposed in our work (which could be used for any tourist ecosystem, not necessarily for one related to industrial tourism, and named as Smart Tourism Business Ecosystem) represent a key element to characterize the aims of the development of industrial tourism in destinations where this heritage is located. There is a growing number of industrial areas where tourism is promoted as a helpful tool for regional restructuring and economic development. In this context, the development of smart industrial heritage tourism can be understood not only as one of the pillars of alternative economic and social development to

replace the deactivated industry, but also as an active agent in the process of defining the diverse collective identities.

This paper is an initial attempt to identify the implication that this new phenomena can have on a smarter tourism development. New steps will have to be covered through new research. In particular, much more emphasis will be put on the challenges that this topic has in relation to a more competitive and sustainable destination governance. In particular, the analysis of actors, inter-actions, coproduction and management of the business ecosystem's resources will represent, perhaps, the main direction of future studies. For this reason the next step could be to use this conceptual model for a case study in a specific destination.

Several implications arise from this study. Theoretical ones are related to the concept of Business Ecosystem. Results have revealed the adequacy of this approach to the analysis of IHM considered as a complex adaptive system. In particular, it gives useful lens to observe and understand the complex mix of actors and activities that compose a project of IHM.

Practical implications are related both to managerial and political issues. About managerial implications, we suggest a new approach to the management of IH resources that comprises first of all new organizational forms (in terms of innovative forms of organization, production methodologies and working practices based on refined forms of self-disciplinary managerial power, control and surveillance) that do not easily fit with the traditional business models but in a smart initiative. The main important political implications are related to implementation of IHM projects. The management of IH, as the management of cultural heritage in general, requires a new approach that involves factors such as creativity, flexibility, networking, dynamism, promotion, ICTs, etc., that are difficult to reconcile with a traditional approach made by high bureaucratization, static conservation and unilateral management. All of that requires a farsighted policy that is able to support, organize, coordinate the industrial/cultural resources and link them with the other resources in the territory.

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NATURE-BASED TOURISM IN THE ALGARVE: A FACT OR A MYTH?

Manuela Guerreiro[1]
Patrícia Pinto[2]
Júlio Mendes[3]

ABSTRACT

The Algarve is a mature destination in the south of Portugal and is mainly well-known for its offerings of sun and sea. In addition to strong seasonal changes, the region also faces strong competition from other nearby destinations, which has affected its ability to better attract tourists. Regional stakeholders have recognized the need to diversify the tourist experience, and a strong effort has been dedicated to the development of complementary tourist products, with special attention to eco-tourism. The present study uses data from a survey of tourists who visited the Algarve in December 2010 (low season) to determine the extent to which tourists visiting the region would actively search for nature-related activities, and the profile of these individuals. In particular, the study aims to understand whether these tourists share environmentally friendly values or, instead, have chosen the Algarve based on its attributes of traditional appealing climatic conditions and beaches. Depending on whether nature-based tourism in the Algarve is a fact or a myth, strategies for repositioning the destination can be adapted, new tourist products can be proposed and communication campaigns may need to be rethought.

Keywords: Tourism Destination, Nature-Based Tourism, Environmentally Friendly Values.

JEL Classification: L83.

1. INTRODUCTION

In recent decades, seaside destinations that have conventionally offered a *sun and beach* product have felt the need to become more competitive, as they face strong seasonality problems, and need to adapt their offerings to the new motivational tendencies of tourists (Valle, Guerreiro, Mendes & Silva, 2011). Tourists nowadays are more proactive and search for more authentic and diversified experiences, which forces destinations to rethink and restructure what they have to offer (Gale, 2005; Sedmak & Mihalic, 2008). Nature-based tourism has recently received attention in mass tourism destinations as a complementary product to *sun and beach*, especially during the low season (Agapito, Valle & Mendes, 2014).

These issues apply to the Algarve, which is the most important tourist region in Portugal, and is usually seen as a seaside destination. Like other coastal destinations, and due to its climate conditions, *sun and beach* is its most important tourist product (Valle, Pintassilgo, Matias & André, 2012). The Algarve suffers from competition with destinations that have

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[1] Manuela Guerreiro, University of Algarve, Faculty of Economics, Research Centre for Spatial and Organizational Dynamics, Faro, Portugal. (mmguerre@ualg.pt)
[2] Patrícia Pinto, University of Algarve, Faculty of Economics, Research Centre for Spatial and Organizational Dynamics, Faro, Portugal. (pvalle@ualg.pt)
[3] Júlio Mendes, University of Algarve, Faculty of Economics, Research Centre for Spatial and Organizational Dynamics, Faro, Portugal. (jmendes@ualg.pt)

similar characteristics, however, such as Spain, Tunisia and Greece, and there has thus been a growing consensus among regional stakeholders that a more wide-ranging set of tourist products is necessary, especially products that take advantage of the inland region. In addition to its beaches, the Algarve actually has a vast interior area that could provide exciting and rich experiences for tourists (Agapito *et al.*, 2015). Individuals who want to explore natural resources or undertake nature-based activities, can go horseback riding, fishing, on safari, on nature walks and enjoy agricultural experiences. Local tourism authorities believe that there is a section of tourists who are more environmentally aware and who want to visit the inland areas, searching for nature-based experiences.

Using data from a survey conducted during the low season of 2010 in the Algarve, this study aims to determine the extent to which this premise is a reality or, instead, whether it is a myth. It also endeavored to provide a better understanding of the relevance of nature-based activities to the tourist experience in the region. Within this scope, four specific objectives are pursued. Firstly, the study intended to investigate whether tourists traveling to the Algarve visit the inland areas and, if that were the case, whether they were interested in alternative experiences to those associated with *sun and beach*. Secondly, the types of nature-based activities that strongly interest these tourists will be identified. The third specific objective is to assess whether a visit to the inland areas is associated with more satisfaction and willingness to revisit the area, as well as recommendations of the Algarve region. Finally, the study aims to understand the extent to which nature and the countryside are important motivators for visiting the Algarve in comparison to other possible regions, especially among tourists who visit the inland areas.

The fact that the main motivator to visit destinations has for decades been identified as a *sun and beach*, in the case of the Algarve) does not mean that tourists restrict their activities to a single area and only engage with what is offered in that area. If, on the contrary, the needs and expectations of "new" tourists are really changing and becoming more comprehensive, tourist destination planners should be aware of this new reality when they promote and manage their destination.

2. LITERATURE REVIEW

2.1 Nature-based Tourism

According to Williams and Buswell (2003), tourism involves three components: travel, accommodation and participation in activities at the destination. Activities such as hiking, nature photography, safaris or fishing are tourist activities that take place in a natural environment.

The erosion caused by traditional mass tourism has contributed to the growth of specific forms of tourism, most of which are more environmentally friendly (Eadington & Smith, 1992). The lack of innovation in traditional mass tourism destinations has also resulted in less attractive tourist products that have not adapted to the new requirements/desires of contemporary tourists. According to Akama and Kieti (2003: 73), "*postmodern social and economic changes, especially in the developed countries in the north, have enhanced the value of natural areas and the promotion of nature-based tourism and recreational activities.*" In this context, nature-based tourism activities have registered growth rates ranging from 10% to 12% per year (Higgins, 1996; McKercher, 1996; Neto, 2003; Ties, 2007). Auesriwong, Nilnoppakun and Parawech (2015: 778) note that "*community-based ecotourism is also recognized as one of the alternative tourism forms that has been introduced to gain stakeholders' participation, especially local's participation, in sustainable tourism development.*"

There has been no clear and consensual definition of nature-based tourism in the literature (Khan & Su, 2003; Cobbinah, 2015; Lenao & Basupi, 2016). Initially defined as travel to undisturbed areas that required respectful consideration of nature (Boo, 1990), nowadays it includes other areas that can be affected by these kinds of activities, including the environment, society, economy (Swarbrooke, 1999) and culture (Figgis, 1993) of the region. According to Wilson (1992: 23), nature-based tourism is a *"temporary migration of people to what they understand to be a different and usually more 'pure' environment."* As Tangeland and Aas (2011: 822) have pointed out, these include *"tourism products that are based upon activities that take place in a natural environment."* Many of the activities connected with nature-based tourism can be enjoyed free of charge and include tourism products like trekking, hiking, rafting, climbing, nature photography, wildlife safaris and camping. Tangeland *et al.* (2013: 364), in turn, considered nature-based tourism a *"specific type of rural tourism."* Other researchers have used synonymous terms, such as ecological, sustainable, green, alternative, responsible or mountain tourism. From a different perspective, Deng and Li (2015) try to depart from this debate around the concept and propose that *"tourists' own self-interpretations of ecotourism and self-identification of ecotourists may be a more meaningful and practical way forward"* (Deng & Li, 2015: 255).

Independently of the adapted definition, ecotourism is increasingly perceived as a way to achieve sustainable development, promote local livelihoods, environmental and cultural conservation (Dimitrov, 2013; Tran & Walter, 2014). The increasing number of visitors who have been interested in this form of tourism, however, has contributed to diversifying the forms of nature-based activities (Urry, 1990; Poon, 1993). This phenomenon has led to increasing concern about the negative impacts of tourism on some especially fragile environments (Buckley, 2007). As Lindberg and Hawkins (1993) note, it is vital to achieve a balanced use of natural resources in order to ensure their conservation and, at the same time, the well-being of local residents. Filion, Foley and Jacquemot (1994) emphasized that this kind of tourism requires responsible behaviour from visitors, who must be environmentally conscious.

2.2 General environmental awareness

The problems raised by modern society about our natural environment are well known, with ozone depletion, acid rain and deforestation being only a few examples. More widespread concern about environmental issues has developed as the breadth of general ecological problems has been increasingly brought to the public's attention. Diverse measurement instruments have been proposed to evaluate general environmental awareness (Maloney & Ward, 1973; Maloney, Ward & Braucht, 1975; Weigel & Weigel, 1978). As Stern *et al.* (1995) noted, the New Environmental Paradigm (NEP) Scale (Dunlap & Van Liere, 1978) is the most extensively used scale. The NEP Scale *"measures a constellation of attitudes that represent the respondents' adherence to a worldview of the relationship between humanity and the environment"* (Vining & Ebreo, 1992: 1582). The NEP arose in opposition to the Dominant Social Paradigm (DSP) (Dunlap & Van Liere, 1978), which highlighted progress and growth instead. The NEP scale was first proposed as a unidimensional measure with 12 items, but additional research has shown that it is a multidimensional concept (Noe & Snow, 1990; Shetzer, Stackman & Moore, 1991; Albrecht, 1997). Consequently, subsets of NEP items were considered in some studies as measures of three different dimensions: balance of nature, limits of growth and humanity over nature (Vining & Ebreo, 1992; Albrecht, 1997; Valle, Reis, Menezes & Rebelo, 2004; Valle, Rebelo, Reis & Menezes, 2005). Other studies obtain different dimensions. Lundmark (2007), for example, found five central dimensions: human domination over nature; human exemptionalism; balance of nature; the risk of an eco-crisis

and, finally, limits to growth. In a recent study that applied the NEP scale to surf tourists in the Algarve, Frank, Pintassilgo and Pinto (2015) obtained a bi-dimensional solution, the ecological view versus the anthropocentric view, and showed that, globally, this segment of tourists reported a very strong ecological view (albeit with some anthropocentric elements).

In the tourism literature, Dolnicar, Crouch and Long (2008) have provided a good review of the characteristics of environmentally friendly tourists and concluded that most studies in this field are focused on the ecotourism sector, and have ignored the results of environmental behaviour from other research areas, such as psychology. In a more recent study, Dolnicar (2010) suggested that both socio-demographic and psychological factors are predictors of pro-environmental behaviour. In particular, this study showed that income and moral obligation affect the environmentally friendly behaviour of tourists on vacation. In another recent study, Mehmetoglu (2010) showed that, in a holiday setting, environmentally friendly behaviour was associated with the following characteristics: gender (female), household income, political orientation (liberal), environmental concern and personal environmental norms. Conversely, fun and excitement values negatively affected pro-environmental behaviour. The studies that we reviewed regarding the environmental awareness of tourists did not reveal the extent to which these and other factors affected their search for nature-based tourism activities.

3. METHODS

3.1 Setting

Located in the south of Portugal, the Algarve is the most important Portuguese destination for tourists, and is well known for its sunny climate and sea. As a result, this region's economy has become strongly dependent on the tourism industry. Although the climate conditions and beaches are the main reasons for visiting the region, the Algarve also offers interesting attributes that appeal to tourists: historical, cultural and architectural heritage; gastronomic attractions and natural and rural landscapes (Valle, Silva, Mendes & Guerreiro, 2006; Valle, Guerreiro & Mendes, 2010; Mendes *et al.*, 2011; Agapito *et al.*, 2015).

The Algarve has recently started to invest in a diversified set of products that is seen as strategically important for reducing problems of seasonality, and enabling accommodation units to maintain a reasonable occupancy rate throughout the year. Complementary products include golf, nautical tourism (which would take advantage of the marinas and port facilities), international conferences, culture-oriented tourism, health tourism and nature-based tourism (PENT, 2013). Authorities believe that this strategic diversification could potentially attract more tourists and/or encourage an increase in the average length of stay and daily expenditure (PENT, 2013). These issues bring challenges for destination management organizations (DMO) that need to understand tourist receptiveness to new products and offer. While previous studies have provided some insights into the importance of cultural offerings in this type of destination (Valle *et al.*, 2011), the remaining possible products, including nature-based tourism, have rarely been studied. This study is thus a first attempt to comprehend the extent to which the type of tourist who visits the inland of the region really has a specific profile (motivations to visit the region, preferences regarding tourism experiences and degree of environment awareness), different from the typical "seaside" tourist.

3.2 Questionnaire and data

The data for this study came from 384 questionnaires that were given to foreign tourists who visited the Algarve region during the winter months in 2010. The sample size was determined based on the most conservative estimate of the sample proportion ($p = 0.5$), a 95% level of confidence and a maximum sampling error of 5% (Vicente & Reis, 1996). Two interviewers used the questionnaire with tourists leaving the region at Faro International Airport, as they were waiting to depart. The interviewers were suitably identified and the study's purposes were explained to the respondents. Data was collected using a systematic sampling procedure.

The questionnaire included four sections of interest for this study. Section I aimed to identify the motivations of tourists in visiting the Algarve; Section II sought to understand their environmental awareness using the NEP, which is composed of 15 items (Dunlap & Van Liere, 1978); Section III investigated the activities in which the tourists took part during their stay, and Section IV included questions about their socio-demographic characteristics (gender, age, nationality, marital status, educational qualifications and employment situation).

3.3 Data analysis methods

Data analysis included a preliminary descriptive analysis of the questions that were relevant to the specific objectives of this study, in particular those that outlined the profile of the respondents and described their visit to the Algarve. An exploratory factorial analysis (EFA) was applied to the items that measured their environmental awareness, to reduce the dimensionality of the original dataset (15 items). To assess the reliability of the identified factors, Cronbach's alpha coefficients were calculated.

4. RESULTS AND DISCUSSION

4.1 Overall sample profile

The sample comprised the following socio-demographic characteristics: 54% were women and 46% were men. Ages ranged from 16 to 82 years, with the majority of respondents (61%) from 45 to 60 years old or older. The average age was 48 years, with a standard deviation of 17. The median age was 50 years and the mode was 65 years. Seventy percent of the 384 tourists who were interviewed were from the UK, and 9% were from Germany, which was the second most represented country. In terms of professional status, 49% were still working, and 21% were retired. The marital status data showed that 66% were married, 26% were single and 7% were divorced. Most participants had a higher education degree (57%) and 40% had a secondary education degree.

Results about their tourist experience in the Algarve showed that 77% of the respondents had visited the region previously and only 23% was visiting the Algarve for the first time. The types of accommodation that they chose consisted of apartments (38%), hotels (21%) and their own properties (19%). Rural tourism was the least popular reason for the trip (selected by only 1% of respondents). The internet (41%) and travel agencies (17%) were the most common accommodation booking methods. Most respondents stayed at the destination for a week (54%), with an average stay of 12 days (standard deviation: 8 days). The median and mode were 7 days. In terms of the transportation methods used within the region, 31% of respondents rented a car, 20% preferred to use the bus and 20% had their own car. The train was used by only 7% of respondents.

4.2 Visit to the Algarve

Most tourists stayed in coastal municipalities (63%), with Albufeira, Loulé and Portimão together hosting 40% of respondents. All respondents had visited the coastal area of the Algarve, and 68% had visited the inland region, with the most visited places located in the municipalities of Monchique, Silves and Loulé (Figure 1).

Figure 1. Areas Visited in the Inland of the Region

Source: Own elaboration

Among the tourists who had visited the region for the first time (38.8%), only 13.1% travelled inland. This implies that, among the tourists who had visited the region one year ago (76.8%), 86.9% searched for experiences other than the Algarve's *sun and beach* product. Table 1 shows the activities in which the tourists who visited the inland of the region (referred to as "inland tourists") and those in which the tourists who only visited seaside areas (referred to as "seaside tourists") participated. The most common activities were "nature walks" and "gastronomic experiences," with these activities characterizing "inland tourists" more than "seaside tourists." These two groups of tourists also engaged in "walking tours," "fishing" and "bike riding." Such results conform with previous research which has shown that activities and resources that could potentially become tourism products in the Algarve inland should also be considered as complementary tourism products in coastal areas since "seaside tourists" also search for a more diversified experience (Valle *et al.*, 2011).

Table 1. Participation in Activities in the Algarve Region
(Inland Tourists versus Seaside Tourists)

Activities	Inland tourists	Seaside tourists
Horseback riding	1.9%	2.5%
Fishing	11.9%	5.0%
Safaris	2.7%	0.8%
Hunting	2.3%	3.3%
Nature walks	46.4%	36.7%
Golf	18.4%	17.5%
Gastronomic experiences	45.2%	22.5%
Agricultural activities	3.1%	1.7%
Walking tours	15.3%	10.8%
Bike riding	10.0%	8.3%
Other	18.4%	10.0%

Source: Own elaboration

While there were no statistically significant relationships between overall satisfaction with the tourism experience and visits to specific locations within the Algarve inland (independence tests: $p > 0.05$), recommendations to visit the region and repeated visits had statistically significant relationships with visiting the inland region (independence tests: $p = 0.003$ and $p = 0.000$, respectively). The greatest intentions to recommend visits to the region were expressed by visitors to inland Algarve (88.8%). The percentage was slightly lower among tourists who were in coastal areas (76.7%). A large proportion (86.4%) of tourists who visited the inland were favorable to the idea of repeating their visit. This intention was not equally present among those who stayed in coastal areas (70%).

4.3 Motivations

Overall, eight motivations for tourists to visit the Algarve region were assessed using a 5-point Likert scale: 1 – Not at all important, 2 – Not very important, 3 – Indifferent, 4 – Important and 5 – Very important. The results showed that the most important reasons for selecting the Algarve as a tourism destination were *sun and beach*, nature and rural landscape (Table 2). These reasons scored the highest in the categories *important* and *very important* (86.8% and 77.7%, respectively). Other important motives for visiting the region were to visit towns and monuments (59.4%) and to have gastronomic experiences (56.5%). Sports events and activities, as well as health and beauty related activities, were the least considered motivations (27.4% and 24.3%, respectively).

Table 2. Motivations to Visit the Algarve
(Distribution by Responses on the Likert Scale)

Motivations	(1)+(2)	(3)	(4)	(5)	(4)+(5)	Total	Mode
Nature and countryside	7.1%	15.2%	49.9%	27.8%	77.7%	100%	4
Sun and beach	6.0%	7.1%	47.5%	39.3%	86.8%	100%	4
Cities, towns and monuments	12.9%	27.8%	45.1%	14.3%	59.4%	100%	4
To visit family and friends	43.8%	17.4%	18.3%	20.5%	38.8%	100%	1
Sports events and sports activities	48.0%	24.6%	16.9%	10.5%	27.4%	100%	1
Gastronomy	19.7%	23.9%	41.7%	14.8%	56.5%	100%	4
Health and beauty	46.6%	29.1%	21.5%	2.8%	24.3%	100%	3
Learn Portuguese	37.6%	27.5%	24.8%	10.1%	34.9%	100%	3

(1) = Not at all important; (2) = Not very important; (3) = Indifferent; (4) = Important; (5) = Very important

Source: Own elaboration

Table 3 further compares the motivations of tourists who visited inland Algarve with those who only visited the seaside. The table presents responses using the sum of Categories 4 (important) and 5 (very important). The findings clearly show that "inland tourists" valued nature and countryside more than "seaside tourists" (88.8% versus 82.6%), however, with the exception of "health and beauty," the former group rated all motives strongly.

Table 3. Motivations to Visit the Algarve
(Inland Tourists versus Seaside Tourists)

Motivations	Overall sample	Inland tourists	Seaside tourists
Nature and countryside	77.7%	84.0%	63.3%
Sun and beach	86.8%	88.8%	82.6%
Cities, towns and monuments	59.4%	64.8%	48.1%
To visit family and friends	38.8%	41.4%	32.7%
Sport events and sport activities	27.4%	27.9%	26.5%
Gastronomy	56.5%	62.7%	41.6%
Health and beauty	24.3%	23.3%	27.0%
Learn Portuguese	34.9%	42.0%	18.8%

Source: Own elaboration

4.4 Environmental awareness

The following five-point Likert scale was used to measure environmental awareness: 1 – strongly disagree, 2 – disagree, 3 – indifferent, 4 – agree and 5 – strongly agree. For the purposes of data reduction, EFA was applied to the 15 items used to measure general environmental awareness. The use of this method provided four new dimensions (factors) that best represented the initial item, together accounting for 56% of the total variance. Both the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity indicated that the data was suitable for an EFA (KMO = 0.778; Bartlett test: p = 0.000). All items loaded reasonably strongly on one factor and the Cronbach's alphas reported acceptable values, as summarized in Table 4. Taking into account the meaning of the corresponding items with higher loadings, factors were labelled *Human over Nature*, *Limits of Nature*, *Balance of Nature* and *Need for a Lifestyle Change*. These results are somewhat consistent with previous findings on general environmental awareness. Table 4 shows the results from the EFA and some descriptive statistics, including the percentage of responses in the response categories "agree" plus "strongly agree" (within the overall sample, among "inland tourists" only and among "seaside tourists" only), the mode and the median for each item (the numbers in parentheses).

Factor 1 was labelled *Human over Nature* because it included items related to the legitimacy of human dominion over nature. High values for this factor would suggest that tourists expressed beliefs that humankind has the right to modify the natural environment and to rule over the rest of nature. Overall, agreement with the items included in this factor was low, ranging from 21.2% (in items 2 and 5) to 45.8% (in item 4). The last two columns of Table 3 show that "inland tourists" reported lower levels of agreement with this factor than "seaside tourists" (30.4% versus 37.5%), meaning the former group possessed a more environmentally friendly attitude regarding this dimension.

Factor 2, *Limits of Nature*, included items expressing the idea that the exploration of environmental resources has limits that, once surpassed, can produce catastrophic consequences. Overall, tourists demonstrated high levels of agreement with the items included in this factor, ranging from 66.2% (in item 9) to 78.1% (in item 8). "Inland tourists" expressed higher levels of agreement with this factor than "seaside tourists" (77.5% versus 64.2%), which implies that the former had a more positive environmental attitude concerning this dimension.

Factor 3 was the *Balance of Nature*, and included items that indicated the fragility of the balance of nature. This factor had the highest consistency among responses; the overall

sample reported high levels of agreement with all items, ranging from 76.1% (in item 12) to 84.0% (in item 10). As in the previous factor, "inland tourists" expressed higher levels of agreement on this factor than "seaside tourists" (83.6% versus 75.0%), which suggests that the former had a more environmentally friendly attitude based on this dimension.

Finally, Factor 4 was *Need for a Lifestyle Change* because it included items that reflected the importance of considering the capacity of the planet in terms of available space and resources. In this factor, items 13 and 15 had lower levels of agreement than those included in factors 2 and 3 but still indicated an environmentally friendly attitude, which was reinforced by the high level of agreement in item 14. As in factors 2 and 3, "inland tourists" exhibited higher levels of agreement with this factor than "seaside tourists" (63.7% versus 57.0%), which shows that the former were more environmentally aware in this dimension.

Table 4. Environmental Awareness Items, *Loadings* **from EFA and Descriptive Statistics**

Items and Factors	Loadings	Overall sample	Inland tourists	Seaside tourists
Man over nature (alpha = 0.746)		32.7%	30.4%	37.5%
1.Humans will eventually learn enough about how nature works to be able to control it	0.714	45.1% (4/3)	44.7%	45.0%
2.Humans were meant to rule over the rest of nature	0.663	21.2% (2/2)	16.4%	31.9%
3.Humans have the right to modify the natural environment to suit their needs	0.663	33.5% (2/2)	31.0%	38.4%
4.Human ingenuity will insure that we do not make the earth unlivable	0.660	45.8% (4/3)	48.2%	40.9%
5.The balance of nature is strong enough to cope with the impacts of modern industrial nations	0.630	21.2% (2/2)	17.3%	29.7%
6.The so-called "ecological crisis" facing humankind has been greatly exaggerated	0.576	29.6% (2/3)	24.9%	39.3%
Limits of nature (alpha = 0.653)		73.6%	77.5%	64.2%
7.When humans interfere with nature, it often produces disastrous consequences	0.704	76.6% (4/4)	80.1%	67.9%
8.Humans are severely abusing the environment	0.676	78.1% (4/4)	83.4%	65.5%
9.If things continue on their present course, we will soon experience a major ecological catastrophe	0.584	66.2% (4/4)	69.0%	59.3%
Balance of nature (alpha = 0.673)		81.0%	83.6%	75.0%
10.Plants and animals have as much right as humans to exist	0.769	84.0% (4/4)	86.1%	78.9%
11.Despite our special abilities, humans are still subject to the laws of nature	0.687	82.8% (4/4)	86.5%	74.5%
12.The balance of nature is very delicate and easily upset	0.590	76.1% (4/4)	78.2%	71.7%
Need of a lifestyle change (alpha = 0.727)		61.8%	63.7%	57.0%
13.The earth is like a spaceship with very limited room and resources	0.722	61.4% (4/4)	63.1%	55.4%
14.The earth has plenty of natural resources if we just learn how to develop them	-0.580	79.9% (4/4)	81.4%	77.0%
15.We are approaching the limit of the number of people the earth can support	0.564	44.1% (4/3)	46.7%	38.5%

Source: Own elaboration

5. CONCLUSION AND RESEARCH IMPLICATIONS

In contrast to the belief that the *sun and beach* product is the main motivator for tourists to visit the Algarve, the present study showed that natural and rural landscapes, gastronomy, cities,

towns and monuments are also important attractions (78%, 57% and 60%, respectively). The results also showed a stronger valorization of nature and countryside among "inland tourists" compared to "seaside tourists." Another relevant point was that nature-based walks and gastronomy-related experiences were considered favorite activities for tourists visiting inland Algarve. Also of note was that intentions to recommend the region to others and to revisit the region had a statistically significant positive relationship with visiting the inland.

These results support a new reality that must be acknowledged in order to meet the needs of new market segments that have not, so far, been considered in the DMO's communication strategies. A concluding remark on the promotion of this destination is thus warranted. In particular, this study has implications in terms of the design, development and promotion of new products to the region of Algarve. In effect, the study's findings suggest that it would not be sustainable to promote the destination exclusively with a focus on the *sun and beach* product. More than ever, it is necessary that the DMOs endorse an integrated management of new products with existing ones, in order to effectively meet the expectations of new tourists. It is thus necessary to reposition the strategy for the Algarve by differentiating it from the competition based on an integrated offer of sun and beach, nature, culture and gastronomy. As in many other times and circumstances, substantive decisions on this issue are necessary, taking advantage of all the opportunities offered by the market, and intending to plan the future of the Algarve as a destination with vision, wisdom and good sense.

Another important finding from this study was that tourists visiting the Algarve reported a strong environmental awareness, as demonstrated by their recognition of the balance and limits of nature and the importance of considering these environmental limits. Tourists recognized that there are limits to the supremacy of humans over nature. Another important finding was that the sense of responsibility to the environment was stronger among "inland tourists" than "seaside tourists." In other words, tourists who sought the interior of this region adhered more strongly to the values and beliefs represented on the NEP scale. It could be assumed that these tourists were also more aware of the problems of nature and the need for its conservation, or even the need to practice more environmentally and culturally sustainable forms of tourism. This is an important finding since it shows that nature-based tourism in the Algarve is not a myth, but is, instead, a type of tourism that should receive more attention from the individuals who are responsible for managing and promoting the destination. This information is particularly important when providing the necessary input for the development of strategies to reposition the destination, either in terms of new product proposals, or of more effective communication with target audiences (current and potential).

Finally, some future research topics emerge from this study's findings. Firstly, it is important to understand the functioning and the dynamics of regional and local partnerships. This would facilitate the design and implementation of programs and strategies in tourist destinations, allowing the promotion of new tourist products, integrated with the more traditional ones. The issue of positioning and repositioning the anchor tourist products in destinations also deserves more research attention. Finally, a deeper understanding of nature-based tourists is required, including their demand patterns, competing destinations, source markets, socio-economic characteristics and motivations to choose this type of destination.

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Authors

Alfonso Vargas-Sánchez

Angelo Presenza

Carolina Rebollo

Daniele Adelaide Brandão de Oliveira

Estrella Gualda

Eugénia Maria Dores Maia Ferreira

Israel V. Guarda

Júlio Mendes

Manuela Guerreiro

Maria Concetta Perfetto

Maria José Baltazar dos Reis de Pinto Gouveia

Maria Rosália Guerreiro

Patrícia Pinto

Rômulo Alves Soares

Silvia Fernandes

Sílvia Maria Dias Pedro Rebouças

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