TOURIST BEACH MANAGEMENT, A PERSPECTIVE FORM THE SYSTEMS THINKING

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ABSTRACT

The development of buildings and massive tourism activities in tourist beaches have affected the natural value of these areas as well as their natural processes. In this regard, it is important to propose alternatives from the Systems Science that grant to design strategies to handle appropriately these spaces. This paper presents an option, from the systemic perspective, to strengthen the beach management process through the integration of relevant actors in order to protect it. The methodological approach was made through the Soft Systems Methodology and the Viable System Model. As a result, a diagnostic was generated that allowed to characterize the system under study and elucidate the interrelations among the actors involved in the problematic situation, for later determine an administrative structure that considers mechanisms of control, coordination and monitoring of the coast area in order to harmonize the different dimensions of the beach.

Keywords: Systems Science, Soft Systems Methodology, Viable System Model, Coastline management, Tourism.

INTRODUCTION

The development of recreational activities is related to the usage of the geographical space, and sometimes, the utilization of natural resources. In this sense, coastal ecosystems provide a great variety of goods and services to humans such as food, protection, commercial development and recreation (Alves, Ballester, Rigall, Ferreira, & Benavante, 2017). Their ability to support recreational activities, turns it into a tourist resource (Almirón, 2004; Sánchez, 1991).

To use this space, as a support for tourism activities, it is necessary to adapt and transform it into a tourist product, which involves the construction of equipment and facilities to provide tourist and complementary services. The conditioning of a space refers to the enhancement of the same, which in the first instance is positive because it attracts more tourists, as well as people seeking jobs or new homes. Nevertheless, if these flows are not controlled, the environmental and cultural quality is threatened (Barrado, 2004; Barragán, 2012).

This is a problem that sun & sand tourist destinations face, because in the coastal areas, tourism development is based on a model characterized by: build hotels and facilities for second residences on the front area of the beach, little planning and trend towards overcrowding. Based on this it is inferred the little reflection of this model, with regard to the consequences of transforming these spaces. Therefore, it is considered pertinent to review the management of these spaces with the

objective of formulating strategies for its strengthening, taking as a basis the regulation of the participation anthropic.

Sun & Sand Tourism and beach management

The tourist use of the coast, in the Mexican context, led to the adoption of the sun & sand tourism modality as the main offer with the aim to accelerate the economic growth (Benseny, 2006). However, poor planning of tourist activity and the lack in urban management in the beaches and its peripheries has caused: water pollution by sewage, loss of vegetation, wear of environmental area, alteration of the original landscape, improper soil use and increased vulnerability to natural phenomena (Bringas, 1999; Aguiló, Alegre, & Sardá, 2005; Benseny, 2006, 2007; Cuevas & Euán, 2009; Baños, 2012; López et al., 2012).

The constant demand for these spaces, requires to considerate strategies that promote competitive destinations in different aspects such as: economic, ecological, social and cultural. Especially, if there is taken into consideration the change of requirements of the users towards more respectful destinations with the environment and the culture (Diéguez, Gueimonde, Sinde, & Blanco, 2011; Hidalgo, Arenas, & Santana, 2016)

The practice of tourism, and tourist inflow in these spaces, generates social, economic and environmental interactions, in which different actors such as community, private sector, tourists and government interact (Yepes, 2007; Sardá, Francesc, Pintó, *et al*., 2015). In this sense, it should be administered in a way that promotes its permanence and rational use. With regard to this, the systems approach represents an alternative to improve the reductionist models that are currently used in the management on the beach area.

The administration of a resource starts by controlling the use and access that individuals have to the same, that is to say, who and how cares, regulates and distributes the resource (Arce & Armijo, 2011). In this sense, the beach management should consider who are the users of the same, as well as the processes and relationships that affect it.

Integral management seeks to protect the economic and social benefits generated by tourism rationally exploiting the resource. Thus, the systemic paradigm provides comprehensive tools to understand and contribute to problems resolution that require holistic vision (Pulgarín, 2002; Yepes, 2007; Vargas, 2012). Therefore, beach management should also consider other elements such as the relations among the physical-natural, socio-cultural and management subsystems (Yepes, 2007). From the mentioned paradigm, it should be considered that in a tourist beach take place relations derived from the provision of services such as accommodation, food and beverage, recreation, security and complementary services; it is also necessary to bear in mind that morphological, technical, legal, cultural, economic and accessibility elements are involved (Torres & Córdova, 2010; Martí, Ramis, & Sardá, 2015).

To include these aspects, is important to take appropriate decisions about the beach management and identify factors that risk its environmental quality, with the objective of generating protective measures and propose the bases to deal with the impacts of the environment such as emergence of new types of tourism, competing destinations, technological and tourism demand changes (Soares, Ivars, & Gândara, 2015). Motivating this way the transition of models based on fragmented competitions towards one integral (Martí *et al*., 2015).

According to the NMX-AA-120-SCFI-2006, the beaches are defined like natural systems that collaborate in a process of self-regeneration, as they filter pollutants from freshwater systems, protect the coastline from erosion and storms. But human intervention has altered this process (Benseny, 2006). With regard to this, it is considered that Autopoieisis theory can contribute to clarify the understanding of the human-environment interaction (Maturana & Varela, 1998, 2004; Van Gigch, 2012; Devlin, 2014;). Derived from this, the beach area and its management can be seen as set of interrelations among its components which intention is to coexist in order to enter into a viable equilibrium state.

Based on the foregoing, it is relevant to address the deficiencies in the beach management under the Viable System Model (VSM), since it seeks to designed a system capable of being self-sustained and respond to stimuli in the environment in a consistent manner. This gives every system, the ability to evolve (François, 2004). On having used the systemic paradigm, it is stressed that systemic methodologies should be used in order to deal with the problem situation.

METHODOLOGY

The Systemic Method was selected since it allows both define the elements of the system and the set of relations and dynamism that is between the same (Sánchez *et al.,* 2016). Regarding to this, Baggio (2014) establishes that the Systemic Approach allows to understand issues that affect the tourism as well as the relations among its components and the environment. In addition, it grants to integrate different approaches and perceptions and generates a holistic vision.

Conceptualizing the tourist beaches, from the Systems Thinking allows to establish its limits, not only in the geographical sense but by the human relations that self-produce it. In that sense, the Soft Systems Methodology (SSM) grants to intervene and establish the diagnosis of the problem situation as a whole, i.e. It recognizes the human component and enriches decision-making capacity through pluralism, same that strengthens the interrelations among actors and the achievement of the objectives (Jackson, 2003).

In this case, the SSM was used to design a construct that supports the VSM and thus determine a relevant structure to deal with the environment and internal changes. This model is a meta-language to facilitate the self-regulation of organisations through a process of learning, adaptation, self-reference and evolution (Espinosa *et al.*, 2011). It should be added that this work was carried out in the tourist destination called Puerto Escondido, located in Oaxaca, Mexico.

Particularly, collaboration with actors located in its main beach as well as the commercial area known as the "*adoquín*" was established. Likewise, the participation of the local “Playas Limpias committee” was integred.

Appliying the SSM and the VSM

Through the stages 1 and 2 of the SSM, the diagnosis of the beach was made (system in focus). Here, the main actors were identified and their vision about the problematic situation was integrated. This allowed to detect their influence in that situation and place it in three recursions levels.

Figure 1 shows three levels of recursion. From the center outward, are placed the elements directly related to activities in the system in focus. These relate to the provision of services, the equipment and the own tourist and complementary activities. The next level integrates the elements of the environment, this affect directly to the system and face them to ensure its viability. The next level is the macro environment, it contains the components that affect in an indirect way the problem situation.

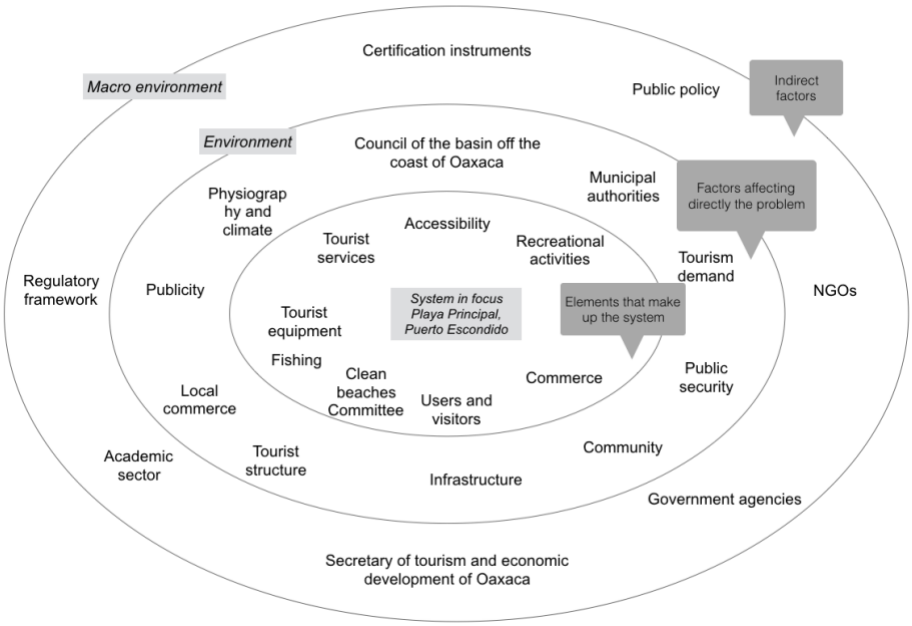

Figure 1. **Picture of the system and its environment**

Once these items were identified, the interactions are presented in the **figure 2**, which were identified as healthy and in conflict, the latter show the dysfunctional links or in its case non-existent.

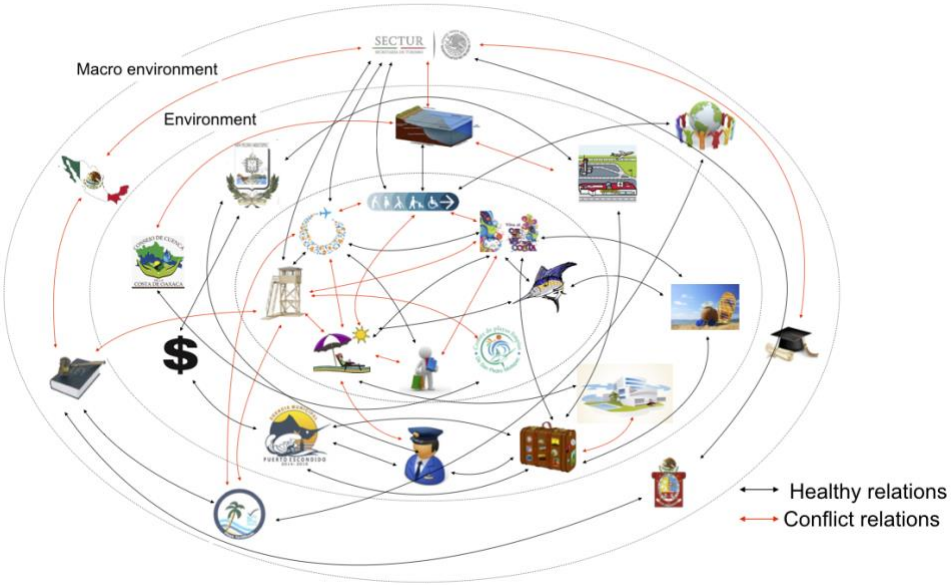

Figure 2. Rich picture of the system

Listed below, are some examples of relationships in conflict, recognized by the actors involved:

- Service providers require training to cater the tourists needs.
- Events do not have restrictive measures or environmental studies and they increase the impact on the beach.
- Recreational services are not enabled to assist users with visual, hearing, or motor disabilities.
- Improper control of the activities developed by the tourists on the beach.
- The beach equipment was carried out without planning.
- The linkage with the academic sector is not a priority.
- Although the coastal policy in Mexico mentions participation among different government departments, such collaboration does not take place.
- The application of instruments of quality assessment, is scarce.

Rich vision, allowed to raise the way how it should operate the system to address its weaknesses and to carry out a proper use of space through the integration of stakeholders and shape the root definition. Its formulation was verified by the CATOWE mnemonic, this determined the actors of the system and its functional elements.

Table 1. Root definition and CATOWE .

Root definition: a management system to strengthen conduction from the main beach, through bonding, planning and regulation of the activities taking place therein.	
C	Users and visitors, community, tourism service providers, fishermen, traders
A	Service providers, community, municipal authorities, Committee of clean beaches
T	The incorporation of the systemic paradigm will lead the linking among actors and sectors to regulate and make efficient the operations in the system under study

O	Municipal authorities, Committee of clean beaches, local community, Government agencies
W	The beach requires regulatory mechanisms from linking the actors involved to avoid the loss of attractiveness and quality
E	Regulatory framework, STyDE of Oaxaca, NGOs, government agencies, public policy and academic sector

The foregoing, derives in the nomination of the relevant systems:

- **Exploration:** assesses the role of the system components, its limitations, synergies between them and the environment without fail to consider the multiple factors of the past and present that are related to the problem in question (François, 2004).

- **Management:** it defines the identity of the system, which sets objectives, strategies, media and activities (François, 2004), it is to say, specifies the definition of the organisation for internal and external stakeholders (Harrison & St. John, 2009).

- **Operational activities:** implementation of strategies and activities through the efficient use of resources (Krajewski & Ritzman, 2000), as well as generate information of such activities.

- **Audit and Control:** consider the information flow obtained and filtered in other systems and counteracts the entropic trends. Contributes to the regulation and control by: restrictions, variety obstruction, limitation of the degrees of freedom and organisation (François, 2004).

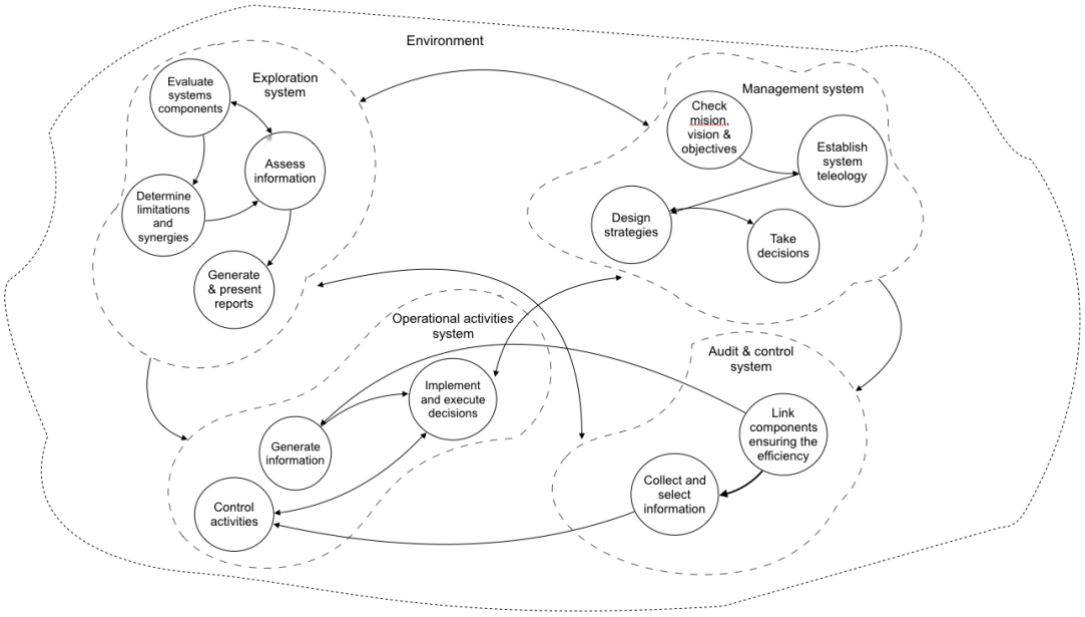

Figure 3. Conceptual model

The construct express that it is necessary to try the correct communication among the systems for its harmonic operation, to ensure the viability and competitiveness. The evaluation of the coastal space as well as the introduction of mechanisms of control and regulation, from the systemic perspective, implies to reduce the anthropic impact, maintain the viability of the beach , as well as to reflect on environmental, social and economic aspects (Benseny, 2006). To ensure that purpose the VSM provides a robust structure to contrast the conceptual model, as it contains subsystems necessary to achieve the autonomy of an organisation, which are: operations, coordination, control, intelligence, policy and audit (Pérez, 2008).

The first step was to adapt the operating subsystems to management of beaches:
S1. Operations: it delivers to the environment the goods and produced services. The beneficiaries of the system, expressed in the CATOWE, must be attended through the performance of operational units, which are:

1. **Environmental quality (EQ):** focused on caring and regulate the environmental aspects of the beach.
2. **Accessibility and security (A&S):** Sets the conditions required to maintain a favorable environment for the development of activities.
3. **Structure and tourist equipment (S&TE):** regulates the impact of infrastructure, seeking to use materials from the region, according to the norm and to the configuration of natural space.
4. **Services (S):** identifies the effects that can generate to the beach, therefore, must be a constant monitoring so that they meet the purpose of the system.

S2. Coordination: is responsible for preventing and addressing the shocks that may occur between the operational units. Each unit has a control center.

EQ unit: programs of environmental education, cleaning and residues management; regulations for disposal of garbage and waste.
A&S unit: restrictive regulations of activities, norms for terrestrial and nautical use of teams, emergency programs before natural phenomena.
S&TE unit: regulation for new constructions. Priority must be given to extensions to existing buildings therefore regulate such modifications and maintenance, putting emphasis on minimizing the impact to the beach.
S unit: it has regulations on informal commerce, generation of wastes and pollutants for the provision of services. As well as the regulation of activities in accordance with their impact on the beach.

S3. Operational management: it manages to S1, assigns objectives and resources through instructions, negotiation of resources and accountability. Complies with agents from the different sectors, for example, managers, municipal authority, members of local organisations.

S3*. Audit: identifies the information in non-explicit aspects through the usual channels of communication, it is accomplished through audits, studies, surveys, interviews and other information gathering tools.

S4. Intelligence: it is responsible for the future and environment of the organisation, its function is to detect changes in the environment to respond in time and with greater certainty. it should be formed by members of all the productive sectors, those involved in the administration of the beach, among them, representatives of the local, state and federal authority; local community; academic sector; NGOs and other actors that intervene in the development of the beach.

Therefore, this system must filter information from the environment with regard to: environmental restrictions, regulatory framework, public policies and government agencies. At the same time, it should study information from system 3 to communicate it to system 5.

S5. Policy: it sets the purpose for the organisation and intervention of the actors with decision power such as: municipal authorities, state and federal agencies involved; representatives of operational units; committee of clean beaches council of the basin of the coast of Oaxaca. In order to with the purpose of combining the above the figure 4 shows the VSM model for beach management.

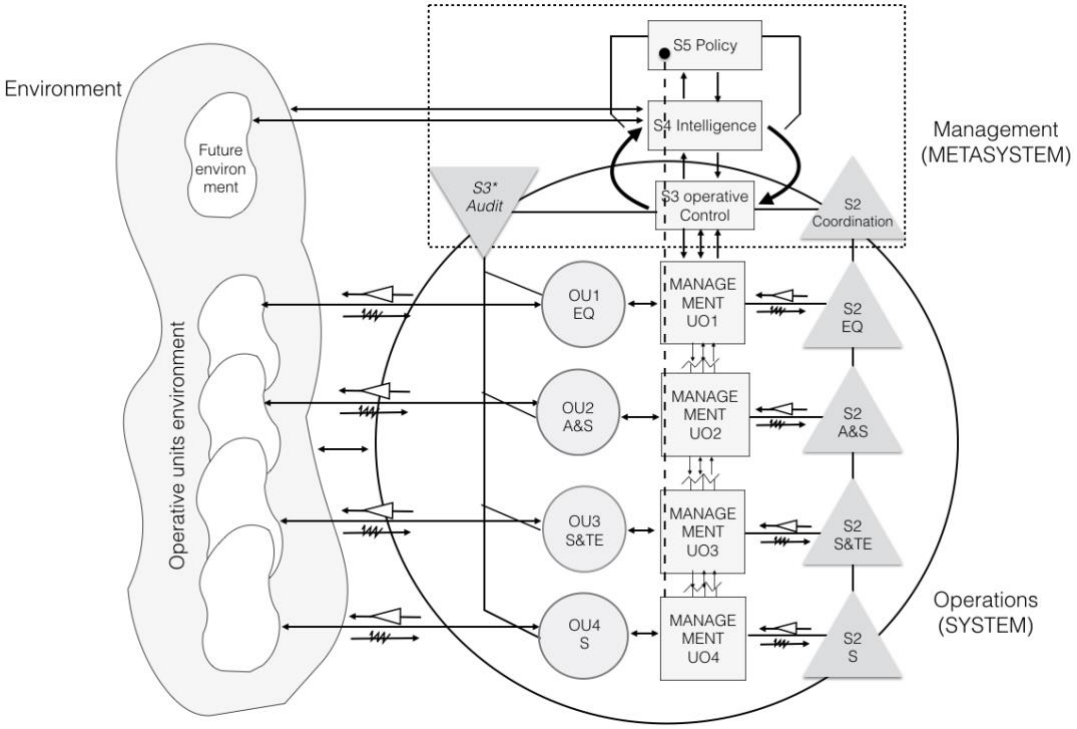

Figure 4. VSM for the beach management in Puerto Escondido

Finally, the need for a common purpose, a mission, and vision that enable everyone to be part of the system is exposed, so that they advance together towards the real integration of the beach, towards an effective beach holistic management.

Table 2. Conceptual Model V.S. Viable System Model

Exploration system: it identifies malfunction causes, check the elements of the system, its limitations and synergies.	**S3*:** look for information and audit. **S4:** it studies the present and future environment.
Management system: it sets the core activity for the whole system and the way to accomplish it.	**S5:** it makes decisions, policies and strategies. **S3:** assigns objectives and resources to S1.

Operative activity systems: implementation and execution of strategies and activities established for the management.	**S1:** it produces and delivers products and services to market. **S2:** strive for the coordination, integration and stability among operative units.
Audit and control system: it keeps the flow of information through a process of selection and evaluation of the same.	**S3:** it sets mechanisms to clarify information. **S3*:** audit, operations research, surveys.

In sum, order and control must be reinforced through the constant of information flow and an assessment that allows visualizing changes on the system over time. This contributes to analyze its growth and identify actions needed to ensure its viability and survival.

CONCLUSIONS

Beaches have shown a relevant value for tourist development. However, the traditional massive tourism scheme is opposed to an appropriated land use and tourism planning. Having negative social and environmental consequences.

From the systemic perspective, the beach can be understood as a human activity system immersed in an changing ecological environment. Therefore, it requires mechanisms of order and control that will enable to maintain its viability under a smooth operation of its elements.

The development of this work identified that:

The administration of tourist beaches focuses on tourist satisfaction, without considering all beneficiaries for its management.

On the other hand, through literature review was identified that the delimitation of tourist beaches space is based on a geographic paradigm, this provides the same static value for all components and differs from a holistic vision that sees the beach as a dynamic system in constant interaction with its environment.

In the studied system, it was found that the growth devoid of planning, the increase of individual interests, lack of long-term vision, improper links between actors, pollution, disruption of tourism infrastructure and the provision of tourist services, are factors that can be tackled for the model in order to seek a viable equilibrium state.

In order to correct the mentioned problems, the conceptual model has the purpose to involve stakeholders in the beach management process, through a holistic view of the identified problems. As it was established in the root definition, and its verification through the CATOWE, the proposal is not only aimed at customers of the tourist market, but the actors affected by correct or incorrect management of beaches. It is important to mention that the provision of services does not lose significance; however, it is not the purpose of the system not to seek to development in a tourist system, but to observe and implement improvements in the beach management through a system with adaptation and learning capacity facing changes in the environment.

Finally, from the systemic perspective, the beach can be understood as a system of human activity immersed in an ecological environment changing. Therefore, requires mechanisms of order and control that will enable it to maintain its viability under a smooth operation of its elements.

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