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A Strategic Environmental Management Model: Salt Lake Case

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Abstract

Strategic Environmental Management Plan (SEMP) is the most important tool used to determine how to protect, to use, to develop and to manage regions. SEM is prepared for the identification of natural and cultural resources, identifying threats to those resources, and the long term protection of the region and it also provides development of strategies and implementation plans. Within SEM is based on the current state of the region and it shows the most efficient and equitable way to be achieved in the future.

The article aims to correctly analyse Salt Lake's unique environmental conditions and protect its biological endogenous and exogenous factors that may arise in the future. In this paper, it is also developed creative and innovative approaches to use and to protect existing stocks by establishing a major paradigm to carry these approaches into future. The model includes four dimensions. First the problems of Salt Lake is determined in consideration of four dimensions such as environment, agriculture and livestock, business world and management issues then a scale is developed according to results obtained from focus group meetings. Stakeholders of Salt Lake evaluate each component of the region –economic condition, biological, ecological and social values, protection of environment, and regional management issues -. Finally, a strategic environmental management model is developed special to Salt Lake.

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1. Introduction

Salt Lake located in Konya Closed Basin covers an area approximately 260.000 hectares and in this respect it is the second largest lake in Turkey. Salt Lake and its surroundings, have been identified as the Special Environmental Protection Area (SEPA) by Council of Ministers Decision dated 14.09.2000 and numbered 2000/1381. Within Council of Minister Decision dated 07.04.2002 and numbered 2002/ 4512, the region's boundaries were changed. Salt Lake SEPA has a dry climate structure and it locates within the borders of Ankara, Konya and Aksaray. It covers an area of 7.414 km². In this respect, Salt Lake, the most largest SEPA in Turkey, hosts 3 cities, 5 counties, 26 towns and 61 villages. Because of the value of biological diversity, Salt Lake SEPA has gained an important bird area, important plant area and key biodiversity area status. Among the cultural values of the area, Ivris Relief, Silk Road Route, 51 mounds (each of them is a first degree Archaeological Site), 13 historical place (each of them is a first degree Archaeological Site), 2 mosques, 2 castles, 1 hostel, 1 water channel, 1 open air site, 2 ancient cities (one of them is a stack and th other is underground). As an economic value, around the lake, approximately \$ 130 million from the irrigated agriculture activities, \$ 25 million from dry land farming activities, \$ 182 million from livestock operations and \$ 17 million from the production of salt and sodium sulfate are obtained. The vision of the Salt Lake is to be a world known SEPA where environment conscious and happy people live while using the resources of the region by maintaining its potential. In the first part of the study, a comprehensive literature review were made about the environmental management models and land use methods in environmental management plans. In addition, case studies for Environmental Management Planning Models were given to create a base for model and benchmarking. In the second part of the study, methodology was explained and analysis results were discussed. Finally, at the conclusion part, the ideal strategies of the Salt Lake were given and strategic operational model of the Salt Lake SEPA was generated.

2. Literature Review

Environmental Management Plans are very extensive studies which include not only many areas such as lake, watershed, forest area collectively but also is created for each field in a separate way. Many approaches is seen for the preparation of environmental management plans in the world and these approaches are named General Approaches to Environmental Management Plan in the literature.

2.1. Environmental Management Approaches

Takeuchi and Lee (1989) discussed Environmental Management Plans with the ecosystem approach. Armitage (1995), criticized the ecosystem approach because the approach is an ethical approach rather than empirical evidence and methodologically and it is inadequate to analyze complex systems. Instead of ecosystem approach, Armitage (1995) developed an integrative methodological framework for sustainable environmental planning and management by combining Basin Planning Model of Hufschmidt and ABC Resource Survey Method. Besides, Linkov et al (2006) developed a Traditional Environmental Management Model. In contrast to this model, adaptive management approach provided a systematical tool for linking a dynamic relationship between environmental management and information on the performance of ecosystem or social and economic priorities. Whereas Stroup and Finewood (2011) criticized this approach, they presented an alternative approach by combining this approach with political and ecological approaches. One of the studies of management plans for protected areas and basins such as Gunes (2011), Participation Management Approach was emphasized and case studies carried out in Turkey to show how the participation management planning process should be handled. Muñoz-Erickson et al. (1999) used ecological and socio-economic factors of Integrated Ecosystem Health Indicators Management Models for evaluation of Collaboration Based Management Model in the case study of Diablo Trust Land. Bentrap (2001) criticized traditional participatory management processes in basin planning, because these processes restricted information sharing, public participation and sample promotion during public announcements and interpretation period. This approach was also inadequate for environmental planning because it supported win-lose strategy. The study of Selin ve Chavez (1995) revealed fundamental differences between Collaboration Based Management Planning and participatory planning. Another approach for Environmental Management Plan was Environmental Impact Evaluation. Canter (1998) gave brief descriptions of methods used in this approach and classified them in a table by at what stage of the methodology applied in works, usage areas, frequency of use, the degree of importance according to periods. One of the important approaches for EMP is Integrated EMP. Margerum (1999) evaluated the literature and examined twenty three case

studies from America and Australia then applied a survey to 285 Australian questionnaires. At the end of his analyses, he classified twenty elements of the approach in three categories such as initial, operation and outcomes. Besides, Yaşar Korkanç (2004) developed a Watershed Management Approach to investigate how multi-element integrated water resources and wetland ecosystems are protected and restored.

2.2. Land Use Methods

Land Use Methods are always an important tool for EMP. For that reason, land use literature is examined in this article. Liu et al. (2007) articulated studies on the land use cover settlements such as basins, urban areas, agricultural areas and forest areas. In studies of land use management, the researchers used many innovative approaches such as assessment of appropriateness of the land use, the estimated changes in land use and evaluation and allocation of land. AHP method was developed by Saaty (1980) which provided an evaluation of group decisions by systematic and logical approach (Akbulak, 2010). This method was used in rural development, modeling sustainable development plans and layout planning. Roberts et al. (1979) developed a model by using weighted matrices to determine suitability of land use of a region and applied this model to Monorea Lake where flooding was seen frequently. The main purpose of this model was to decide optimal usage for this region and transforming this region in one of these existing alternatives; settlement, wild life, entertainment, public domain or agriculture. One of the land use methods were usage change and demand prediction approach. In this approach, a number of in one of estimation methods such as system-dynamics modeling, scenario analysis, input-output analysis, land transformation, simulation and neural network were used. Pijanowski et al. (2002) proposed a land transformation model by using artificial neural network and GIS together to predict change of land use in Michigan Grand Traverse Bay Basin. Results had shown that various social, political and environmental factors were required at land use transformation estimation. He et al. (2006) developed a cellular automation model by integrated system dynamics to predict scenarios of land use change in north China in the next twenty years. Rossiter (1996) drew a theoretical framework for land assessment and explained the process of this land assessment in “land assessment” lecture notes published in 1994. Besides, Klocking et al. (2003) developed a GIS based model for spatial layout of crop areas which locate at Thuringian Basin, Germany in their study on land use allocation (another important land use approach). Wang et al. (2004) proposed unreal fuzzy multi-targeted programming for the placement of Erhai Lake in China. Liu et al. (2007) combined GIS and Multi Criteria Analysis Method for conformity assessment. At this integrated model, system dynamics model was used for estimation of change in land use. In addition, for assessment of resource and regional market values, cost approach method and hierarchical process method were used in the model. Jaakson (1972) proposed to use Zoning Methods in land use plan of lakes. However, Anderson et al (1976), developed a flexible classification system, consisting two levels in general by remote sensing for land use and classifying land cover. Riveira and Maseda (2006) showed land use models which have different goals, implications, technics and methodologies in a table. Existing literature on this subject included studies in different fields such as planning, GIS, decision making and computer systems.

2.3. Case Studies for Environmental Management Planning Models

In this part, several case studies of Environmental Management Planning Models were examined to see process of an environmental management plan and implications of a model to regions. When Scugog Lake Environmental Management Model was examined in detail, activities at the plan are grouped under six strategies including all dimensions of human activities. As a result, Plan was made within a predictable cost. Indeed, the water budget for the area was made. In another case study, Jipe Lake Management Plan, the fundamental goal is putting forward a sustainable management approach for the protection of natural resources and their functions toward needs of local, regional and international wetlands. For this purpose, group meetings and interviews were conducted with key stakeholders (farmers, breeders, fishermen, non-governmental organizations, health, city planning, environment and natural resources, water and agriculture district directorates) to develop a land use plan. They obtained information about land use activities from field visits. GIS computer system was also used to collect data about geographic areas. These collected data were examined on maps to identify characteristics of these areas. In addition, five types of soil samples were collected and analyzed to have an idea about land use of the entire area. In Blue Lake Management Plan, a survey conducted to determine why people prefer to live at Blue Lake, their perceptions, the characteristics of the lake and activities that have carried out around the lake and then Mapping Methods were used. In the largest lake of the U.S., Great Salt Lake Management Plan, sub system approach was used. In this approach, interaction of social, physical and ecological subsystem of Great Salt Lake was modeled.

3. Methodology

This study aims to generate a strategic operational environmental management model for Salt Lake. For this reason, the qualitative and quantitative research methods were applied together. At first, a comprehensive literature review was made. In the light of the secondary data, seven meeting groups were organized and a reliable and valid survey were conducted to 343 participants. This survey consisted two parts. At the first part, the likert type questions searched about economical, managerial, agricultural, livestock and environmental problems of Salt Lake SEPA. At the second part, there were open ended questions to determine the strategies for Salt Lake environmental management plan. According to survey results, four Dynamic Diamond Models were set for every dimension of problems of Salt Lake.

3.1. The problems of Salt Lake

The problems about water particularly attract attention in Konya closed basin. Poor underground resources, increase of the sink-holes, hydrogeological variations and unlicensed wells, meteorological variations, water pollution, agricultural structure and activities in the watershed are major important problems of the Salt Lake. For example, Salt Lake is one of the driest regions in Turkey. Because of this reason, salinization occurs gradually in underground waters. Also there is a direct link between sink-holes formation and underground waters reduction. Natural events and human activities underlie sink-holes formation. Land degradations, the result of sink-holes formation cause environmental risks as well as cause adverse effects on the social area. The people, who lose their lands or their source of income, have to migrate other regions. In addition to these, illegal wells prevent sustainability of water resources. Therefore dryness in the region increases gradually. Although, in 2000, Salt Lake sub basin was announced Specially Protected Environment Area, the water pollution and agriculture and livestock activities in the region continue threaten natural life seriously. According to results of focus group meetings and survey results, the fundamental problems of Salt Lake are incorrect and unsustainable resource usage. The major problems are categorized under the four dimensions such as environment, agriculture and livestock, business world and management issues. As a result of four Dynamic Diamond Models, it has been concluded that region attains a standard in the field of business whereas the region remains generally weak in the other fields.

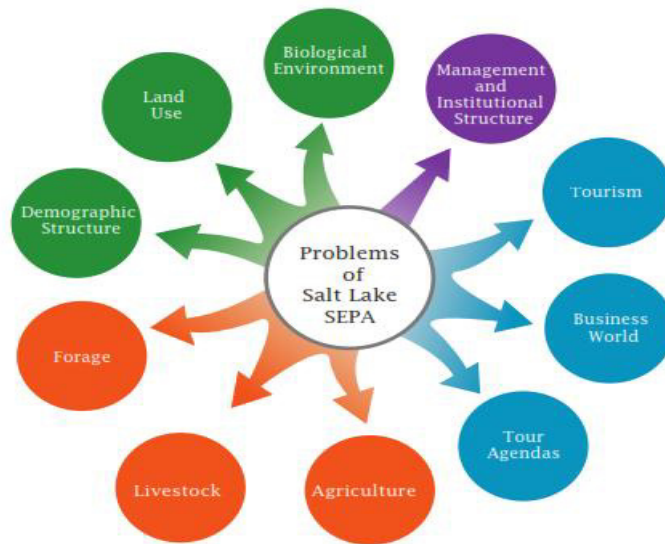


Fig 1. Problems of Salt Lake SEPA

3.2. The Dynamic Diamond Model For Salt Lake

In this study, dynamic diamond model was used to build quantitative understanding of the problems of Salt Lake SEPA. The model diagrams had been simplified the outcomes to highlight the models major components. The major problems of Salt Lake SEPA was modelled as below.

3.2.1. Environmental Problems

As a result of the first dynamic diamond model for Salt Lake, it was concluded that environmental awareness is low and people are insensitive to the environment in the region. In this regard, it can be said that ecological and biological values of the area have not been recognized by the people who live in this region. In addition, the low level of socio-economic development of the area has affected negatively development of the environmental consciousness and increase of environmental awareness. Besides the measures taken for environmental protection is inadequate and there is no effective control mechanism whether the measures are applied or not.

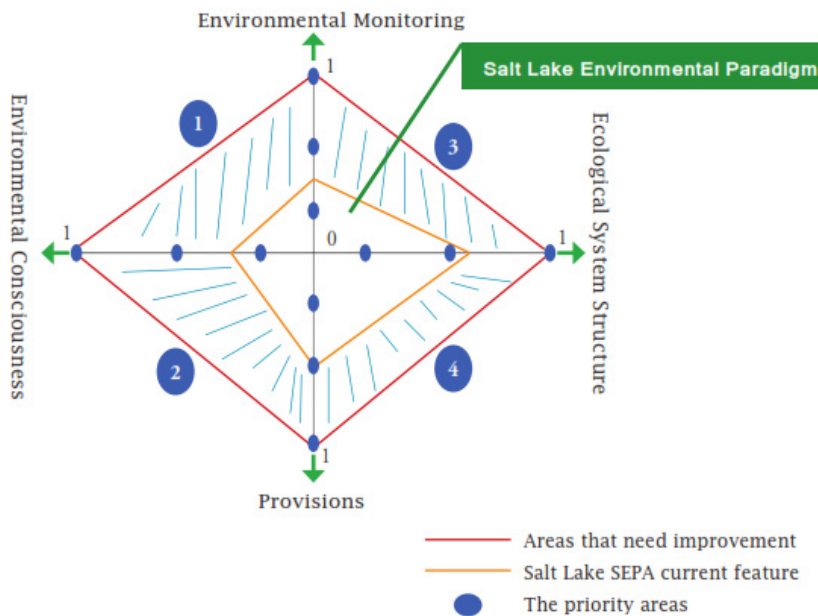


Fig 2. The Dynamic Dimond Model for Environmental Problem

3.2.2. Problems Related Agriculture and Livestock

As it was seen from the model, water and natural resources should be used in a sustainable manner. Moreover, an effective agriculture and livestock organization structure should be formed. Besides forming a good organization, the producers should be supported by providing seed, knowledge, finance and modern agricultural practice methods. In the past there were given incentives such as different products for agricultural activities in the region (canola, anise, cumin, almonds, corn, etc.) but farmers were not interested in these incentives because they could not outgrow their agricultural practices.

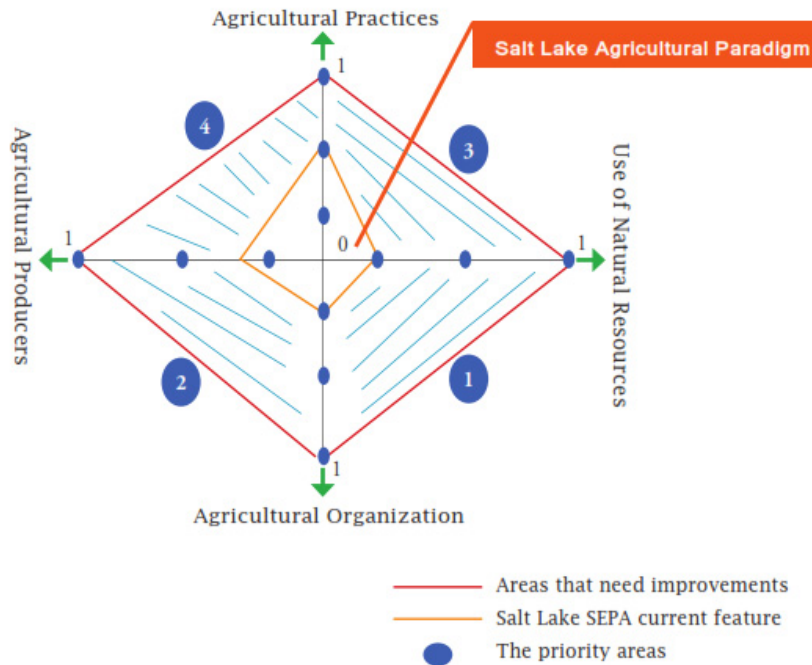


Fig 3. The Dynamic Dimond Model for Problems Related Agricultural and Livestock

3.2.3. Problems Related Business World

Salt Lake and its environment comes into prominence not only its ecological and physical values, but also its contribution to the national economy and generated value added (minimum 425 million \$). Besides developed agriculture and livestock sector, there are salt enterprises who supply %70 of salt demand in Turkey. In addition, region structure is favorable for tourism activities. In spite of this economic size and production capacity, there are several problems related business world in the region. According to model, the weakest link in the business world of the region is the general approach of the business world. The general approach of the business world refers that perception of the sectors operating in the region towards the region and sectorial outlook of the region from outside. In this context, the players in the business world can see the investment potential and employment opportunities in the region but they don't believe that current sectorial structure is sustainable. Especially, due to the pollution created, Organized Industrial Zone is regarded with suspicion. This study claims that increasing economic and social welfare of the people in this region will affect the environmental awareness and consciousness in the positive direction. But due the region is SEPA, environmental protection law pushes up bureaucratic barriers for the new investments such as cartons, sacks and pipe factories in the region. In Salt Lake region, business world is formed family and micro scaled companies whose management and financial structures are weak and fragile. These enterprises included salt enterprises meet only domestic market demand and don't have adequate know-how to develop derivative products which high added values. This sectorial structure causes to fail rapid development of economy in this region and to shift potential investments to other regions. In addition to this, the wrong launch of products in the national and

international markets such as salt production process pollutes the Salt Lake as well as cause dry lake has led to decline in sales. On the other side, as mentioned in the focus groups and scale, despite Salt Lake and its surroundings have a high potential for tourism, growth rate of the tourism sector is low and has remained behind its potential revenue. Inadequate infrastructure and promotion and failure to make strategic tourism management planning are the major problems about tourism in the region. Indeed, the region has a significant potential for alternative tourism from health tourism to nature tourism but this sectors has not gained to Salt Lake and surrounding.

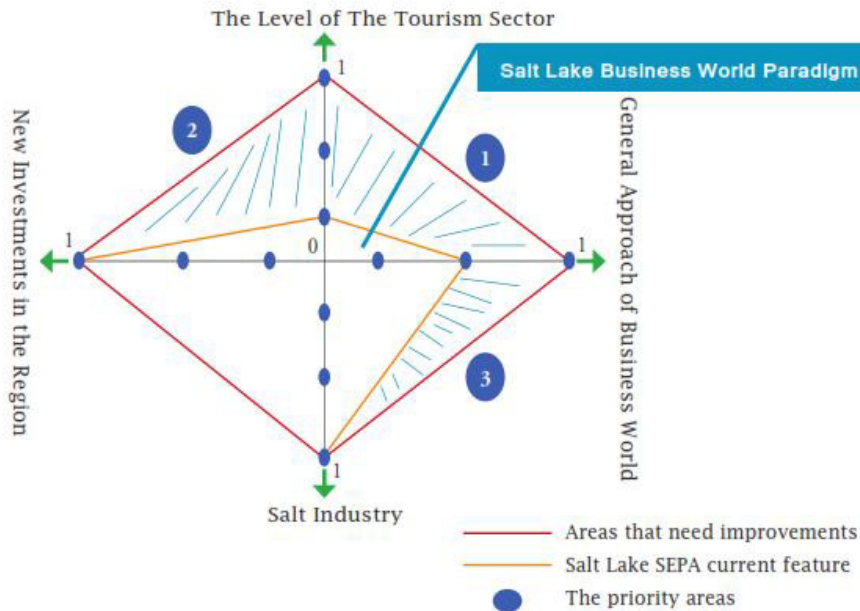


Fig 4. The Dynamic Dimond Model for Problems Related Business World

3.2.4. Management Problems

The most problematic area is current management structure of Salt Lake SEPA. Undefined authority and responsibility boundaries of the institutions is one of the most important problem for region management. For example, conflict of authority between institutions prevents the effectiveness of practices. Another important problem of Salt Lake SEPA region management is the lack of coordination between institutions. Disconnected practices of different organizations are weaken relationships and prevent the development of effective communication and collaboration network. In this network, Civil Society Organizations have the weak instutional structure. Weak communication between central government and universities and inadequate support to universities adversely affect research and development studies for region. A poor understanding of the central government from the local government causes rejection of decisions by subcommittee and to experience difficulties in the practical implications of decisions. Local governments who have financial difficulties implement all works in the form of service procurement. Therefore this case brings additional costs to local governments and also reduce the quality of service.

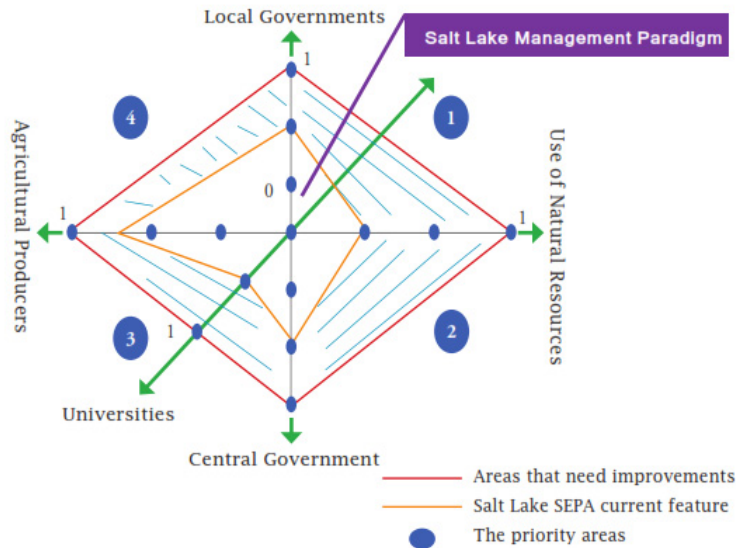


Fig 5. The Dynamic Dimond Model for Managerial Problems

In conclusion, Salt Lake and surroundings need an environmental management plan and a organizational model in order to maintain its current biological, pyhsical, economic and social values.

4. Conclusion

At a result of the analysis, there were determined six ideal goals for Salt Lake and towards these ideal goals, Strategic Operational Environmental Management Model was created for Salt Lake. In the research, first a comprehensive literature review was performed for benchmarking the models. At the focus group meetings, the problems of the SEPA were determined in terms of environment, agriculture and livestock, business world and management throughout Michael Porter's Dynamic Diamond Model. Finally a strategic operational model was generated in the light of the six ideal goals in Salt Lake strategic environmental management plan.

The ideal goals of the Salt Lake Strategic Environmental Management Plan:

- Protect biological diversity and ecosystem services of the region,
- Ensure the efficient and sustainable use of natural resources
- Ensure the sustainability of agriculture and livestock activities
- Develop economic activities in the region toward the axis of the natural values
- Develop sustainable tourism
- Ensure effective management of the Salt Lake SEPA

An organizational model, Salt Lake Protection Union was constructed to ensure the sustainability of the Environmental Management Model which was mentioned below. This union consists of several committees which are water, environment, consultation, management, agriculture and livestock. These committees work in coordination with each other and their areas of authority and responsibility are specified. This union is monitored by independent auditing companies and supervised by Ministry of Environment and Urban Planning.

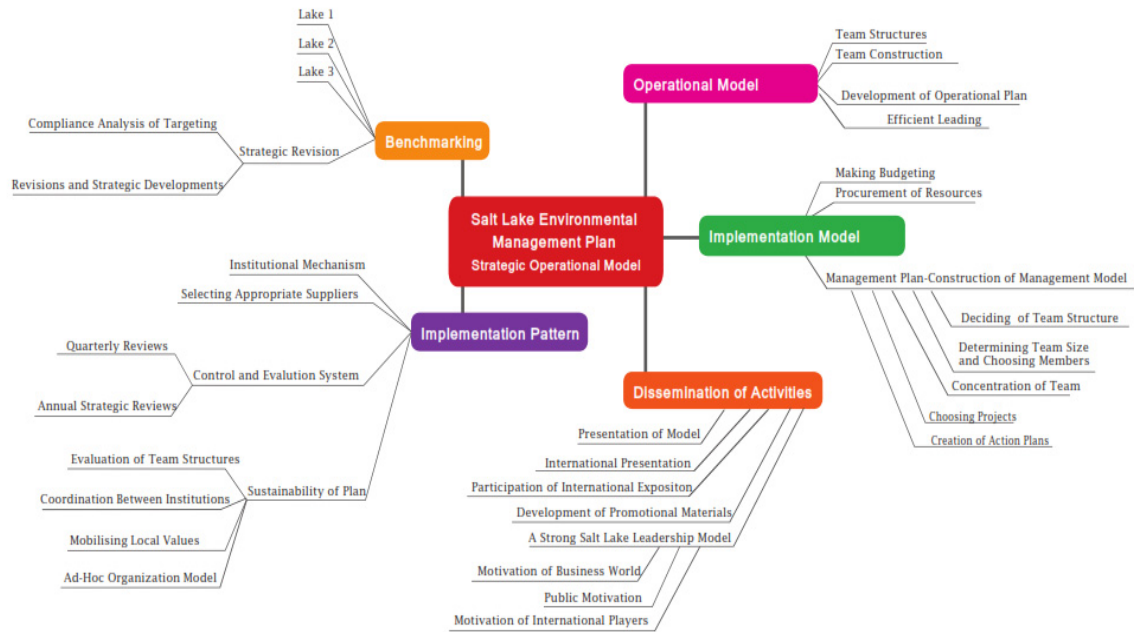


Fig 6. Salt Lake Strategic Environmental Management Plan

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