



ORIGINAL ARTICLE

Sustainable Touristic Development in Rural Areas: The Issue of Carrying Capacity, and Systems Theory

Philippos Nicolopoulos

Secretary of the Deanship and All Schools of the Literal Society of "Parnassos" Athens, Former Asst. Prof. of the Faculty of Philosophy at the University of Crete and Former Assoc. Prof. of the University of Indianapolis, Athens Campus

The mass conventional tourism, mainly appeared in coastal areas of southern countries with mild weather and warm summer in the last 50-60 years, had negative impacts on the natural environment and on local cultures. This kind of tourism gave priority to the increase of economic profit of local societies "selling" natural advantages to people who liked summer vacation "relax". On the contrary in the last years, exactly because of the aforementioned negative impacts, there exists a tendency for a sustainable touristic development, connected with the so-called alternative and qualitative tourism. This is another kind of tourism which intends to combine the meeting of the desires of tourists, the reinforcement of local and national economy of countries and the non-degradation of natural and cultural capital of the touristic areas. That's why it began to turn to other activities which are more "qualitative" and to consider the protection of natural environment as an issue of first priority. From this point of view the rural areas, exactly, because many times are more "virgin" and "exciting" compared with the crowded coastal zones are preferable.

In the present article I propose how systems theory and sociocybernetics can contribute to the sustainable development of this kind, based on an "intelligent" control system which applies their principles and their perspective.

Keywords: mass conventional tourism, natural environment, local culture, sustainable touristic development, alternative and qualitative tourism, systems theory, sociocybernetics, "intelligent" control system.

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1. A Small Introduction

When I decided to write this study for the Sustainable Touristic Development and the Carrying Capacity of concrete areas, my concern has to do with the attempt to point out how we can combine touristic development process in rural areas with the protection of their natural, cultural and social capital. I have some experiences from my country, Greece, as I have cooperated as a legal and sociological advisor with some companies which have dealt with touristic investments in rural areas, or I have carried out some empirical sociological research in them (especially in Crete, Corfu and Arcadia) for their local development.

A basic sector of the Greek economy is the tourism. It has been said that tourism is the "heavy industry" of the country, although I do not agree with that characterization. Rural areas are the appropriate ones for touristic investments which focus on touristic activities, beyond coastal zones – only for "summer relaxation", – urban or cosmopolitan areas, for touristic investments in areas in

which there are still “virgin elements” of the natural environment (I do not mean only areas close to the sea, but also mountains). In that environment the tourists can enjoy “something different” compared with the mass conventional tourism of coastal zones. The tourists, bored in the last years by the mass tourism of the summer period (the so-called “sea, sun and sand” tourism) are searching for that “different” and are attracted by investments and activities which are able to offer it. That view is a right one not only for Greece but for any other touristic country of the southern regions, for any country which can develop the touristic section of its economy based on its natural, historical, archaeological and cultural capital.

But on the other hand, always there is the danger for a gradual disaster of the aforementioned capital, if the touristic pressure exceeds some necessary limits. The investment companies, as well the people working in tourism sector, press for more and more economic profit neglecting many times the protection of that capital. For example, in Greece the last decades the increase of pollution in sea waters of coastal zones is a fact. A similar danger (i.e., the degradation of natural ecosystems) may there be even in mountainous areas, if the “touristic waves” become stronger and stronger, without protection measures. There is a serious need for more protection and balance. Balance between economic profit, protection of nature and local culture, and preservation of some traditional elements of the built environment.

It is a great mistake if we let tourism (in the name of increase of national income or in the name of “relaxion” or pleasure in general) be identified absolutely with the limitless pursuit of economic profit. It is a great mistake if we let tourism, in the name of profit, level everything else (from the world of nature, of national and ethnic culture). And with the trend and conditions of globalization actually there exists a danger for exaggerations of the kind.

So in the present article I propose the use of Systems Theory and Sociocybernetics in order to create an efficient plan of Sustainable Touristic Development, a development with balance and without exaggerations against the protection of nature and local culture, a development which takes into account the basic issue of Carrying Capacity of the particular areas, denying to be identified absolutely with the pursuit of economic profit.

2. About the Concept of Sustainable Touristic Development (STD)

The meaning of Sustainable Touristic Development (STD) is not the same with the meaning of the mass conventional tourism, which appeared mainly in coastal areas (mostly of countries with mild weather and warm summer) in the last 50-60 years. The latter gave priority to the increase of the economic profit of local societies, through “selling” natural advantages (sun, sea, warm climate for relaxation) of the coastal areas “and, many times, without specific interest about the proper infrastructures and superstructures or about the efficient protection of natural environment. On the contrary, the former intends to combine the meeting of the desires of tourists, the reinforcement of local and national economy, and the non-degradation of natural, cultural and social capital of the touristic areas. Even more, the former sometimes gives more priority to the protection of natural ecosystem and the preservation of local ethnic and national cultures than to economic aims. The deeper spirit of the former is the same with that of Sustainable Development (SD) generally: to meet the needs of present generations without compromising the meeting of the needs of the future generations (classical definition of Brundtland World Commission on Environment and Development).

The “boundaries” between the two sorts of tourism (from the point of view of sustainability) are not always clear, as well as the “boundaries” of the various kinds of tourism from the point of view of the “specific” characteristics of the “touristic product”. Such a thing happens because it is difficult to

isolate the new policy of protection of natural environment from the conventional economic policies based on mass tourism, while one cannot put the touristic activities and interests in very strict “water-tight compartments”. More or less, in many touristic areas or broadly in touristic countries one can notice a “mixed touristic landscape”. That result is connected with the specific structural elements of many societies and economies (and we mean mainly market economies with the predominant incentive of profit) and more deeply with the features of human nature.

The Sustainable Touristic Development (STD) many times is not a policy easily implemented, because there are very strong pressures from capitalist circles or even from public organizations for big touristic investments and new “development” achievements. The rural areas attract the investors for new type touristic installations (connected with activities of Alternative and Qualitative Tourism (AQT) and, in some cases, with high quality luxurious services), exactly because are more “virgin” and more “exciting”, namely their Natural (NAC) and Cultural Capital (CUC) are very important.

When we say “Alternative and Qualitative Tourism” we mean a sort of tourism different from the mass tourism of summertime in coastal zones, in which the tourists (mainly from northern industrial countries) enjoy summer vacations in southern countries (the so-called tourism of “sun, sea and sand”). In that case the companies (for example “tour operators”) or in general all the people involved in offering touristic services intend to increase the quantity of tourists for more economic profit. In that case all the sides involved in touristic activities are not concerned, so much, for the other parameters of the above-mentioned activities as regards the impacts on the natural environment and on the cultural capital of the various areas. The prominent characteristics of those activities have something “mechanistic” and quantitative, exactly because they have “mass” character.

On the contrary the philosophy of alternative and qualitative tourism considers the protection of natural environment and cultural capital of the various rural areas at least equivalent with the importance of profit pursuit. Much more it is not interested in “mass summer relaxation” in coastal zones but for a qualitative relationship of tourists with the areas which they visit through many ways. It is interested in many other activities in which the tourists can participate beyond “superficial relaxation”, e.g. naturalist excursions, hiking, mountaineering, skiing, climbing, trekking, thematic tourism, voluntary participation in different rural works, religious tours (old monasteries, churches, holy sites), visits to historical and archaeological sites, athletic activities, rafting in the rivers, interest about the local customs and cultures, etc. In this sort of tourism the visitors try to have a real communication with the people and their culture which they meet, as well as enjoy the various aspects of the natural environment and much more its greatness beyond the “superficial relaxation”. They try to understand people’s cultures and their mutual influences with the environment. They want to “live” “the aura” and the various cultural characteristics of the areas. They “experience a change” in their life, as they leave for a while their home and they visit new areas probably with people with a different “way of mind”. In this sort of qualitative tourism one focuses on activities, on experiences, on enjoyment of natural beauties (both in coastal and mountainous areas) themselves, on study, on cultural characteristics. Thus, the quantity of tourists probably is smaller and the economic profit is diminished. But the quality of the human communication and the deeper understanding of people and of natural beauties is greatly increased!

Generally when we adopt “quantitative” criteria we mean mainly numbers (“how many people?”, “how much money”, “how much the national income has increased?”), while when we adopt “qualitative” criteria we mean more experiences, feelings, intellectual aspiration, interactions among humans, the protection of natural environment, interests about cultures, namely things, which “are not sold or bought” by money or cannot be measured by numbers, e.g. the feeling of enjoyment of a natural beauty or the understanding of a local culture. As we accept the concept of Integrated

Environmental and Socioeconomic System (IESES), we should always try to combine the quantitative with the qualitative criteria.

On the contrary the big private companies, many times, press for touristic investments pursuing new profits, without the appropriate sensitivity for the conservation of the natural environment, given that in the era of globalized capitalism the competition generally has been increased. Especially the rural areas need high environmental protection, because their main “wealth” and “attractive” advantage are their natural capital, beauty, and their cultural heritage. In rural areas the specific balance between Man-Made Systems (MMS) and Natural Ecosystems (NES) is more important, but also more fragile, in comparison with other areas (less rural or semi-urban or urban), exactly because their Natural and Cultural Capital (NAC and CUC), should be preserved for the needs of the broader ecological balance based on the principles of sustainability.

The touristic investors many times are interested in a large-scale investment. While they declare that they intend to go beyond the mass conventional tourism, in action, pursuing their profits, they don't pay the proper attention to the prerequisites of the sustainable character of their investments. So, they can compromise, rather easily, with the idea of a luxurious large-scale investment. But Alternative Tourism doesn't mean only luxurious stunning installations (hotels, apartments, villas etc.) and high-quality services. If we accept the identification of Alternative Tourism with luxurious tourism, having no interest about the size of the investments and the other prerequisites and principles of sustainability, there always exists the danger coming gradually from an acceptance of luxurious mass tourism again with the consequent negative impacts on the environment.

Thus, the local societies and the state mechanisms should be always ready to resist the pressures of large companies, when the latter give much more priority to their profits. They can negotiate or compromise with them, but they should point out that some limits of their investment activities are not raised. So, an efficient protective legislation is necessary, as well as an efficient and non-corrupted Public Administration and a real independent system of Justice (and when we say “efficient” we mean legislation, Public Administration and system of justice not only “efficacious” – i.e. with right theoretical plans of work and a right theoretical formulation of policies – but “effective” too, i.e. with qualitative and right performance in action). The efficient function of the latter, as institutions, is very important especially for the countries of the former communist block and of the Third world, because in them the pressures of capitalist circles are very high and the corruption sometimes very extensive. Sustainability and corrupted state mechanisms are incompatible policies and sociopolitical conditions.

On the other hand, sustainability is not only a result of an individual protection of a limited isolated ecosystem or simply the protection of natural environment. It is a result of a whole social-cultural approach about the interdependence of man and nature. It is a right human choice within the dynamics of that interdependence and for its enhancement. It is a cultural value stance about the intervention of human beings in the field of the natural environment. It is “value (qualitative dimension) laden” and it is naive to try to reduce it only to quantifiable variables. Thus, the organization, the qualitative character and the efficiency of the control in the human intervention is equally taken into consideration, beyond any other measurable variable and criterion of economic viability. That's why when we want to assess the Carrying Capacity (CC) of an area, we should face the issue on the basis of the Integrated Environmental and Socioeconomic System (IESES). On the basis of that integrated system we will face it not only in quantifiable impacts and parameters or financial business criteria, but also in terms of “how” (scientific management and control, scientific systemic hierarchy, scientific monitoring, scientific “cybernetic” defence against entropic tendencies, qualitative assessment and analysis of the local socioeconomic structures and parameters) the investments and generally the productive human activities which are implemented in that area. The

point is not only “how many” (investments, activities, hotels, buildings etc.) but also the organization level in details, the spirit of “know how” and specifically of “qualitative how”, independently of absolute numbers and “magnitudes”.

3. The Issue and the Principle of Carrying Capacity (CC)

When the investors press the local societies in rural areas for large scale investments, without a specific care about the limits of Carrying Capacity (CC), it is possible to have some tensions with them. In that case, the negative reactions of the local societies are reasonable and fair. An argument of the investors is that they offer jobs, and, if the areas have a high level of unemployment or underemployment, this offer actually has an influence. Although the social-developmental dimension of an investment shouldn't be underestimated, nevertheless the principle of carrying capacity has an autonomous importance and any investment, independently if it is or it is not integrated to the Carrying Capacity (CC) of the area, cannot be based on a “blackmail” about the offer of new jobs.

Carrying Capacity (CC) is one from the basic principles of sustainable development. It refers to quantitative dimensions of developmental activities and implies their limits. Any developmental activity should not transcend some limits in a concrete area with concrete limited resources, because any Natural Ecosystems (NES) and any Man-Made System (MMS) has a finite capacity and tolerance and the above-mentioned limits refer to both of them. Any developmental activity is realized, more or less, at the cost of natural resources. The point is to minimize the cost in the best possible way. Nature and Man-Made Systems in principle can co-exist and co-evolve, but beyond some limits the coexistence is broken up and there is no sustainable and creative development. Beyond those limits the process of destabilization appears and gradually the entropic tendencies of the existing systems can lead them to a serious degradation.

So, according to a typical definition, the Touristic Carrying Capacity (TCC) is the tolerable number of tourists, as well as that sort of touristic activities, which an area can accept, without degradation of local natural ecosystems and local culture, and finally without being in danger the ability (of that area) to support touristic activities or to give recreation to its visitors in the future. There are various methods according to which we try to “measure” the Carrying Capacity (CC) of an area (continuous measurements based on a steady monitoring system, field studies, sample surveys, empirical observations of touristic activities in different times and different seasons with their impacts on the ecosystems and the sociocultural system of the area, definition of some “measurement criteria”, which refers to some components), but objectively there are serious difficulties for an exact measurement in which concrete limits are fixed, e.g. for some environmentalists the area A (20,000 m²) has a capacity for 5,000 touristic beds (with the No 5,000 as strict limit), while the area B (35,000 m²) has a carrying capacity for 8,000 touristic beds (with the No 8,000 as strict limit), while for others the same areas have capacity for 6,000 and 9,000 beds correspondingly etc. At last analysis the value stance and assessment for the relationship between Nature and Man-Made systems cannot be excluded, and this parameter finally is not a part of an exact positive measurement. The preference of the formers or the latter cannot be blamed according to absolutely positive criteria of “measurement”, because it has included value elements, which are not defined with methods of “formal” rationality” (Max Weber's term: *zweckrational*) or methods of hard sciences: “I like or I don't like that. I prefer this type or the other type of relationship between the aforementioned systems, independently if the so-called “threshold” has not been exceeded”. The above mentioned method of A.Parpairis (see endnote 8) about measuring includes only one “pure” quantitative indicator. The other three ones include, more or less, qualitative assessments.

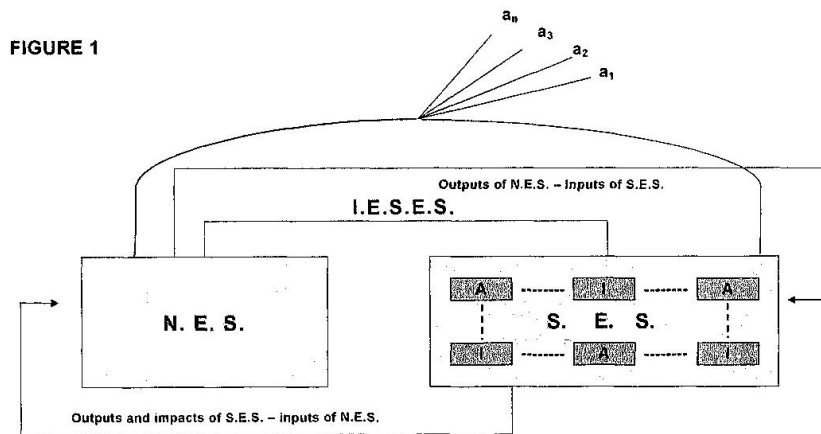
It is obvious that the whole discussion about the Carrying Capacity (CC), especially when the reference levels are extensive areas and large-scale social systems, theoretically has many dimensions. Practically, as I said above, one cannot isolate the qualitative elements from the whole assessment. The whole discussion cannot be limited only in the attempts to find exclusively quantitative methods in order to measure the Carrying Capacity (CC) of a particular place regarding concrete investments (of any sector of the economy). The mature scientific approach to that issue avoids one-sided views and accepts the need of complementariness of the quantitative approach with the qualitative one. Especially for sustainable touristic investments in rural areas the methodological complementariness is very critical, because the whole human stance about the re-consideration of the relationship between nature and human activities includes as strong value and cultural positions, as choices of technological innovations and new positive practical arrangements in the unified field of Integrated Environmental and Socioeconomic Systems (IESES).

4. System's Dynamics and the Touristic Carrying Capacity (TCC)

The assessment about the possibility of the combination of a large scale touristic investment with the characteristics of the Alternative and Qualitative Tourism (AQT) (see the unity II of this paper), as I said above, is not connected only with a quantitative approach (measurements and numbers), but also with qualitative elements (concepts, choices, considerations, value judgments, combinations, value and cultural priorities, organization, "smart" and efficient management, communication channels, leading groups, developmental policies, policies about natural resources). Those qualitative dimensions of the whole discussion probably are the most important ones, although their assessment is not so easy. We think that the most appropriate methods for the assessment of sustainability of touristic complexes, especially if they are large scale ones, are those which are connected with systems theory and some principles of Cybernetics on the basis of the spirit of a holistic approach. Based on those methods we can perceive holistically (and not only analytically) the whole dynamics of the functional relationship and interdependence of the various elements of a concrete area as Integrated Environmental and Socioeconomic System (IESES). Only through a deep understanding of that dynamics one can conceive of the general tendencies, possibilities and limits of the integrated system from the standpoint of sustainability. Dynamics by definition means fluctuations, emerging or diminishing possibilities and alternatives which are dependent on many factors and parameters and may be enacted in many levels (multilevel approach of systems and meta-systems dynamics with probabilistic tendencies).

In the aforementioned dynamics the specific quality of the whole human intervention and organization is of high importance, as a "guarantee factor" of sustainability. The features, the specific properties and the efficiency of communication between the Man-Made elements of the Integrated Environmental and Socioeconomic System (IESES) are of first priority. The human organized intervention (organized actions and policies of individual, collective and "institutional" actors) is of high importance, because otherwise there doesn't exist a real integration. The more there exists a specific quality in human intervention and human policy in the environment, as well as in the unified socioeconomic field, the more the integration and sustainability are increased (fig.1).

Based on the aforementioned holistic approach of the Integrated System we avoid the one-sidedness of the descriptive-analytical method regarding its particular elements and much more the "trap of reductionism". For the right holistic perception of its various components as well as for the sustainable construction and function of large touristic complexes, ecologists, environmentalists, civil engineers, architects, urban planners, social scientists and systems experts should cooperate with equivalent roles composing a unified scientific group.



N.E.S. = Natural Ecosystems
 S.E.S. = Socioeconomic System
 I.E.S.E.S. = Integrated Environmental & Socioeconomic System
 A = Actors
 I = Institutions
 --- = Communication and Interaction
 a_1, a_2, a_3, a_n = Various potential states of I.E.S.E.S., in which the degree of sustainability may increase

The quality of communication and control of the various elements of the S.E.S. (actors and institutions) and the sort and the control of impacts of S.E.S. on N.E.S. determine the degree of sustainability of the whole I.E.S.E.S. The higher the above mentioned quality, the higher the degree of sustainability and the better control of non exceeding the C.C. of the whole area.

5. Communication Process and the Importance of the Organization of Man-Made Systems (MMS)

The discussion about Touristic Carrying Capacity (TCC), as we have said, is not limited in quantitative terms but is spread also in the field of qualitative assessments and arguments. And from this point of view we are highly concerned about the predominant value system, the efficient organization and order (efficient always from the standpoint of sustainability of the tourist units and complexes) and about control and management systems. According to our approach, the very important points are a) The reflexivity about the serious impacts of Man-Made Systems (MMS) (local self-government organizations, local development organizations, branches of central state authorities, political parties, educational organizations, the touristic complexes themselves as economic organizations, etc) on the Natural Eco-Systems (we mean mainly the impacts of the various decisions of these systems). The decisions and the impacts of the above-mentioned systems are always connected with value choices and cultural traits which are predominant in them. b) The specific quality of the communication among the various Man-Made Systems (MMS) and elements of the Integrated Environmental and Socioeconomic System (IESES). c) The efficiency of the decision-making processes of these systems and d) the organization ability of some leading above-mentioned systems (e.g. of the local self-government organizations, the touristic complexes as economic organizations).

“Specific quality of communication” between these systems at first means effective flow and exchange of information, coordination, cooperation, anticipation and common activities (when it is necessary and possible). Furthermore it means the ability of a system (sender) to send fast a message to another one (receiver) and to affect it towards the desirable direction. At that point we underscore the interest of modern sociologists (e.g. N. Luhmann) and social philosophers (e.g. J. Habermas) about the importance of communication, among the actors and the institutions of a society. An

efficient communication is always the necessary prerequisite of an efficient management, control and creative action based on elements of 1st and 2nd Order Cybernetics.

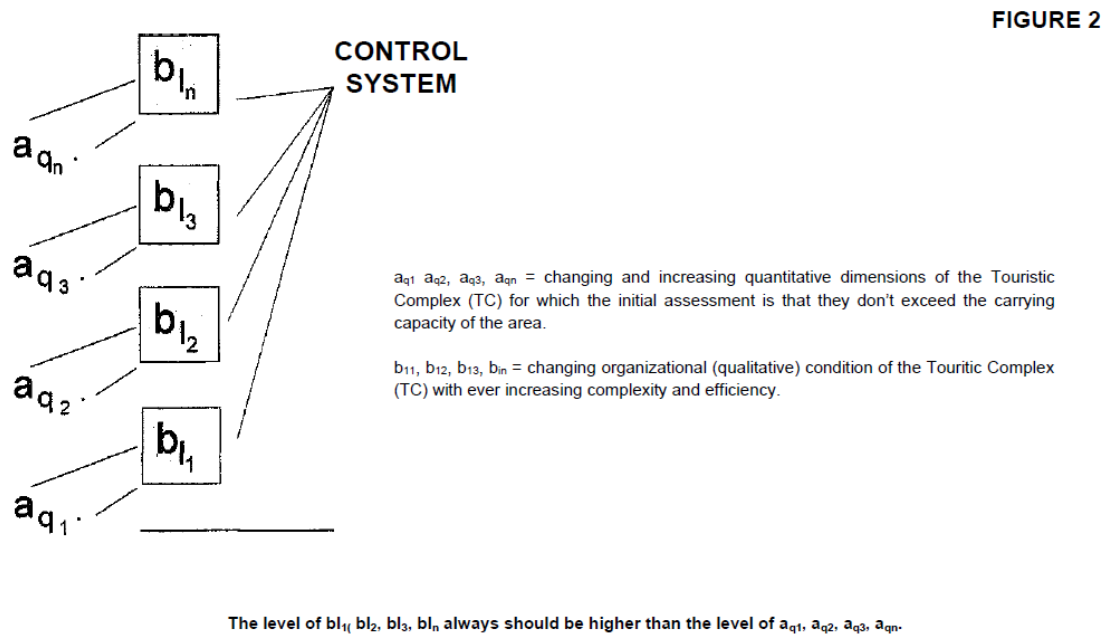
Furthermore, efficiency (combination of efficacy with effectiveness : the former, as concept, has something more theoretical, while the latter has a practical dimension, it refers exclusively to empirical reality) of decision –making process refers to the ability of some concrete systems or leading groups to take right information and to give solutions to problems with the least possible cost and the shortest possible time.

Finally, system ability means the ability of a system to find the appropriate method and to do the right move in order to upgrade its structure and function for adapting to various situations of its environment, to form down its complexity and perplexity and to resist its dangerous entropic tendencies. The efficient organization always is a qualitative response to any danger of disorder due to the increase of quantity of the Man-Made elements (population, human activities, infrastructures, over structures, etc, which are found in its environment).

Thus, an exclusive quantitative approach is incomplete. On the contrary, every quantitative approach of Touristic Carrying Capacity (TCC) should be combined with a “safety valve”, which will function in qualitative terms. That “valve” should be connected with those appropriate mechanisms which will be able to upgrade the whole touristic complex in a higher organization level, and probably to stop some existing activities or to reduce the number of visitors, if such a decision is necessary for the protection of the Natural Ecosystems and Cultural Capital (NES and CUC). The upgrading is possible, if the control system acquires new information and achieves new and more qualitative combinations of the already existing elements of the touristic complex (human and non human elements). So, the touristic complex will achieve its restructure and through that a new structure will find an adaptation to new situations [see fig2: when in the figure we say “the level of $aq_1...aq_n$ ” we mean the degree of “quantities” generally in a touristic complex (“how many people? How many activities? How many impacts on environment?”). The degree of “quantities” at the beginning might have been within the limits of Carrying Capacity of the area, but later probably it may increase and exceed these limits. When we say “the level of $bl_1...bl_n$ ” we mean the degree of organization in a touristic complex. The degree of organization should always be ahead of the degree of “quantitative” increase, should always anticipate of “quantitative” increase, of the “quantities”, and of the probable entropic tendencies in a touristic complex].

In addition to the aforementioned qualitative “safety valve” (connected with the “intelligent” control system), we shouldn’t forget that the whole discussion about “capacity limits” depends (to an extent) on the value system we accept. Any value system “is not measured”, and scientifically we cannot prove, with certainty and exactness, if it is right or wrong (Weberian view). We can develop only some arguments (not absolutely scientific), to a point, with elements of moral, social, political and ecological philosophy, according to which the “a” (for example) value system is preferable than the “b” one. Absolute “hard scientific” certainty about the “rightness” of the value systems does not exist.

In any case for every large-scale touristic investment in rural areas the crucial point is to carry out a successful Environmental Impact Study (EIS) and a Sustainable Management Study (SMS) for the whole touristic complex. These studies (which shouldn’t be only “formal documents” which typically are submitted to the public authorities for the approval of the “environmental terms”) determine the prerequisites and the terms on the basis of which the protection of Natural Environment (NE) and the local culture will be covered with “scientific guaranty”. The aforementioned studies constitute the “scientific instruments” which will help the work of Sustainable Management Committee (SMC) in cooperation and in compliance with the instructions of Public Authorities (Central Public Administration, Municipalities, Prefectures, Peripheries etc).



6. Ashby's "Law of Requisite Variety", Touristic Carrying Capacity (TCC) and the "Intelligent" Control System (CS) of High Complexity

What we have written above is in compliance with the basic principle of systems theory, according to which the Control System (CS) must have, at least, the same complexity with the environment which it intends to steer. The need of that complexity is absolutely connected with Ashby's "Law of Requisite Variety". According to that law a system can steer its environment and adapt to a variety of its states, only if it is characterized by a high complexity and response ability which can cover absolutely the variety of the changes and the states of that environment. Application of the above-mentioned law in the case of a large scale touristic complex in a rural area: the Control System (CS) of the touristic complex should have always higher complexity than its environment, (natural and human), specifically in the area where the touristic installations are located with the activities that are included, in order to steer it with efficiency. This control comprises scientific monitoring of all environmental parameters and decisions in correspondence with the "inputs" of the system (included possible modifications of the touristic activities or even serious limitations of the number of visitors, if such a thing is necessary for the protection of the environment).

In addition the right and effective connection and balance of the "essential variables" (according to Ashby's theory) of the Control System (CS), and of all Man-Made subsystems, which are affected by it or are involved in general, contributes to their survival and adaptation. So, in turn these systems are able to reduce the entropic tendencies of theirs and of their environment. Consequently, they can steer better themselves and their environment or can reduce their whole complexity.

Surely when we speak about "essential variables" of the aforementioned systems we speak metaphorically, because those variables in first place refer to biological organisms. In our case we mean functions for a "social organism" (or system) necessary for its maintenance and adaptation.

So, for us the Touristic Carrying Capacity (TCC) is not a "static size" but a dynamical one. It cannot be determined with an absolute quantitative way, but it can be changed, if the possibilities for organization and order in the area of the Control System (CS) also change. The more the organization and the order there are in the area (regarding the installations, infrastructures, hotels,

visitors, activities etc), the more the degree of Carrying Capacity increases. Of course there are some limits which should not be exceeded, but “near to limits” there exists a kind of “fluctuation” about the “right size”, depending on the degree of organization and order of the human intervention, as well as of the human care about the protection of the environment. In the same area (we mean in the same land with the same number of square meters) we can have better or worse arrangement of constructions, activities and visitors, accordingly with the plans and the scientific instructions we follow.

It is not useless to say that even N. Luhmann’s theoretical guidelines give priority to how the complexity of environment can be reduced through systems or more exactly through systemic organization. In other words N. Luhmann maintained that “qualitative functions and abilities” can force down the complexity and perplexity of environment, and reduce the problems are brought about by them.

The aforementioned views about the Touristic Carrying Capacity (TCC) are in compliance with the spirit of cybernetics (1st and 2nd order one) and its concern how to fight entropy and to increase the effectiveness of human action. In the concrete case the concern is to improve the human action (in scientific and technological terms) for the protection of natural environment and sociocultural capital, based on information, organizational structures and constant monitoring. Especially they are in correspondence with the characteristics of sociocybernetics, which have to do with the study of nature and reactions of “observing systems” (living, human and social systems). Sociocybernetics studies and assesses the meaningful, value, symbolic and cultural dimensions of the communication between social systems. So, it is much more able to conceive of the qualitative attributes of the interactions among these systems and their impacts on non-human systems.

7. The Sustainability, the Value Parameters and the High Level of Organization

The spirit at the previous unity (VI) can contribute to the achievement of sustainability. That issue and principle includes very critical social, cultural and value parameters and is directly connected with the Carrying Capacity (CC). Any developmental intervention is not a neutral activity, as well as the assessment about its sustainability is not value neutral, although the last opinions about the “sustainable characteristics” should be based also on scientific approaches with rational and empirical methods. We should not forget that any developmental intervention (organizational structure, scientific methods, advanced technology, adequate complexity degree of the control system, responding ability to the social demands), is an issue with value parameters. Every social stance about development and sustainability has a value dimension. And from the standpoint of that dimension, I reject an insistence on limitless “productionism” and on economic policies against strong Social State and efficient State Interventions in critical sectors of social life. Protection of environment, ecological culture, Welfare state and fair distribution of the National Income should be conceived together, as parts of the same value totality.

Furthermore, the entropy of social (Man-Made) systems cannot be measured as the entropy of natural systems. We need a more complicated method which is not reduced only to quantifiable elements. Any developmental process may bring about entropic tendencies, and those tendencies are connected with the interaction between man and nature. Thus, the danger of entropic (or much more chaotic) results of a developmental intervention should be faced with a strict and effective monitoring and Control System (CS), which will be able to work in both terms, quantitative and qualitative ones (and when we say in “quantitative term” we mean assessments based on positive measurements with numbers, while when we say in “qualitative term” we mean a) value criteria and assessments and b) quality of organization. Organization is a qualitative concept: how the various elements of a totality are combined and structured in order to increase the performance of a system).

The more the complexity of this “intelligent” Control System (CS) is higher than the complexity of its environment, the more the latter can be forced down, and more generally the entropic tendencies can be confronted with effectiveness, according to Ashby’s “law of requisite variety”. We think that the issue of Touristic Carrying Capacity (TCC) should be considered in the light of the systemic approach to the whole developmental process, its sustainability, and the value preferences, which support them. The “great weapon” against gradual entropic tendencies always is the high level of organization (“intelligent” Control System of higher complexity) in the area of sustainable touristic investments and the ability of stable order regarding the Man-Made Systems and their activities that have impact on the Natural Ecosystems (NES). Since we have to do with rural areas, the Control System (CS) should give priority to environmental parameters which refer to Natural Ecosystems (flora, fauna, structure of soil, ground morphology, landscape, climate etc). Those parameters should be measured with positive methods and with the best possible way. The Control System (CS) should have always the ability to fight entropic tendencies and the degradation of natural environment, even if the Integrated Environmental and Socioeconomic System (IESES) presents a kind of “fragmentation” and internal contradictions (meta-systemic dynamical state, situation with chaotic elements). That system should have the appropriate competence and should be ready to modify the regulations and the arrangements of any kind of activities in the touristic complexes in the rural areas, if those modifications are necessary for the protection of the environment. That’s why it shouldn’t be “blocked” by organized private economic interests or interests based on any kind of “statism”.

Furthermore a constant goal of the sustainability policy, which takes into account the issue of Carrying Capacity (CC), is the maintenance of a multi-level order in the area of investments. And when we say “order”, we mean order in the area of concrete touristic complexes, always in connection with social surroundings, the protection of Cultural Capital (CUC), and the dynamics of social demands.

Finally when we speak about Control System (CS) we do not mean only a strict scientific team (environmentalists, ecologists, social scientists, technocrats etc) which will monitor all the environmental parameters and the right application of environmental terms, but also all the administrative and scientific bridges with the supervising competent Local, Peripheral and Central State Authorities. Thus, Control System (CS) of high complexity and efficiency means definitely Public (central and local) Administration of high quality. And of course, we mean a scientific team, State Authorities and Public Administration always in communication with people (giving information to them and taking into account their own views). In any formulation of developmental and environmental policy the participation of people is necessary.

To wind up the key point, according to our views, of sustainability and of the right assessment of the Carrying Capacity is the efficient organization based on Systems Theory and Sociocybernetic model. But a basic prerequisite of the efficient function of the Control System (CS) (for a large touristic complex) is a performance without barriers created by big organized economic and political interests. 1st and 2nd order cybernetics, the cybernetics of living social entities generally do not put an end to the confrontations and conflicts of socioeconomic groups, classes and interests, conflicts which nowadays can have a serious impact on the environment. But they can help humans to understand more about their reasons, as well as can contribute to their management and resolution with positive consequences on the environment. They face the particular involved social systems not with a mechanistic way, but as open systems in interaction with themselves and with their observers and their values.

References / Endnotes

¹ Almaguer-Kalixto, Patricia Eugenia and Fabio Giglietto “Steering the World from where we are: An Introduction to the Sociocybernetics Perspective” in *Current Sociology*, 67(4), 2019, pp. 479-494, where the writers maintain that “Sociocybernetics approach in applied even in issues (cross-disciplinary) such as environmental challenges, urban planning, community development” and they believe that “sustainability is perhaps the theme must extensively explored in the papers of *Journal of Sociocybernetics*”. In my article exactly I focus on the issue of *sustainability* as regards the touristic development which has impacts on environment and the local culture.

² Brundtland World Commission on Environment and Development, *Our Common Future*, Oxford, Oxford University Press, 1987, pp. 43-65.

³ Coccossis H. and P. Tsartas, *Viossimi Touristiki Anaptixi ke Perivallon (Sustainable Touristic Development and Environment)*, Athens, Kritiki, 2001, pp. 87, 126-127.

⁴ Ibid, pp. 80-83.

⁵ Michael Decleris, *The Law of Sustainable Development*, Luxemburg, European Communities, 2000, pp. 38-41; Lucian W. Pye, *Aspects of Political Development*. Boston, Little, Brown and Company, 1966, pp. 38, 114-115.

⁶ Michael Decleris, see above, pp. 85-90.

⁷ E.T.A.M. E.P.E., *Meleti Touristikis Anaptixis Periferias Kritis (Study of Touristic Development of the Periphery of Crete)*, 2003, pp. 248-251.

⁸ Ibid, p. 251.

⁹ Michael Decleris, see above, p. 7.

¹⁰ For example the Greek State Council many times assesses the Carrying Capacity of an area rather with a qualitative way, independently of strict quantitative criteria. Michael Decleris, see above, pp. 86-89. See also above *The Study of Touristic Development of the Periphery of Crete*, pp. 149-272.

¹¹ Meta-systems dynamics refer to conflict processes which happen beyond the systemic equilibrium. One can consider it as *non-linear conflict relationships* among various elements of the reality.

¹² Michael Decleris, see above, pp. 7-8. Bernard Scott “Being Holistic about Global Issues: Needs and meanings” in *Journal of Sociocybernetics*, (Electronic Journal), Vol. 3, No 21, 2002, pp. 21-26.

¹³ Basic components are: a) the physical-ecological, b) the social c) the demographic, d) the economic, e) the political, f) the legal, g) the administrative h) the educational and i) the cultural one.

¹⁴ N. Luhmann, *The Differentiation of Society*, New York, Columbia University Press, 1982. pp. 169-180.

¹⁵ Habermas, *The Theory of Communicative Action: The Critique of Functionalist Reason*, Cambridge, Polity Press, 1987, pp. 1-43.

¹⁶ Juan J. Linz, “The Breakdown of Democratic Regimes: Crisis, Breakdown and Re-equilibration”, in Juan Linz and Alfred Stepan (eds), *Breakdown of Democratic Regimes*, Baltimore, John Hopkins University, 1978, pp. 20-22, where the professor Juan Linz explains analytically the difference between “efficacy” and “effectiveness”.

¹⁷ Ibid, pp. 22-24.

¹⁸ Max Weber, *Economy and Society* (with Guenther Roth and Claus Wittich as eds), Berkley, University of California Press, 1978, pp. 24-26.

¹⁹ When I say “formal documents” I mean scientific papers which are submitted only for “typical” reasons, in order to be typically in compliance with the prerequisites of the law, while they are not characterized by a real scientific quality that constitute a substantial and safe guarantee for the confrontation of the environmental impacts. The “formalism” is a “disease” of Public Administration: the “formal” procedures are realized but without any effectiveness in the reality. Many times, big, organized interests constitute a real obstacle for the aforementioned effectiveness, because they “block” the performance of Public Administration against the protection of the natural environment.

²⁰ Michael Decleris, see above, p. 39.

²¹ W.R.Ashby, “Self-regulation and Requisite variety” in F.E. Emery (ed.) *System Thinking*, vol. one, New York, Penguin Education, 1981, pp 105-107; W.R.Ashby, *Introduction to Cybernetics*, Wiley, 1956, pp.202-218.

²² See www.johnljerz.com, where John L. Jerz: “W. Ross Asby, Design for a Brain the Origin of Adaptable Behaviour”, 1960 (2nd revised ed.) pp. 1, 38. 42-43; <http://panarchy.org>, where *Selected Passages from W. Ross Ashby, “Design for a Brain”, 1960*; Michael C. Geoghegan and Paul Pangaro, *Design for a Self-Regenerating Organization*, Ashby Centenary Conference, 2004; David Vernon “Interpreting Ashby – But which One?” in *Constructivist Foundations*, 9(1) 2013, pp. 111-113.

²³ Jonathan Turner, *The Structure of Sociological Theory*, 5th ed. Belmont, Wadsworth Publishing Company, 1991, pp. 94-96.

²⁴ Felix Ceyer, *The Challenge of Sociocybernetics*, paper delivered at the 13th World Congress of Sociology, Bielefeld, 1994- Richard E. Lee, Felix Geyer and Bernd R. Hornung, “A Journal of Sociocybernetics” in *Journal of Sociocybernetics*, (electronic journal) Vol. I, No I, 2000, pp. 2-6.

²⁵ Euel Elliott and L. Douglas Kiel ‘Introduction’, in L. Douglas Kiel and Euel Elliott, *Chaos Theory in the Social Sciences*, Ann Arbor, The University of Michigan Press, 2004, pp. 1-6; David L. Harvey and Michael Reed “Social Science as the Study of Complex Systems” in L. Douglas Kiel and Euel Elliott, *Chaos Theory in the Social Sciences*, see above.

²⁶ As it is known in the European Union there exists a law, according to which for works that can cause serious impacts on the environment, because of their nature and size, an *Environmental Impact Study* (EIS) is required. An EIS is submitted to the competent ministry or other competent organization of Public Administration by the investment company (private or public). If the EIS is approved, the competent ministry (mainly the ministry of the Environment) or other competent unit of Public Administration issue the so-called *Environmental Terms*, which the company should follow (for example in Greece at first there was the Law No 1650/1986. In addition the Law No 3010/2002 was issued according to the directives 97/11 and 96/91 of European Union).

Appendix

Abbreviations

AQT: Alternative and Qualitative Tourism

BE: Built Environment

CC: Carrying Capacity

CS: Control System

CUC: Cultural Capital

EIS: Environmental Impact Study

IESES: Integrated Environmental and Socioeconomic System

MMS: Man-Made Systems

NAC: Natural Capital

NES: Natural Ecosystems

NAE: Natural Environment

SD: Sustainable Development

SES: Socioeconomic System

SMC: Sustainable Management Committee

SMS: Sustainable Management Study

STT: Sustainable Touristic Development

TCC: Touristic Carrying Capacity