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## A new knowledge management model for the conservation of historical sites

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### *Abstract*

*The fast growth and globalization of the tourism industry produces a massive volume of information which could shape a data base of knowledge in this industry. Knowledge creation requires specific models which can gather information from trajectory patterns that evolve through time and convert them into explicit knowledge. Historical sites are sensitive destinations that are vulnerable to changes. Therefore, planning for the protection and conservation of such historical destinations not only need efficient and long-term development plans but also require dynamic systems to enhance knowledge over time. The manuscript suggested a knowledge management based model called the "Tornado Model" to address these challenges. The suggested model provides a framework to reveal and convert tacit knowledge into explicit knowledge based on related indicators and the uncertainties in the tourism industry. This model is believed to be a practical planning tool for better preservation and management in sensitive sites.*

**Keywords:** Knowledge Management, the Tornado Model, Tourism Industry, Planning, Sensitive Sites, Tacit Knowledge, Explicit Knowledge, Conservation

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## 1. Introduction

With the ongoing growth in the tourism industry and impacts caused by increasing visits to sites which are mainly vulnerable sites such as the World Heritage Sites, new challenges have evolved (Gilmore et al, 2007) where in some cases de-marketing a tourism destination has become an option to protect these sites (Quan, 2000). In order to be able, gain a long term approach towards this industry with less negative impacts, we require proper management and planning with in-depth knowledge and information about historical destinations. Gathering knowledge and the proper and efficient use of this source of information requires knowledge management. Today many organizations are implementing knowledge management for better performance in their work (Ruggles 1998; Yew Wong, 2005; Pfeffer & Sutton, 2011; Hislop 2013). Knowledge innovation is also opening doors for improving the situation in their type of activities, resolving and changing issues that have negative impacts, competitiveness in their organizations and long-term development. The rapid changes in organizations has made them try to update and adapt their knowledge in order to be able to compete with each other (Radenmakers, 2005).

In the case of conservation in Historical sites and sustainable tourism development, the data source is vast and continuing to grow with the all year round visits from tourists. With the competitiveness in tourism destinations to attract tourists there is a necessity to have a database and implement knowledge management for efficient and practical marketing, planning and management. In order to develop this industry and protect these destinations for future generations, data management and knowledge management can help use the sources of information efficiently when required. Historical and cultural sites are one of the important but vulnerable tourism destinations, sensitive to changes and culture acts as the main 'pull factor' (Akama, 2000). In order to have accurate and authentic monitoring over time we need precise data and information about these destinations for adequate measurements and alternative assessments. Tourism sites have tangible and intangible assets which attract visitors to these destinations. We can categorize data regarding these sites as tacit data and explicit data. Applying data as measurements can become a challenge when we have

tacit data which needs to be converted to explicit and implemented in planning scenarios of for predicting the outcomes of development plans. Therefore, a knowledge management model is required to convert tacit data to explicit for these required measurements and assessments in historical and cultural sites.

The main aim is to develop a model of knowledge management in order to convert one of the main sources of data (tacit data) into explicit data to be applicable in the measurements and planning procedures and evolve this model for the large amount of data concerning historical sites. In order to reach this aim at first, we will try to give a brief on the literature of knowledge management and specifically knowledge management in tourism. Then the importance of historical sites such as World Heritage Sites will be introduced. This will lead us towards the importance of knowledge management for the conservation of these sites and sustainable planning. Therefore, the new knowledge management model will be introduced based on the Tornado Uncertainty Model (Yu et al, 2007). This suggested model is believed to be applicable as a base for the long-term tourism development planning and the conservation of historical sites.

## 2. Knowledge management

The foundation of knowledge management is more or less established (Jennix, 2008). According to KPMG (1998), "Knowledge management represents a systematic and organized approach of using knowledge for storing and extending knowledge." Management provides a framework which promotes better performance in organizations and can be defined as creating, the acquisition, sharing and the usage and utilization of knowledge in order to promote organization performance (Laurie, 1997). Therefore, KM is applying knowledge from previous experiences of decision-making to current and future decision-making activities in to improving effectiveness (Jennex, 2005).

Knowledge is known as one of the important sources of information in organizations (Ofek and Sarvary 2001, Smith 2001) and even according to Rylander the critical resource "of economic development and success for nations, companies and individuals alike" (2009:01), therefore knowledge

management is used to ameliorate knowledge performance and help the economy of the organizations. Klein (2008) believes that sustainability is a major goal of today's societies. Hence, not only what you know has a critical role, but also how it utilizes and how fast you can learn something new are vital.

Knowledge can be classified as tacit and explicit (Polyani, 1966; Blackler, 1995; Choo, 1998; Gourlay 2002). With systematic management and planning, organizations are able to maximize the benefits of these two types of knowledge (Hansen et al 1999) and develop proper long-term strategies in industries such as the tourism industry. As a result, decision-making and planning can be more effective when we have organized information and knowledge in hand and can use the knowledge we require more efficiently in the least possible time.

### *2.1. Knowledge management in the tourism industry*

Tourism -has had and will continue to develop and have- the ability to bring recognition to a site (Gilmore et al 2007), economic growth to its society and people (Mowforth & Munt, 2003; Budeanu, 2005; Choi & Sirakaya, 2006; Michalena et al 2009), and environmental education for site preservation (Mowforth & Munt, 2003; Imran et al 2014) if planned and managed properly. Hohl & Tisdell state: "If the overall goal of tourism development is to achieve economic, social, and ecological sustainability, it must provide a first quality visitor experience, conserve natural and cultural resources, and bring substantial benefits to local communities." (1995: 533). They propose the continuous monitoring of tourism activities and their impacts on the sites concerned, and suggest the use of adequate counter measures by the management authorities to avoid the negative impacts of tourism (1995). Therefore in order to conserve historical sites and be able to manage tourism development for long term we need to assess the outcomes of development plans in this industry to reduce the negative impacts of tourism but at the same time benefit the local communities and the tourists from the tourism industry. For this aim indicators and measurements are needed to better help the monitoring

and assessments processes. One efficient way is the use of knowledge management in this industry so that we can gather these sources of information and implement wisely based on each case scenario.

Knowledge management in tourism requires adapting knowledge for better performance and competitiveness. In this case where several factors impact the performance of tourism fast-growing industry, the goal of better performance becomes more crucial. According to Simkova, in order to adapt with the changing situation in the tourism market we need "...continuous environmental scanning, understanding of customer behavior and prevention of lack or overload of information" (2009: 01). Therefore, we need knowledge management to be able to use the source of knowledge and information wisely and practically. Cooper (2006) maintains that knowledge management can provide a useful conceptual framework and set of approaches in the time we need to be competitive, in crises, changes, for contextual adaptation and solve future circumstances (2006) and Simkova believes that knowledge in tourism can be classified as: "locality value, marketing applications, and techniques of problem solving and decision making" (2009).

### **3. UNESCO world heritage sites**

Historical and cultural sites are important destinations that represent a nation's history. These sites attract tourists all year round and are one of the main sources of income. According to the Global Heritage Fund, "Cultural Heritage Sites are the root of people's history and the bedrock of their future. Their preservation is vital for protecting the rich, shared history of humankind." (2017). In order to protect these sites and preserve our heritage for the future generations we need to gain knowledge about the past history, the area at present, and planning requirements for future plans. As UNESCO<sup>6</sup> maintains, "Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration."(2017). After the First World War UNESCO organization started a movement to nominate and protect World Heritage Sites and in 1972

<sup>6</sup> The United Nations Educational, Scientific and Cultural Organization

the movement was divided into two separate movements with the intention to preserve cultural sites and natural sites. Today this convention is continuing its work with 193 state parties and a total of 1052 nominated properties in the list.

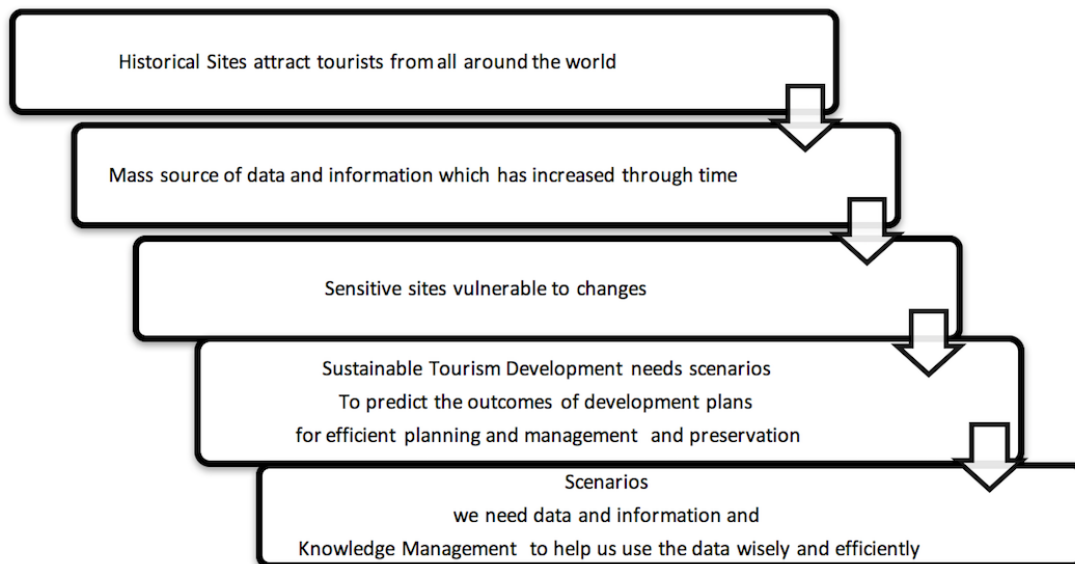
UNESCO has eight missions which, one of the main missions can be to “-Encourage countries to sign the World Heritage Convention and to ensure the protection of their natural and cultural heritage;”. The other missions that can help the preservation of these sites can be developing policies and actions to manage these World Heritage properties for today’s use, encourage intercultural dialogue among tourists and local communities and at the same time preserve them for the next generations (UNESCO, 2017). Therefore any development plan that may destroy these sites

must be prohibited and all plans should be with regard to the standards based on The Limits of Acceptable Changes (LAC) in the tourism destination with its people.

#### 4. Data sources in historical sites

Historical sites encompass a rich database source in accordance to their history, notability and significance among people specially tourists. Because of their vast source of data and information which has been gathered through ages in these destinations, the proper usage of knowledge regarding these sites requires management models which can use all sources of data and information (tacit and explicit) efficiently when required.

Figure 2. The use of knowledge management for tourism planning scenarios



As mentioned before, one of the main sources of data in the tourism industry is tacit data which is an important source of information in this industry, therefore it needs to be gathered and converted to explicit for coding so that it can be practically used in planning, marketing and management plans. These sources of data are mainly seen in the intangible assets of tourism (sense of place, place identity ...) and in tourism behavior. Historical sites are fragile destinations that in spite of their important economic contribution to the tourism industry need to be very cautiously used in development plans for long term usage with less negative impacts. Therefore all development projects should be cautiously chosen and measurements should be taken into consideration in all

phases of this process. The outcomes of these projects should also be predicted before the planning starts, therefore one of our best approaches can be building scenarios based on the gathered data to predict the outcomes of development plans.

But based on the tacit knowledge which will be gathered there are some uncertain data objects which are subject to change based on time and space. Therefore, for better management, the tacit data which is mainly tourist’s attributes and behavior will be gathered in a spatiotemporal database and used in the Tornado Uncertainty Model (Yu et al 2007).

In order to build the framework of this research we will need to show and categorize tacit and explicit data, therefore our first step will be defining tacit data and

explicit data. Based on these definitions the next step will be characterizing tacit data which is our main target. One of the main sources of tacit data in historical sites is tourism behavior. This source of data has uncertainties which changes in time and space which can impact historical sites. This requires a model that can use these uncertainties and convert them into explicit data for coding and implementation in development plans and assessments. Therefore the next step will be the suggested Tornado Model

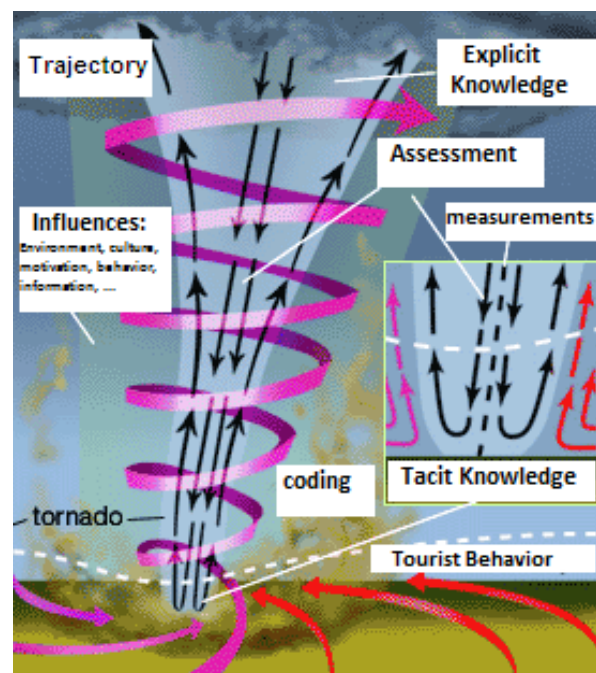
## 5. The Tornado model

Historical sites are important sites that encourage a tourist to visit these destinations. Because of their rich history which represents our heritage, planning approaches must be chosen very carefully. The implementation of planning approaches requires knowledge and information about the destination. This can be a challenge because of the vast source of information which has increased over time. One practical solution can be the usage of a knowledge management model that can ease the process. In these sites, which have been experiencing continuous visits from tourists, tourist behavior is an important source of tacit data which creates uncertainty in these sites. Therefore, there needs to be a model that can store the uncertainty data objects and transform these objects (tacit knowledge) into codes (explicit knowledge) and adopt them for planning and strategic decision making in development projects. The tourism industry is dependent on tourism behavior (tacit knowledge), but because of the several factors that impact this behavior (temporal and non-temporal attributes), gathering and managing this knowledge database can be complex and the adoption of this knowledge for development improvements can become a challenge.

According to Yu et al (2007), the Tornado Model can be used when we have data that is continuously changing and we need a data management system that can store data, update it along the way and retrieve the large sets of this continuous changing or moving data objects (CCDOs). For each of these CCDO states will produce a tornado-shape uncertainty region in the space-time, therefore, they call it the Tornado Uncertainty Model (TUM). In this model they produce

an uncertainty region in the space-time based on the shape of a tornado. Based on their model the CCDO has a set of non-temporal and temporal attributes and tourist behavior is categorized as these temporal and non-temporal attributes. The non-temporal attributes can be tourist behavior which is subject to the site's structure, activities and designs that impact tourist's movement; and the temporal attributes are subject to tourist's motivation, preferences, and other individual behavior. All these attributes can base a trajectory over time which can be coded in this model and gathered as a knowledge database. Using this model for tourist behavior and gathering knowledge about their trajectory attributes while visiting a tourism site can help form a knowledge database for effective sites conservation and strategic planning for sustainable tourism in historical sites.

Figure 3 The Tornado Model<sup>7</sup>



### 5.1. Model function

In this suggested model, knowledge related to tourist behavior is gathered based on his/her attitudes, knowledge, preferences...while visiting a tourism destination (temporal and non-temporal attributes). Based on tourist's movements in the tourism site some similarities can be derived. These similarities will base a trajectory over time in the specific place (in our historical tourism destination) which can become the

<sup>7</sup> [www.britannica.com](http://www.britannica.com) model based on the figure derived on December 2016

data base for our knowledge source. In this knowledge database, the state of tourist behavior at a specific point in time is turned into indicators for coding. With these indicators gathered overtime from the trajectory database in the Tornado Model, codes will be derived (explicit knowledge), and required measurements will be considered accordingly. For this process, based on the Uncertainty Tornado Model, the impacts on the temporal and non-temporal attributes are implemented as layers in the Tornado Model. We can classify this model into three sections:

Section 1- In this section we have our input which are the temporal and non-temporal attributes from tourism behavior. The tourist is the CCDO which based on each of the layers in a specific time and place has varying derivatives. The similarities in each phase and layer (time/place) will bring trajectory patterns which can be coded as explicit knowledge for measurement.

Section2- Data gathered from the attributes in tourism behavior which is mainly tacit data will need to be converted into explicit data. For this aim, trajectories formed from these attributes in specific parts of the site in defined hours of the day will show patterns from tourism behavior which produces a tornado shape uncertainty region which over time follows a specific pattern. These patterns caused by tourism visitation in the specific time and space can be converted into explicit data and coded for different phases in conservation and long-term development plans in the tourism industry.

Section3- The information gathered from the patterns and trajectories when coded are used as explicit data and can become a base for development approaches in tourism development in historical sites and used in scenarios for tourism planning and strategic decision-making processes.

It is believed that the usage of this model can help planners and managers implement this information in scenarios to predict the outcomes of development plans more precisely and with less error percentage.

## **6. Conclusion**

The goal of this research was to adapt knowledge management in tourism development plans for historical sites by modeling tourist behavior in these vulnerable destinations. The conceptual framework of

this article was based on answering the main question that: How can we implement knowledge management to gather and use data for the preservation of Historical Sites and sustainable tourism development? Based on the two sources of data (tacit and explicit) which can be gathered from historical sites, the main aim was to demonstrate a model that can use the knowledge gained from tacit data and find a model which can convert this source of data into explicit data for efficient implementation in long term tourism development plans. Therefore we based our model on the Tornado Uncertainty Model (Yu et al, 2007) and localized it for the CCDO's in the tourism industry. The conceptual framework was based on the data that can be gathered from the trajectory patterns derived from the tourist's behavior and attributes at a specific point in time in the historical sites. Different changing and moving states of tourist's attributes in a specific time and space produces a tornado shape uncertainty region which over time can follow a specific pattern. These gathered trajectory patterns can be coded in the model which bases our influential indicators for measurement and assessment in monitoring and planning tourism development is historical sites. These derived patterns are believed to help planning approaches for tourism development in historical sites for long term usage with less negative impacts.

This new knowledge management model in the tourism industry is believed to help build scenarios based on tourist movements and attributes for assessing and predicting development plans followed by efficient practical planning accordingly. The implementation of tacit knowledge derived from tourism behavior in historical sites from this model has the efficiency to be used in long-term planning and in building scenarios to predict the outcomes of development plans in the tourism industry. Knowledge obtained from this model can help us find out more about tourist perception towards tourism and their needs and behavior while visiting historical sites. Therefore, with proper knowledge management and efficient data implementation in planning for tourism we can also manage marketing these competitive tourism destinations in this fast-growing industry.

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