

Tourism Crisis Management System Based on Ecological Mechanism

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Abstract—Tourism industry has become one of the biggest and dynamic industries in the world, giving a great impetus to the economic development. However, its vulnerability and the crisis management have been the momentous problem. The findings of researches and practices have shown that tourism crisis will possibly take place due to the destruction of system balance, which is similar to the ecological crisis in the natural world. This paper built an ecological system model to research the formation mechanism of tourism crisis, and designed the crisis management system for preventing, monitoring, controlling and recovering the tourism crisis both from natural and social environment.

Index Terms—Tourism Crisis, Crisis management, Management System, Ecological Mechanism

I. INTRODUCTION

Tourism industry has become one of the biggest and dynamic industries in the world, giving a great impetus to the economic development. However, as the tourism industry started to be the pillar industry of the economic development, its vulnerability is revealed seriously.

Since 1980s, a series of crises such as the tsunami in Indonesia in 2004, the hurricane in New Orleans in 2005, etc have attacked the tourism industry, damaging severely the travel economy and the people's life and properties. How to avoid and reduce the possibility of crisis while maintaining the fast development of the tourism industry has been a burning problem.

The management of tourism crisis has been paid much attention, but it is difficult to perform it due to the distinctiveness of the tourism industry. On one hand, it concerns lots of industries that have different characters,

for instance, hotels, travel agencies, etc. On the other hand, the tourism industry has a strong dependence on the natural and social environment. The loose industrial structure and strong dependence on the environments makes it even more difficult to resolve the crises once they occur. The crisis management demands not only the regulations and organizations, but the fast communication of information, quick data processing and well coordination of every part. So, applying the information technology, to establish a crisis management system that can widely collect the information in travel operative activities and crisis and can respond to them efficiently is more and more regarded as a necessity for the realization of an efficient crisis management.

The research on tourism crisis started from 1970s. In 1974, the Travel Research Association first listed the travel research as one of the most important projects. Since then, the areas of crime and travel[1], terrorism and travel[2], war and travel[3], financial crisis and travel[4], natural disaster and travel[5], public health and travel[6], etc have been researched by lots of scholars. But only Faulkner[7] and few scholars have presented the theoretical system of crisis management. As a conclusion, it is still scare in the research of the data acquisition for the general tourism crisis and its responding system, of the mechanism of tourism system and the tourism crisis management system built with modern techniques.

In the area of ecological management research, the ecology was introduced into the management study in 1970 by Aldrich. H. E. and J. Pfeffer[8]. Hannan and Freeman[9] pointed out the community ecological theory in 1977. James F. Moore[10] in 1996 built a business ecological system and Richard L. Daft[11] in 1998 further developed the cooperation and conflict between ecological systems, and reached a competitive and cooperative mode and an organization for study. A through introduction of the ecological management is made by D. Kong and X. Z. Cui in 2003[12].

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This paper used the ecological mechanism to build the tourism ecological system and analyzed the formation and influence of its crisis. On such basis, a management system for tourism crisis is presented to provide a responding solution to the tourism crisis. The system' module functions and architecture are to be analyzed further. In later sections, we provide a compound ecological system of Buddhism cultural travel and put forward an ecological-chain-based developing mode to maintain its sustainable development.

II. TOURISM ECOLOGICAL SYSTEM AND ITS CRISIS MECHANISM

A. Tourism Ecological System

The natural ecological system has the characteristic of fragile since the ecological community and its living environment are dependent on each other. Likewise, the tourism system has integrated into the environment, whose each little fluctuation can leads to the incredible disaster of the tourism industry. With such consideration, introducing the concept of the ecological system into the research of tourism crisis to learn the experience of natural ecological degradation and recovery is really meaningful.

In the natural ecological system, producers, consumers and reducers constitute the whole organic ecological community. The ecological system is not the simple assembly of various kinds of creatures and their environment. Instead, it is an organic system in which all the creatures and environmental factors are interdependent and inter-checked. Since the ecological system has the ability of self-adjusting, it is relatively stable in the normal condition. And generally, there are

two kinds of stable states for one organism. One is the homeostasis, namely the self-adjusting ability to respond to the environmental changes, and another is state that every ecological factor is in the range of its ecological valence, which regulates the highest level that an ecological factor is allowed to reach. Once some ecological factor exceeds its ecological valence, ecological crisis occurs, leading further to the deterioration of the ecological system. Among the various reasons that may cause the ecological system, external interference, especially the manual interference, is the primary reason. Ecological recovery is also in the progress as the deterioration is going on. The natural ecological system retains its systematic structure and function in this process with the favorable factors of the environment and the self-adjusting ability.

In tourism industry, travel activity is the foundation, in which tourists, tourism resources and tourism business constitute the three "T" factors of the travel industry. To put it one step further, the travel industrial system is an organized and functional entity that is constituted by travel activity organizers and participants with the use of information flow, power flow, material flow and value flow, and that is in the form of tourism environmental resources [13][14].

As the natural ecological system we discussed above, the tourism industrial ecological system is also formed generally by producers, consumers, reducers and their dependent environment. Apart from this, the flow of information, power and value, etc is also the part of tourism ecological system. By referring to the natural ecological system and its operation mechanism presented by W. H. Dai, etc in 2005[15], we established the ecological system model of tourism as Figure 1.

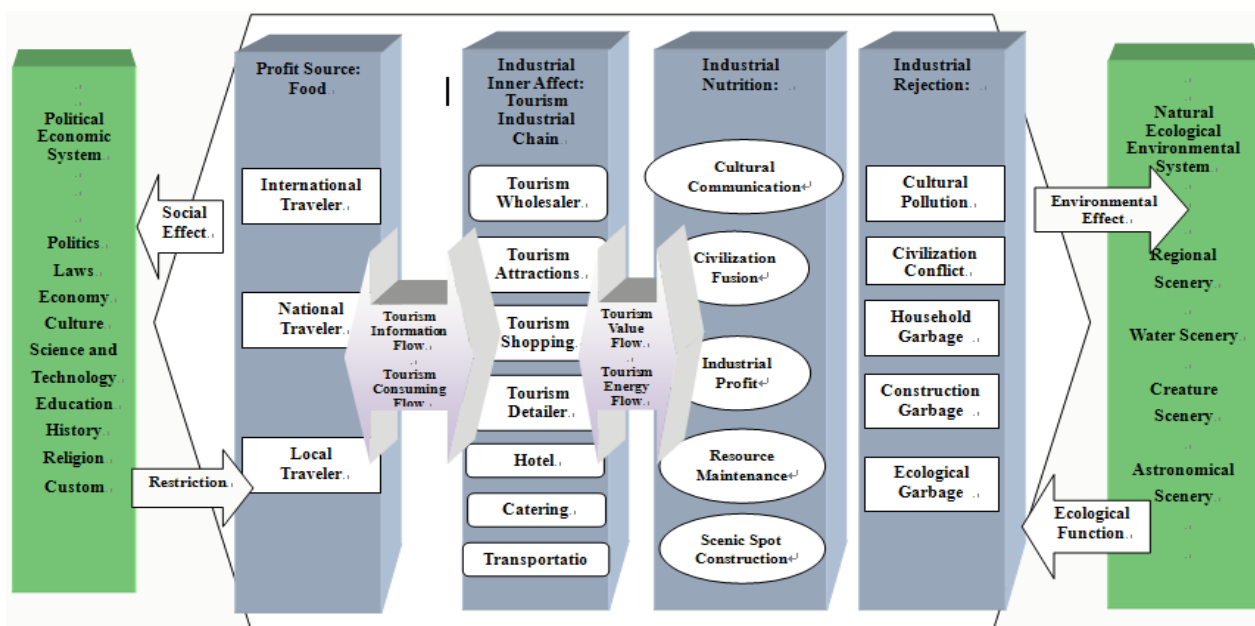


Figure1. Tourism ecological system model

In this system model, producers, consumers and producers promote the circulation of the tourism

ecological system by making use of the information flow, consuming flow, power flow and value flow. The tourism

corporations drive the consumers' travelling desire by the tourism information flow, which leads to the formation of tourism consuming flow, and after the digesting of tourism corporations, the tourism power flow forms to go through the whole process of travel activity and produces industrial nutrition. The positive power flow changes into the travel value flow to raise the system into a higher level and thus can start a new circulation, while the negative power flow may damage the social and natural environment by releasing rejections.

B. Tourism Crisis Mechanism and Management

There is such a wide range of the concept of tourism crisis, which includes the tourism economic crisis, tourism cultural and social relationship crisis, and tourism security crisis, etc[16]-[21], that it is necessary for us to give it a definite definition for our research. In this paper, we defined the tourism crisis as the natural or manual unexpected disasters that affect the travel industrial operation and have to be responded in the limited time and in uncertain conditions. In other words, the tourism crisis in our research range mainly refers to the crises that are related to the tourism security. On the whole, the tourism crisis can be divided into two types: one is the external crisis that occurs when the nature and society are regarded as the environment of the tourism industrial development, and another one is named internal tourism crisis that happens in the travelling process, for example, housing, eating, and transportation, etc. It is not the pure crisis coming out of the inner of the industry. On the contrary, its causes are quite complicated, its occurrences are pretty unpredictable and versatile, its influence covers various regions, and also it is difficult to recover.

Since tourism crisis can't be avoided only by securing the operating procedures in travel operational activities, its management becomes especially important. At present, the management systems for tourism crisis are mostly based on institutions and organizations, lacking a practical management system. The general method is to divide the whole crisis management process into three stages, referring to the warning mechanism before the crisis, the processing mechanism in the crisis, and the recovering mechanism after the crisis. In the warning mechanism management stage, most of the works, such as analyzing and evaluating the original information, are

completed by the management information system to evaluate and predict the risks. In the crisis processing stage, the role that the crisis management mechanism plays changes into the quick response in the shortest time to prevent the development of crisis. And in the last recovering stage, travel places and public confidence are to be resumed by the combining efforts of institutions and organizations.

Though some developed countries have already established a set of public crisis processing system and crisis information management system, shortcomings have been revealed in the real cases in that the traditional crisis management system is weak in the continuous risk management and lacks the quantitative indicators and ability to process the non-structured data.

Addressed by Z. F. Yang, etc. [14] in 2005, the natural ecological system has a potential ability to maintain its service function and health, called the ecological carrying capacity. From the perspective of this view, the tourism ecological system also possesses the ecological carrying capacity concerning its ecological health. The natural and social environments provide the resources carrying capacity for the tourism ecological system, and the tourism ecological system supports travelers' activities in a certain resilience range. As the natural ecological system does, the tourism ecological system maintains stable state with its dependent natural and social environments in the supporting of self-resilience and carrying capacity.

We have already known that the natural ecological system imbalance leads to the crisis finally, and such natural ecological system crisis is mainly driven by external interference. Referring to this mechanism, we reached the conclusion that the tourism crisis is caused by tourism crisis factors, actually the external interference. Once the quantity of the tourism crisis factors exceeds the ecological valiance that the system is able to carry, the system comes into deterioration and even crash. To be more specific, one kind of crisis will bring other kinds of crises, forming a crisis chain finally, because of the food net that all kinds of tourism factors build in power flowing and value flowing process. The crisis spreads in the three mechanisms in Figure 2.

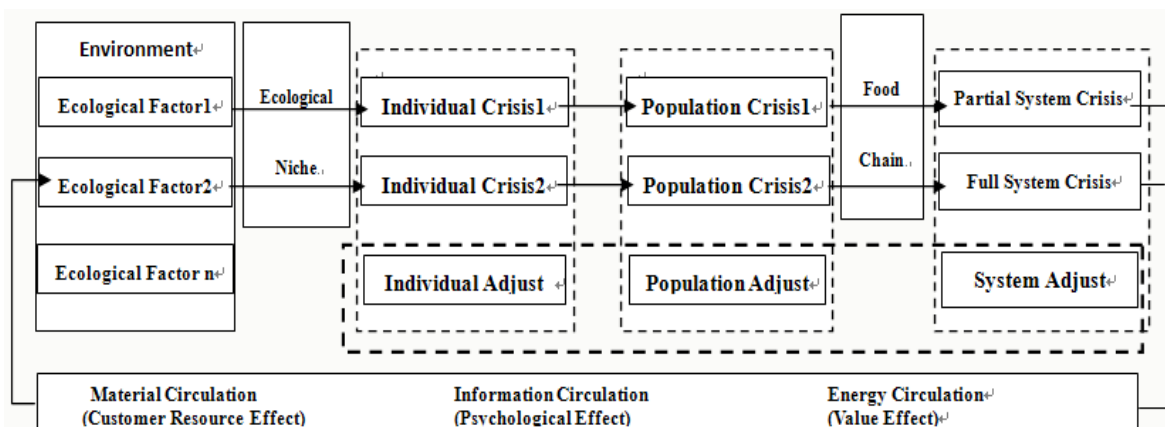


Figure2. Ecological mechanism of tourism crisis

As it shows in the figure, the crisis may occur when the material flow or the value flow breaks down. Crisis series may also happen when the information flow affects the psychological factor to cause more and more crises. Finally, the crisis may affect the environment and the environment reversely affects other ecological factors to change into other interfering factors that may cause other kinds of tourism crises.

III. TOURISM CRISIS MANAGEMENT SYSTEM

A. Framework and Procedures of Tourism Crisis Management

The application of ecological mechanism into the research of tourism industry and its crisis gives us a much more great understanding of the cause and developing process of tourism crisis. In the same way, we can make use of the methods to the crisis in natural ecological system to manage the travel crisis. On the whole, the tourism crisis management which based on the ecological

mechanism is to use the ecological principles to analyze the cause and developing process of tourism crisis and to respond to them by using the methods in ecological system.

In the end, it is the everlasting objective for the tourism crisis management to promote and maintain the health and stability of the travel ecological system. According to what we have analyzed about the ecological mechanism of tourism crisis, the tourism system is such a self-adjusted system that it has certain carrying ability and can respond to the crisis in each stage. Thus it can further be concluded that the ecological-mechanism-based tourism crisis management is terminally to guide the travel system to perform its self-adjusting ability to prevent, warn, control and recover from the crisis.

In order to build a tourism crisis management system based on ecological mechanism, we analyzed the desired system function in the separate stages in crisis management.

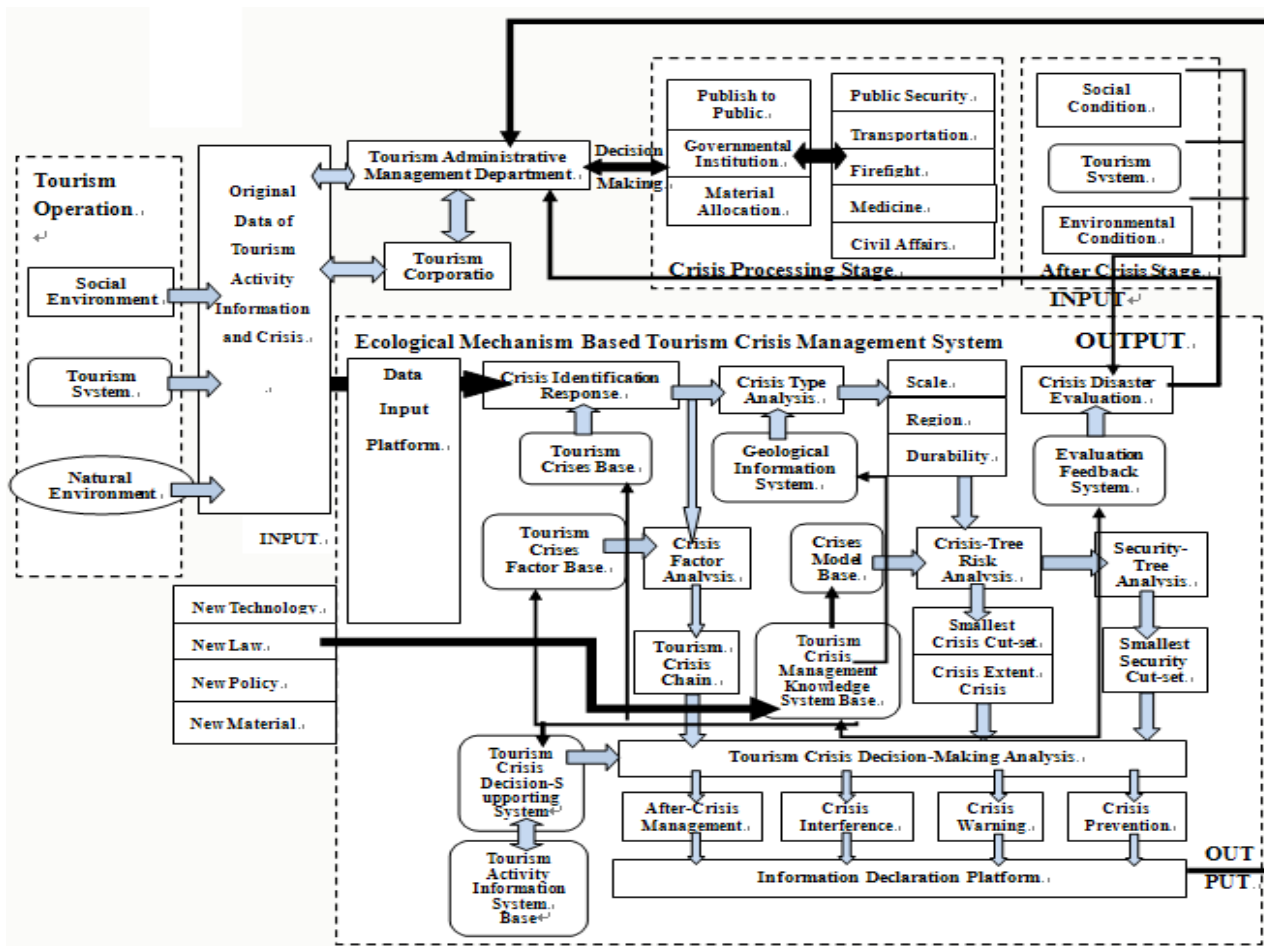


Figure3. Framework and procedures of tourism crisis management

In the preventing stage, the model of security tree is built to analyze and divide the crisis into the smallest factor so that the crisis can be prevented by avoiding the conditions that these smallest crisis factors need. In the warning stage, it is the primary and most difficult task to monitor the crisis factor. Due to the fact that many

tourism crises emerge from their related environments, it is essential to build a well-organized information communicating network that helps to provide the crisis factors' information. In the controlling stage, the system needs to identify the crises and especially their causes first and make the interfering decision with the conditions

of labors and techniques. So a regional crisis management system based on ecological mechanism is to be constructed.

In the recovery stage, we may choose the manual way or the natural way to help recover the tourism system. The choice is based on whether the crisis is caused by natural factors or social factors. The natural-factor-caused crisis can be recovered by the combination of manual and natural method. However, the social-factor-caused crisis can only be resolved by manual method.

On the whole, the tourism crisis management system should realize the following functions: indentifying the tourism crisis, analyzing the crisis factor, modeling the crisis, making the responding decision, returning the evaluation feedback and the publishing the information. Here we present the tourism crisis management system in ecological mechanism. Its function framework and processing procedures can be designed as Figure3.

According to the function figure, there are three working levels and two sub-systems to constitute the whole system. On the first working level, pre-processing work, including the crisis indentifying, crisis factor analyzing and crisis modeling, is completed. Since these works demand different models, there is not a uniformed

system to process them. Instead, the crisis factor analyzing and crisis modeling come into progress separately after the crisis is identified.

On the second working level is the tourism crisis deciding and supporting system. This occupies the heart place of the whole management system. On this level, analysis and decisions are made in the support of database and decision models. And reference models for managing the crisis are available later.

On the third level is the feedback system, which is used to evaluate the crisis to check the afterwards situation, to give a whole understanding of the crisis, and to accumulate the cases for future use.

Apart from the three working levels, dialogue sub-system is constructed for the data input and information declaration. The security sub-system is also set with hardware and software such as identity authentication, firewall and antivirus tools.

B. Architecture of Tourism Crisis Management System

According to the requirements of the framework and procedures of tourism crisis management, we give the architecture design of that crisis management as Figure 4:

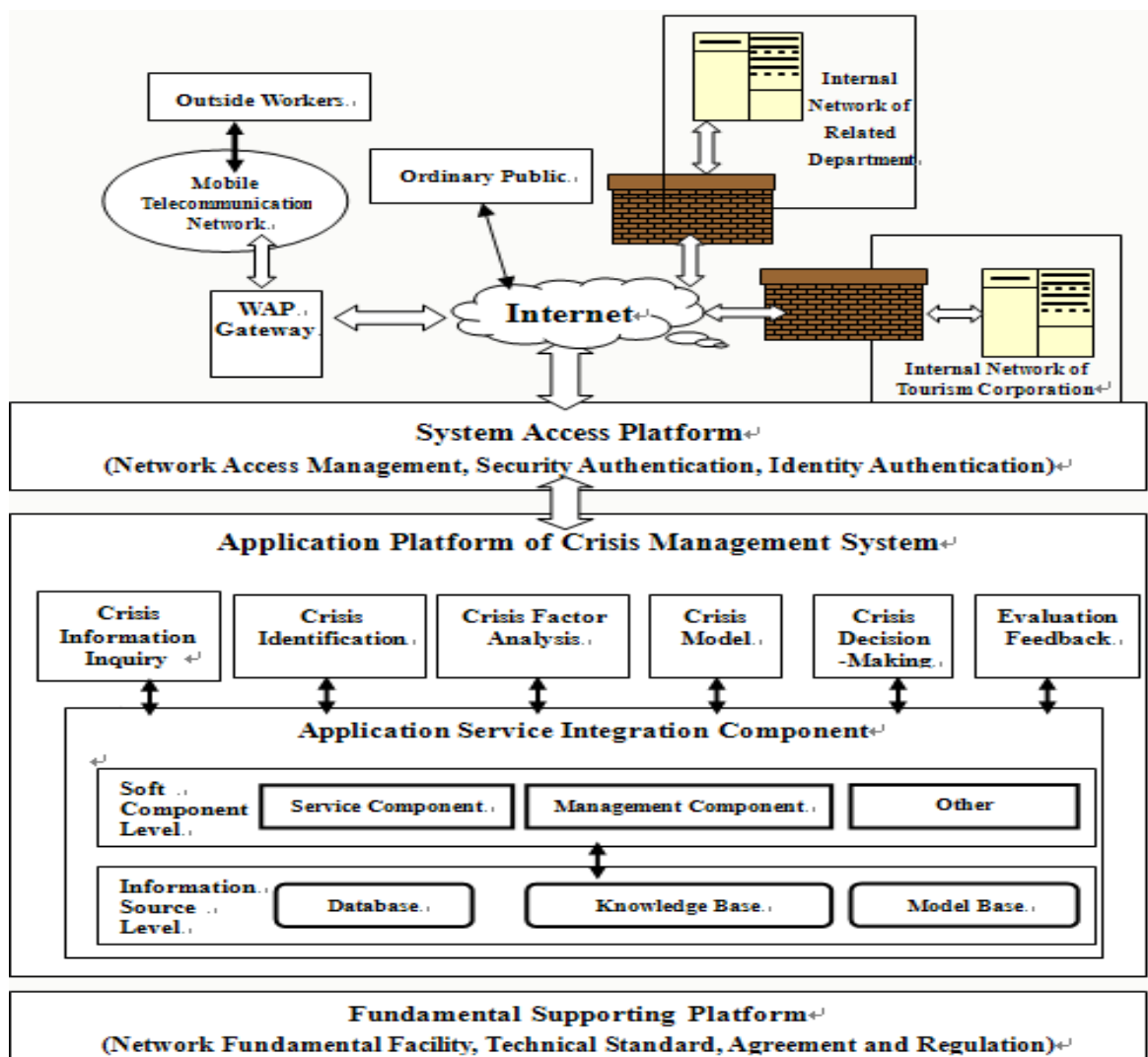


Figure4. Architecture of Tourism Crisis Management System

This includes the integration of two levels. One is the integration of tourism corporations that have the same objection and cooperate frequently. Databases are connected and related information that scatted on different departments is shared on this level. Another is the information integration with regional governments, ministry of public security, fire agents, and other departments. Technologies such as Extranet and Internet are used to realize the information integration of these sub-systems..

In this architecture, there are three major platforms: the system access platform, the application service platform, and the fundamental supporting platform. Various kinds of users connect to the system by the access platform, and receive the services by the application service platform. The network infrastructure, technological standard, agreements and regulations constitute the fundamental supporting platform.

On the side of software system structure, we choose JESS technology to build the three-level browser/server system structure for the tourism crisis management system to realize the information and resources integration.

On the side of network system structure, a regional special network is established and connected with other networks to realize the reliable and widely connected network system.

IV. APPLICATION IN BUDDHISM CULTURAL TRAVEL

Cultural travel has been a new and fashionable kind of travel in recent years. Since the Buddhism cultural travel resources are abundant all over the world and take a heavy place in promoting the local travel industry and spreading the Buddhism culture, developing and managing them in a sustainable way is of great importance. However, the present developing work has been revealed some problems. The development has been mostly in the area of material cultural resources but not the non-material culture, so that the travelers can't fully understand the Buddhism culture that is contained in the places of interest. Besides, the Buddhism cultural travel industrial chain is weak in some parts, with the travel commodities junior in cultural connotation, etc.

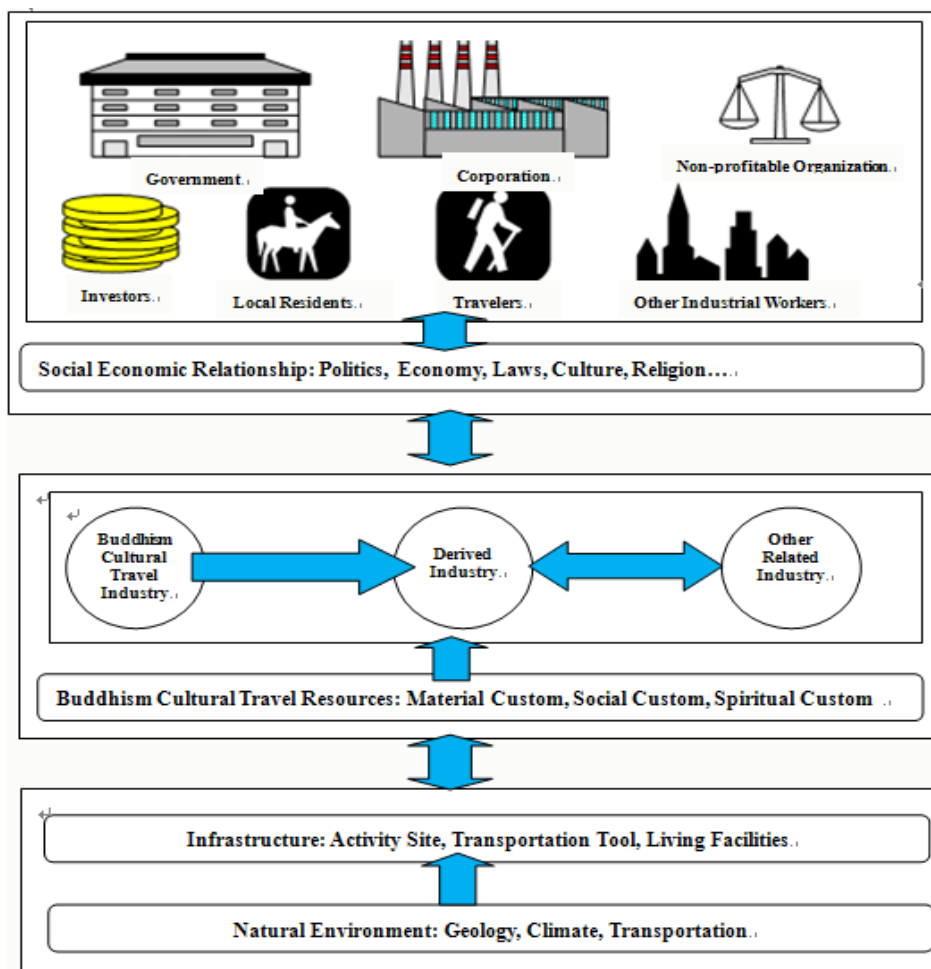


Figure 5 Compound ecological system model of the Buddhism cultural travel

The sustainable development of tourism industry is depended on the balance of a compound ecological system, the concept presented by S. J. Ma[22] in 1984

and the system including social sub-system, economic sub-system and natural sub-system. In this paper, the development of tourism industry is regarded as the

manual interfering process on the compound ecological system. The development of Buddhism cultural travel presents a complicated relationship among this compound ecological system. According to the theory of compound ecological system and the ecological community succession, we analyzed the influence mechanism of tourism development on the subjects of the tourism industrial ecological system, and also analyzed the community succession process of the Buddhism cultural travel development. Aftermath, we established the compound ecological system model of the Buddhism cultural travel development and its sustainable development mechanism.

As it concerns to the influence mechanism of the Buddhism cultural travel development on the compound ecological system, the developed Buddhism cultural travel resources come into the consuming market in the form of Buddhism cultural travel products and their derivatives. The consumers create the investment returns by consuming and the Buddhism cultural travel industry and its related industries got promotion as a result. The social and natural environments receive both the positive and negative effects of these industries' development. As Government, to maintain and improve the tourism resource conditions is the primary responsibility.

The compound ecological system model of the Buddhism cultural travel development is presented by this paper as Figure 5.

In this model, there are three sub-systems of social, economic and natural system, interacted as the arrow showed. In the social system, government, corporations, non-profitable organizations, investors, travelling consumers and other related workers interrelated via some political and economical relationship. In the economical system, the Buddhism cultural travel industry derives other related industries, and the tourism resources provide attractions as the basement that the whole industry existed on. Last, in the natural system, the natural environments such as geology, climate and transportation offer the grounds for the activity sites, living facilities for the travelling. This natural system is also the general basement of the whole Buddhism cultural travel industry.

Tourism crisis may take place while the balance of that ecological system has been seriously broken by any of social, economic or natural factors. Based on the ecological mechanism, we developed a tourism crisis management system for Buddhism cultural travel, which has been successfully applied in China.

V. CONCLUSION

Inspired by natural ecological system, this paper researched the ecological mechanism of tourism system and tourism crisis. To help resolve the present situation in tourism crisis responses, a new design of crisis management system was presented for preventing, monitoring, controlling and recovering the tourism crisis both from natural and social environment based on that ecological mechanism.

With that system, efficient processing can be conducted at the moment that the general tourism crisis happens. This system has been successfully applied in the crisis management of Buddhism cultural travel. Improvement of practical application is our future work.

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