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**A Life experiment of development Mountain tourism in Portugal observed from the point of view of theories of Complexity, Complication and Self-organization**

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Abstract. This paper is an attempt to use the ideas of deepening complexity and self organization theory to a life experiment in developing tourism in a Portuguese mountain region da Estrela.

*JEL Classification:* C93 – Field Experiment; O17 – Institutional Arrangements; O33 - Diffusion Processes ; R11 - Regional Economic Activity; Z13 - Social Networks

**Keywords:** innovation diffusion; complexity; alternative choice; social innovation; learning process; tourism; portugal

## Motivation

The strategic plan to develop tourism in Serra da Estrela mountain region – Portugal – was written as a technical report along four different phases (2004, February to 2006, March).

The 1<sup>st</sup> phase – from 2004, February to September – was the time needed to build a consortium among 10 municipalities in order to apply for funds provided by the decentralized administrative entity in charge of different studies (AIBT-SE), which demanded it to the University of Beira Interior. Dr. P.G. Carvalho chose the working team which he also coordinated.

The 2<sup>nd</sup> phase – 2004, September to 2005, March – was the time needed to gather secondary data and train an undergraduate students group to apply some inquiries and do the first field research with regional residents and incoming tourists (winter season inquiry).

The 3<sup>rd</sup> phase – 2005, March to December - was the time spent to study the problems, repeat the inquiries (summer season) and listening to all the identified stakeholders, opening the debate in announced workshops and seminars to structure the problems apparently diagnosed with in previous phases.

The 4<sup>th</sup> phase – 2006, January to March - was the time to organize the meetings with the 10 mayors, presenting the main diagnosis and discuss possible strategies and desirable policy instruments with them; meanwhile, recent public legislation was published on strategy for the whole country; we also felt it was necessary to meet the main public entities, which would be implicated in that plan implementation.

The relevant legislation included a national strategic plan for tourism (PENT) and the new strategic framework for the EU funding program of 2007-2013 (QREN) published in 2006, January and March respectively. That was a troubled time because mayors

were (naturally) trying to find how they would act in order to take big advantages from EU funding and pushing our team to link the plan results to that.

Furthermore, 2006, March 31<sup>st</sup> was the plan deadline, which placed the presentation upon brand new legislation and required a deeper reflection on the work we developed along those 2 years.

Summing up, though interested in developing a good job we knew we were going to face very tricky problems, due to the higher complexity of the situation: first of all, the main problem concerned the design of a regional development policy for a complex activity (tourism); secondly, the plan would be implemented by a number of players with very different interests; thirdly, the economic activity itself involves dissimilar interests (residents and tourists) and will affect different territories (mountain and surroundings) that will be interconnected in time and space; fourthly, it would be necessary to innovate proposals, able to differentiate the region next to other established tourism destinies (*e.g.* ‘sun and sea’); finally, the political context was going through a huge change, with new elected national government applying strong budget constraints to meet the EU deficit goals (<3 per cent of GDP).

Conventional methodological approaches are not capable to deal with these intricate types of problems. It is not just a quantitative, qualitative or mixed research; we had to deal with the actual major human problem in decision making within a collective complex socioeconomic context, where everyone has different interests and act to maximize her own benefits without acknowledging other’s interests.

The paper is structured as follows: we begin with a review of the main characteristics of tourism development activity and then consider in more detail the specific regional context it is going to be approached; the second and largest section, addresses the basic elements of complexity and complication theory of innovation diffusion in a

phenomenological approach, exploring the emergent properties, illustrating some of the most recent work in innovation diffusion analysis, which suggested some of the present behaviours during the experiment; the third section is devoted to define and give the basic background of the superposition principle; and finally the paper closes with some concluding remarks advocating the main track and references for future research.

### **Tourism as a special complex activity**

Tourism is special because it concerns people relationships within a different cultural background framework. There is one host community and several players coming from different parts of the same country or moreover, from foreign countries, speaking different languages, belonging to different cultures, sharing dissimilar values and belonging to distinct income cohorts.

The host community aims to make them staying longer and spending more; all the community (should) represent the supply side of its whole tourism market. However, host resident's need both to compete with other national and foreign tourism destinies and to cooperate inside the region if they want to build a nice and pleasant environment, able to attract foreign people.

Tourists represent the demand side of the market and will have to decide in which region they intend to sleep more nights and where they are going to spend their available income.

The key for tourism in a region is to have a set of attractive factors (at least one) able to build such an environment that can pull different market segments.

Usually, the supply side of tourism markets is not organized according to these considerations and each supply agent limit her decisions to short run goals, trying to take advantage from the (exogenous) presence of people coming from abroad.

Therefore, the basic question for tourism planning would be to build an enjoyable business environment where people have to learn how to succeed together in a sustainable pathway, focused on long run effects through their collective action. Furthermore, tourism impacts will spread in the whole region and its surroundings, which compel responsible institutions – private and public - to acknowledge the crucial role played by neighbour and networking effects, dependent on the decisions they take.

Tourism is also special due to measurement difficulties.

According to WTO (2001), tourism is one of the strongest economic activities in the world, involving around 650 million people, representing over 462 billion \$US dollars business and with a 3% annual increase rate. *“In years when world economic growth exceeds 4%, the growth of tourism volume tends to be higher. When GDP falls below 2%, tourism growth tends to be even lower...tourism grew on average 1.3 times faster than GDP, the period 1975-2000 tourism increased at an average rate of 4.6 % a year”* UNWTO (2006).

International reports still state that *“Tourism will soon be Europe’s largest service industry. Europe is already the world’s favourite destination, with the sector generating up to 12% of GDP, 6% of employment and 30% of external trade. Tourism demand is forecast to grow by almost 50% by 2010, adding some 2-3 million more jobs to the 9 million it currently supports”* European (2005).

However, as stated in the above UNWTO quotation, if lagged regions found its economy upon tourism itself, they will be dangerously dependent on worldwide growth, mainly during the recession cycles. As a consequence, countries and regions should look at tourist destinies as a complementary composite product, enabling regional and urban development, but requiring efficient differentiation strategies.

Mayor candidates are very sensible to tourism activity because it can give them soaring external and internal prestige once people do appreciate the infrastructure and beauty of the places they visit; in doing so, they can be easily considered potential and precious possible innovators/entrepreneurs, namely in small and lagged regions, where competition in tradable goods markets is fiercer.

Yet, tourism research has to deal with some unsolved problems; at some extent, data from Statistical Institutes and National Accounting Systems measure tourism activity just through two branches: accommodation and restaurant services or number of hotel night sleeping and served meals in restaurants I.N.E. (2005). However, tourism is much more than this: *“The visitor is recognized as the basic unit which undertakes a tourism activity. This activity occurs mainly during trips, but it might also have effects before and after (purchases before and after a trip”* often done in the tourist residence area WTO (2001).

Another intricate problem is the high likelihood that tourist local expenses will easily leak to more developed regions due to the lower economic diversification in destiny places (Gollub *et al.*, 2003). Hence, one need to approach tourism strategies in lagged regions as a cluster activity requiring excellence in networking and complementarily planning among local/regional stakeholders.

Serra da Estrela mountain is attractive because it snows during 2-3 months, unlike any other places in the country; nature is gorgeous, environment is still reasonably protected, it is the source of three Portuguese rivers and built with marvellous landscapes. Demand recognize it as an excellent calm place that should be protected.<sup>1</sup>

We reached a time where we had to ask ourselves how to solve the conflict between the Natural Park manager and the mayors that wanted to allow private promoters to build

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<sup>1</sup> Thirty years ago, the Portuguese government created the Natural Park of Serra da Estrela, which is the victim of expansionist developers that want to build up into the hills. Nevertheless, tourist answers in both phase 1 and 3 of the project still perceive its quality and overwhelming sense of experienced pleasure.

within the Park area, namely a monopoly firm owning the right to exploit mountain activities above the eight hundred meters.

This was actually one of the main questions discussed and not solved among stakeholders: those defending nature and environment protection as the real asset of the entire region, and others that wanted to promote buildings, casinos, new mountain 'villages', resembling what big tourism resorts do around the world.

If stakeholders want to transform the region in a valuable tourism asset, those were the questions one should carry to discuss and learn about for decision making.

We tried to make them understand, through the work in the first 2 phases, that the region has a potential for tourism, but it had not a strong economic diversity; anyway we also tried to show them we could have a key to build the strengths we needed.

First we built the resource's list of the region:

- A Natural Park to protect and preserve the major part of the area, guaranteeing its sustainability attributes;
- A public entity to promote and do the marketing of regional tourism;
- A concessionary firm owning some sport facilities to develop leisure and mountain activities;
- A decentralized public entity to provide EU funds supporting studies and regional development especially through tourism activities;
- Mayors interested in local socioeconomic development;
- Local and Regional Development private associations;
- Firm Associations developing projects in human resources training, auditing and retailing activities;
- Technological centres for research, innovation and industrial parks;
- Agriculture and handicraft cooperatives;



- University and other 3-4 Colleges;
- A number of relevant dynamic high schools with relevant projects on entrepreneurship learning.

Besides that the region also had:

- Population that still resists to successive migration periods and still value the region maintaining links to several emigrant communities around the world;
- A unique mountain, the most well-known in the country and attractive both in winter time and other seasons;
- Two recent highways connecting north to south and east to west of the country, linked to the international transportation network coming from the most busy cross-boarder with Spain (80 per cent of the automobile traffic) and two and a half to three hours distant from Lisbon, Porto and Madrid;
- A huge cultural and traditional culture connected with textile industry, Sheppard activity, cheese production, castles, main land of Brazil discover and Jew villages all over the region;
- Source of three main Portuguese rivers and land for aquatic activities;
- Heritage of 2 glacial valleys, unique in Europe and rare in the world; and so forth...

With such a rich diagnosis and an urgent need to develop, how could we explain that any common idea came out to develop the tourism? How could we stay put and do not converge to a collective action?

The historical and scientific answer could just be driven by the dominance of the worst that lagged regions usually produce in humankind: aversion to risk, dependence on

political parties, protectionism accommodation, inability to organize activities due to cultural reasons, fear to have creative attitudes, and so on.

These were our main findings after studying the region, listening to several groups of people and interviewing distinguished individualities (past and present).

The team felt it should dream and help agents to build a vision for the future, thinking about tourism in a global and sustainable way, freeing people to think about themselves, their future and their self esteem; then, they would be able to build a collective future. Unlikely, they should resign and submit to the major dominance forces and follow old-fashioned leaderships. That was a question of survival they should decide upon.

### **How to build a vision?**

We started discussing with people and all the stakeholders a Vision and define some main goals we needed to achieve. Those goals could be:

**Global Strategic Goal**



**Tourism development sustainability**

**to guarantee Regional development sustainability**

**Sustainability pillars:**

<b>Economic</b>	<b>Social</b>	<b>Environmental</b>
<p><b>Goals/Benefits:</b></p> <ul style="list-style-type: none"> <li>- To increase national and international income entrances;</li> <li>- To provide employment: direct, indirect and inducted;</li> <li>- To push other activity sectors, complementary with tourism</li> </ul> <p><b>Predictable Problems:</b></p> <ul style="list-style-type: none"> <li>- Seasonably</li> <li>- New required infrastructure and specific transport system</li> <li>- Supply diversification, other than snow activities</li> </ul>	<p><b>Goals/Benefits:</b></p> <ul style="list-style-type: none"> <li>- To increase resident's self esteem;</li> <li>- To raise the cultural and informational level about the requirements to build a tourism destiny;</li> <li>- To recover old declining activities, innovating without losing the traditional uniqueness</li> </ul> <p><b>Predictable Problems:</b></p> <ul style="list-style-type: none"> <li>- Cultural shock among residents and tourists;</li> <li>- Seasonable activities; how to fix young people?</li> </ul>	<p><b>Goals/Benefits:</b></p> <ul style="list-style-type: none"> <li>- To finance natural, cultural and social heritage patrimony;</li> <li>- To order territory avoiding to exceed the maximum charge</li> </ul> <p><b>Predictable Problems:</b></p> <ul style="list-style-type: none"> <li>- Higher pollution production;</li> <li>- Ecosystem deterioration and residual spread;</li> <li>- Architectonic Deregulation</li> </ul>

The described goals can play an excellent impact on renewing employment and school programs, because they require qualified workers.

Training them, in the plan context, is educating and raising the general qualifications but, moreover, motivating them to get specific competences to work within the vision plan.

As an example, civil engineers responsible for road infrastructures should specifically know how to build them in a mountain context, carrying about water flows, maintenance costs, usability and durability in all seasons, identifying and knowing how to preserve natural resources, at the same time.

New jobs will be need also, such as cultural guides, with competences in local history, geography, biology, geology, language speaking and so forth; sport monitors and team coaches for groups to explore mountain trails, orientation, safety and 1<sup>st</sup> help 911.

This should be a tremendous project for renewing curricula in the main high schools and even College degrees

### **Basic theoretical elements**

In this section we will follow elements of Complexity and Complication Theory and a phenomenological approach of Innovation Diffusion theory (Abernaty, 1985; Mahajan and Wind, 1986; Rogers, 1962, 1971, 1983, 1995; Sonis, 1983, 1991,1992, 2000,2001), trying to identify how they functioned during our life experiment.

### **Emerging properties**

Between new emerging properties of Complex Tourism Socio - Economic Systems, one being the impossibility to predict within a reasonable expected interval, how different people is going to react and how people decide to reveal (hide) their preferences. In this experiment, one of the mayors thought it would be helpful, as a marketing strategy for its municipality, to apply for UNESCO in order to classify the county as a region with worldwide geological/geographical human heritage. In fact this municipality has a beautiful and large glacial valley. Meanwhile, UNESCO obliged the county to organize a global strategic plan for tourism to prove if tourism could be developed without harming that patrimony; here is the first main reason why the project started.

In between the 1<sup>st</sup> and 3<sup>rd</sup> phases of the work, we noticed that, this same mayor changed his position several times and discovered the reason was he had plenty of social

pressures from people who were expecting to build in the valley and found the severe protection measures UNESCO would oblige as a big obstacle to “development”.

Next emerging property is that, if we use transparent information and relate with the media and some other social elite members so they publish or diffuse a number of ideas about tourism issues, people will become more attracted and feel like something is fortunately changing. It is the property or Notion of Self Organization in complex dynamics. In between our public meetings or workshops, the team developed an internet *blog* about the project where more than two hundred messages were received, with a number of interesting comments, ideas and opinions about the most complicated questions<sup>2</sup>. There were people that, finally, became organized in a private association to defend and preserve nature and environment, querying the mayors and other public institutions, reproving some of their attitudes, planting new trees where hot summer fires had burned them. The team also proposed a kind of contest to high schools teachers and students to work and present some posters about the richness of the mountain and the surrounding area.

### **Self-organization**

We could say that Innovation Diffusion Dynamics is a basic element for self-organization in space and time. The team acknowledged from the very beginning that we had to have the media, the social and cultural elites and the main interested agents on our side, in order to start the process of pushing for innovative behaviours that would be able to break the ice and the traditional inactive attitudes due to several years of poor leaderships. At the same time, we also acknowledge that mayors would be decisive in order to get the final study conclusions to be implemented; and here, we knew they

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<sup>2</sup> More recently, new *webblogs* were built, developing new ideas for sustaining the native assets and providing interesting ideas for new tourism products.

played a very important role considering the influence they still have on intermediate and national political decisions. The dynamic created a very interesting story of pressures upon the media to tell certain things, announcing all kind of lies and saying they were fighting for these type of measures a long time ago and had little to learn with academics and Universities that know very little about social and political realities.

Very soon we learned we were acting as the innovator element of the complex social system and several reactions became rather private, slowing the initial enthusiastic adherence to the site (*blog*); others, also privately, told the team members they were a little bit afraid of some authority's reprisals that could affect their business interests. This led us to cease some public comments and to redirect our diffusion process efforts close to the intermediate and national decision levels, looking for some support or, at least, trying to guess if our diffusion strategy fitted the new government policy arrangements. And soon we found the difference between politicians and technicians within public institutions; here we face another special source of complexity.

### **Economic rationality of *Homo Oeconomicus***

Along the time of the project we could identify that the majority of public agents in this kind of regions still act according to the principles of pure economic rationality; these agents *Homo Oeconomicus* feel like omniscient persons because "they have all" the information they need to decide and it's utility function will represent the collective. They act like if they have known a priori, all the possible alternatives and all the factors. Therefore they think they act in belief of the collective (the people). Most of the agents were barely available to listen to the others or even to the team members. Most of them went to the main discussion meetings saying they didn't get any prior information (the team usually sent 2 weeks before an executive summary) or even they said the digital

information had some errors once the technicians couldn't open the disk or files with the main information for the meeting agenda; others didn't receive the team members and sent an entity technician that usually said she was there just to listen and take some notes to give to their chief officer.

But fortunately we also met some different agents, very interested in discussing, learning and teaching (in other words: interacting); mostly they had not very important decision roles or were very dependent on intermediate and superior decision levels. Those were the people used to prepare and study several files, which knew crude reality and are able to understand how less they know about a number of things. They show different behaviour facing problems and have more cooperative attitudes.

### **Societal Socio-Economic rationality of *Homo Socialis***

In a world like this we live nowadays, the speed of informational diffusion is tremendous, and makes people feel more insecure about the future and the decision processes. Everyone has the awareness, even without admitting it, that it is a very small part of these social complex systems. Rationality of *Homo Socialis* is then parsimonious and risk averse, because he doesn't want to spend any type of effort for nothing. Being so, *Homo Socialis* make his individual choice within the collective - a group of persons with common values, common modes of behaviour and common modes of choice - tending to follow the values and decisions of the other members of the group, fearing a process of ostracism and competitive exclusion.

Understanding these two types of behaviour (*Homo Oeconomicus* and *Homo Socialis*) we can easily understand that innovation diffusion processes are basic elements for self organization processes. There are several agents in all the innovative diffusion processes that can either play the role of an innovator or a simple adopter; the first can be

entrepreneurs, opinion leaders, charismatic personalities, stars and superstars, models, passionate, and so forth; the second can really be conservative till the end, or simply renitent to adopt immediately, fearing risk or just social and cultural criticism.

According to time and space where we are working, innovative diffusion processes will then be completely different, dependent on the social structure of the population and on the roles and number of innovators the community has. In the experiment we are writing about, the region has a past experience of interiority and low exposure to competitive behaviours. On one side it was a national protected textile region, based on low salaries and low capital investments in new technologies (mainly after the informatics revolution); on the other side, it was a source of a huge number of emigrants during the 60's. As a consequence one could expect low aversion to risk and to innovative behaviour, because people thought the situation could last for a great number of years more.

### **Characteristics of learning process of *Homo Socialis***

The learning process of *Homo Socialis*, e.g., the construction of his individual choice utility function, can therefore happen in a great variety of forms/types.

The types of learning for the utility function construction could be divided in four main types:

a) Imitation of other's members of the collective choice behaviours, the essential of the choice within uncertain environment (e.g., some mayors joined the starting consortium because they look at others doing it);



- b) Converting each person with partial information, in an expert for the collective (e.g., someone that visited Asian or European mountains can bring relevant information about what he saw there – good and bad);
- c) Learning by using the innovation (e.g. municipalities technicians became more performing the more they use GIS software the team was using);
- d) Learning by spreading the innovation (e.g. whenever we scheduled workshops with tourism agents in the field and tried to convince them about what they should do to innovate and raise mountain service quality, we always learned something new to add for future reflections and research).

Regarding all we have said before, utility function is constructed by a stepwise process, repeating steps, learning and redoing it again and should always be changed with the contact with other “experts”. Utility function will then represent a discrete and highly individual choice but never a global utility function (for the collective). Although representing the collective it will still be individual, which means it will be dependent on the way each one of the members will perceive it.

The big difference between the utility function for the *Homo Oeconomicus* and for the *Homo Socialis* is that the last, does not “know everything” (priori information) and ignores all other’s alternatives of choice. Therefore he needs to construct his own individual utility function and his individualistic set of choice alternatives with the others; deeply interacting, he will stop his learning process when his individual list is closed, excluding all the other alternatives. Then, he will decide.

Within this collective process of choice, innovators will be those agents trying to convert preferable alternatives into the captive alternative; in itself this is an active/asset that can be either positive or negative: positive if it is used to create motivation and a stimulus to organize innovation spread and it can be considered as supplying knowledge about human collective values once motivation includes human values (*s.a.* sustainability, reciprocity, respect, autonomy, self esteem); negative if it is used to manipulate other's viewpoint leading them to the radical and inhuman decisions (*s.a.*, manipulation, opportunistic behaviour, massive destruction, chaos, terrorism, killings, overthrow).

### **The role of the elites of innovators in a self-organizing process**

The coordinators of a project to construct and gather people together in a collective action are considered as the elite, which should have clear objectives organizing the collective for innovation and organizing the spread of the innovative processes where leaders, adopters and so forth will play the adequate roles.

They will not organize the alternatives of choice but they will collect all the useful information to construct the preferable alternative, avoiding the interference of all the personified questions and tittle-tattle intrigues.

In this experiment it was easy to make the first steps but very difficult to end it up well, because political leadership is still strong enough to overcome university elite leadership. But again, if the transparency of the informational process with the main private stakeholders is well conducted, then political power has huge problems to deal with it and a huge amount of new initiatives will emerge from very different sectors in the whole region society. This is happening, fortunately nowadays and we can collect a number of local newspaper contradictions comparing what they published during and

after the plan was delivered. Moreover, after I have been invited as a consultant by the intermediate level of the public administration to supervise the tourism chapter of the new regional plan for the centre territory, the team prestige has socially increased.

### **The Superposition Principle**

The complication means the transfer from complex towards much more complex structures in the evolution of complex systems. The simplification means the clearing place for further complication by exclusion, reconstruction and destruction of less efficient substructures. The theoretical rationale of complication studies includes the study of the spread and partial adoption of new information and partial destruction of deepness of memory that is characterized by a path-dependent process of self-organization within spatial socio-spatial complex systems. The paradigm of complication is pointing out on the deficiency of purely economic considerations of socio-economic systems and stresses the necessity to widen the concept of “Homo Oeconomicus” to the concept of “Homo Socialis”. Such a widening is radical in the study of complex socio-economic and behavioural processes because of the important difference between the economic and socio-economic rationality: the traditional identification of economic rationality of “Homo Oeconomicus” as optimization is complimentary to socio-economic rationality of “Homo Socialis” as parsimony. So the concept of complication stresses the necessity to transfer from optimization by considering the superposition of different optimization tendencies and analysis of concrete (or realizable) states of socio-economic systems.

In this research we comprehend the quintessential role of innovation diffusion as a part of the process of complication of tourist development. Here we should stress that the innovation diffusion is generated by the choice of competitive innovations: the

innovation is the subject of individual choice within the collectives. Properties of innovation diffusion processes include (i) empirical regularities of the choice process – the S-shaped change in the portion of adopters of alternative competitive innovations; (ii) the first principles of parsimonious human behaviour as collective beings, (iii) the Schumpeterian gales of creative destruction and the competitive behaviour of social elites in the mathematical form of variation principles and (iv) the “lock in” captivity phenomenon in the behaviour of social elites. These different approaches reflect the behaviour of actors involved in the innovation diffusion process, spreading the information within society in space-time.

In the process of tourism development we are working with, several objective functions and their action can not be presented in a complete form with the help of Superposition principle. That means that in reality each alternative is realized/represented partially with some weights and this weight will represent the partial materialization of the objective, being  $\sum W_i = 1$ ; therefore the collection of weights represents competition and complementarity of the alternatives. We do not live in a totalitarian society, where someone will choose for all the others.

Self-organization is the process that will fix the weights ( $W_i$ ) in order to know exactly which part will be satisfied, that's to say “to live and give; to live to/with the others”.

The mathematical foundation of Superposition analysis is the Theory of Convex Polyhedra (Minkovski-Caratheodory Theorem on Centre of Gravity of convex polyhedron) and the ideas of Combinatorial Topology in the form of the Atkin hierarchical Q-analysis (see Sonis, 1982).

## **Conclusion**

In this paper we attempt to see the life experiment of mountain tourism development through the lenses of new theories of Complexity, Complication, Innovation Diffusion and Self-organization. Undoubtedly, there are many facets to this consideration, analytical and substantive, which are not addressed here.

Future work could possibly reveal yet richer elements in the universal scheme of complex tourist development.

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