Knowledge Management for Tourism Crises and Disasters

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PAPER SUBMITTED TO BEST EDUCATION NETWORK THINK TANK V - MANAGING RISK AND CRISIS FOR SUSTAINABLE TOURISM: RESEARCH AND INNOVATION  
June 16-19, 2005, the University of West Indies Kingston, Jamaica
KNOWLEDGE MANAGEMENT FOR TOURISM CRISES AND DISASTERS

Abstract

Tourism is especially vulnerable to disasters and, being fragmented, often its response is difficult to initiate and coordinate. It is also information intensive and when in chaos its information needs are exacerbated. The paper aims to develop a knowledge management system for disasters in a tourist destination in terms of a knowledge framework for tourism disaster management at the public sector level. Knowledge is a powerful resource to help governments, organisations and communities prevent, mitigate, plan for and recover from disasters and crises. Destinations need knowledge in the three stages of disaster management - pre disaster prevention and planning, disaster situation management and post disaster phases of resolution and return to normality. The paper creates a tourism destination’s public sector model of a knowledge management system for the first two stages of preventative planning and management of disasters - knowledge framework for disaster management in a learning destination. It includes recommendations about the various types of knowledge and information needed and the specifics of the information system architecture.

1. Introduction

Tourism is information intensive and when in chaos its information needs are exacerbated. The severity and frequency of tourism crises and disasters are increasing dramatically and destinations need ways to mitigate the impact of these crises or avoid them altogether. Knowledge is a powerful resource to help governments, private firms and the communities prevent, plan for, and recover from various types of disasters and crises. Ritchie (2004) calls for the contribution of different research disciplines to address how a destination can recover from crisis, and mentions the discipline of communication and information systems management as one of those.

Tourism is a large and unique collection of industry sectors with special needs in disaster planning and recovery. The tourism literature has little to offer governments as they prepare for the unexpected and cope with the impact of disasters (Prideaux et al (2003). With the increased severity and frequency of such events in recent, this gap needs to be closed. The failure of tourism to embrace the notion of disaster management planning is possibly due to two things (Faulkner and Vikulov (2001)): first, the lack of development of theoretical and conceptual foundations for analyzing tourism disaster events and developing disaster management plans, and second, there has been little systematic analysis of previous crisis events. Failure to articulate any tourism disaster management plan with broader disaster planning in the location could have contributed to the low level of preparedness in the sector (Faulkner and Vikulov (2001)).

Even though articulation with other sectors is crucial, it is important to recognize that tourism is unique from a disaster planning perspective and is exposed to more danger than other industries. For example,

- Tourism is highly people-oriented with both employees and tourists being vulnerable to the disasters that can hit tourist destinations. Many human lives are at stake in tourism destinations, and the devastation can be extensive.
• The behavior of tourists in a destination is unpredictable and therefore harder to control in the event of a disaster. This creates a stronger need to easily accessible information in remote areas and throughout the entire destination area.
• In many cases, tourists do not speak the local language and cannot easily locate instructions of how to behave in a disaster setting.
• To exacerbate this even more, when a disaster hits a tourism area, the first response of tourists is to go home. This experience of risk and fear compounded with the heterogeneous nature of the tourists underscores the need for information systems (Huan, Beaman and Shelby, 2004). This strong desire to exit creates further complications that non-tourist locations do not have to deal with.
• Many tourism destinations are located in areas of natural beauty – coastlines, mountains, rivers and lakes – where there is greater risk and danger and natural disasters often hit. In many cases destinations are high risk and exotic (Faulkner, 2001). These natural resources are usually managed by the public sector requiring that the public sector become involved, and that government take the lead in such scenarios.
• They are vulnerable to terrorist attacks for reasons already stated in the literature (Sonmez, 1998; Faulkner, 2001) – tourism is visible and gives the terrorists media attention. Sonmez calls for the creation of an inventory of destinations’ experiences with terrorism.
• The vacuum of place information that many tourists have about their vacation home. Tourists are more dependent, less familiar with local hazards and the resources to help them avoid risk (Faulkner, 2001). Even if they are a repeat visitor, they have little knowledge of the place they are visiting, and have even less knowledge of how to react, where to go, who to talk to and what the emergency procedures are in a strange destination. Ritchie (2004), along with other researchers suggests the need for an information coordination team to help aid recovery.
• The tourism industry is fragmented and so does not easily respond to disasters. This also stresses the need for an information system across the industry that is available for all types of enterprises to use in the event of a crisis. Indeed, Faulkner (2000) noted that many different types of organizations become involved both during and after a crisis and sometimes rivalry between these organizations occurs. A centralized information system may provide an infrastructure for cooperation rather than competition.

The reasons mentioned above emphasize the need for destination governments to create a crisis or disaster knowledge system that can communicate information to tourists and employees alike to reduce the amount of loss and damage to human life and property. A tourism destination would benefit from knowledge and information systems used to deal effectively with risk, crises and disasters. This paper will propose a framework for a knowledge management system for tourism crises and disasters, a perspective that has not been addressed by previous studies. The paper aims to create a tourism destination’s public sector model of a knowledge management system to manage crises and disasters in the destination – a knowledge framework for disaster management in a learning destination. Recommendations will be made about the various types of knowledge and information needed and the specifics of the information system architecture.

Following this introduction, the paper analyses disaster management in tourism and then knowledge management and information systems for disasters. It then describes the steps to create a knowledge management framework for tourism assistance and ends with conclusions and recommendations for further research.
2. Disaster Management in Tourism

A number of authors have examined tourism destination disasters and crises from various perspectives, including recovery strategies (Beirman, 2003; Glaesser, 2003), models for analyzing and developing tourism disaster management strategies (Faulkner, 2001; Faulkner and Vikulov, 2001), economic assessment of policy responses (Blake and Sinclair, 2003), effects on tourism forecasting (Prideaux et al, 2003), and broad processes for a strategic and holistic approach to crises and disaster management in public and private sector organizations (Ritchie, 2003). Others have looked at human error disaster from the organization response view (Henderson, 2003), or assessed the recovery pattern associated with the impacts of government policy after a natural disaster (Huang et al, 2002). None have modeled how to accumulate, store, distribute and manage data and knowledge for preventative planning and crisis management (including situation awareness), or to alleviate future disasters.

A major study by Faulkner (2001) developed a comprehensive framework to describe stages of community response and a generic framework for tourism disaster strategies. He gives a framework with five phases in disaster process, which are pre-event, prodromal (disaster imminent), emergency, intermediate and long term recovery. Each is linked to elements of the disaster management response (precursors, mobilization, action, recovery, reconstruction, reassessment and review) and also to principal ingredients of the disaster management strategies (risk assessment and disaster contingency plans). The elements of Faulkner’s framework that immediately relate to knowledge management are risk assessment, prioritization protocols, community capability audit, disaster management command centre, media and monitoring activities, warning systems, flexibility and involvement education and review.

Ritchie (2003) offers a strategic approach to crises and disaster management in public and private sector organizations. He suggested that developing organization strategy could help destinations limit the severity of change induced by crises or disasters. Strategic planning is usually concerned with four main elements – strategic analysis, strategic direction and choice, strategy implementation and control and strategic evaluation and feedback. The classification of the three stages are prevention and planning (proactive planning and strategy formulation; scanning to planning); strategic implementation (strategic evaluation and strategic control, crisis communication and control, resource management, understanding and collaborating with stakeholders); and resolution, evaluation and feedback (resolution and normality; organization learning and feedback). Even though strategic planning is critical, the study does not address how a knowledge management system would fit into the strategic efforts.

The categorization of crises and disasters is important in a knowledge management system since the information, response and communication required for each crisis category may differ. Crises and disaster categories include, for example, those associated with political events (unrest, coups, ethnic turmoil, terrorist threats and attacks (Sonmez 1998), natural disasters (earthquake, volcanic eruption, fires, floods, avalanches, tsunami, hurricane, tornado, oil spill, extreme weather), epidemics (SARS, bird flu, foot and mouth), terrorism and war. Financial events such as stock market crashes and severe exchange rate fluctuations can also affect tourism (Beirman, 2003). Each has its own level of scale or magnitude, which would affect the amount of information needed. Dimensions such as the immediacy and duration of the disaster, the degree of control; the extent of damage; the people and stakeholders affected must also be considered.
Faulkner (2001) suggests that a crisis and a disaster differ. A crisis is induced by the actions or inactions of the organization thereby requiring an information system that is predominantly internal to the organization, whereas a disaster is an event induced by natural phenomena, which requires broader-based information system incorporating weather detection systems, or by external human action. Ritchie 2004 (citing Burnett 1998) gives a different classification of disasters where the degree of threat and the response options are one dimension and the time pressure and degree of control represent the other. These have consequences for information systems also – events with a higher time pressure require more immediate real-time access to information. Similarly, Huan, Beaman and Shelby (2004) discuss the difference between disasters in which there is no lead-time for tourists to escape, and those which permit escape. A knowledge management system must assist destinations in ascertaining which types and categories of disasters might be experienced and in preparing for them.

The next section will summarize the generic literature on how knowledge management systems can assist in disaster scenarios for all industries. From this summary, the design of a tourism knowledge management system for disasters will follow.

3. Knowledge Management and Information Systems for Disasters

Knowledge can be considered as object, as interpretation, process or as relationship (Kakihara and Sorensen, 2002). Knowledge Management (KM) refers to the creation of knowledge repositories, the improvement of knowledge acquisition; the enhancement of the knowledge environment; and the management of knowledge as an asset (Rowley, 1999). It enables groups to share and re-use information resources, and have the power to make decisions faster and less expensively.

Knowledge systems are often created to facilitate the circulation of best practices (Bansler and Hagn 2003) and may be called knowledge sharing systems. They provide an integrated approach to identifying, managing, sharing and reusing all of an enterprise's information assets with advanced technology (Zhang et al, 2002). Others have noted the importance of the knowledge flow (Kakabadse et al 2003) from data to information to realization to action and reflection and finally to wisdom. More specifically, KM systems within an organization are archives of information on employees, customers, processes, products and decisions - which create an audit trail and also a sense of security and provide some understanding of cause and effect (Fowler and Pryke 2003). Understanding of cause and effect is important in crisis or disaster scenarios and comes from shared mental models of people, standard operating procedures, best practices, and rules and routines of a company. Organizational learning occurs as this knowledge base is increased. All of these facets of knowledge management are important to consider in the planning for and recovery from tourism disasters.

A good knowledge management system has various technologies serving as collection points and storage and communication devices. Various information technology (IT) systems such as groupware, management information systems, the Internet, CD-ROM, Multimedia, DVD, distance learning and websites can be used to enhance emergency mitigation, planning, response and recovery (Fischer 1998). IT systems provide channels for interaction to allow knowledge to flow throughout an organization in other than hierarchical forms (Smoliar, 2003), and the travel industry with its heterogeneous nature needs those kinds of knowledge flows and interactions.
A knowledge management system cannot be created without some development time. Liebowitz (2003) suggests a progressive, two-year process to incorporate KM into an organization, and this is applicable to a destination also. In the first year, it is necessary to create awareness of KM through the entire organization, to educate people on KM, to initiate pilot projects with a chance for quick-win, to develop the technology infrastructure to support knowledge sharing, and incorporate KM into the human capital strategy. In the second year, the development of an organizational infrastructure to support KM is needed. It is also necessary to embed KM into the daily working activities of employees with rewards and recognition programs, and expand pilot projects into full-fledged projects. All of these are applicable to a destination at the public sector and private firm level, and an integrated approach coordinated by the destination is desirable.

After these two steps have been accomplished, the destination and its private firms can become a learning destination relative to disaster management. Organizational learning depends on organizational memory, which includes knowledge acquisition, retention, and retrieval (Kruse 2003). Sometimes organizational memory is forgotten – for example how a destination dealt with a crisis ten years ago. De Holan et al (2004) address the issue of organizational forgetting and how that can affect the development of a knowledge system. In order to address this potential problem, first the type of forgetting needs to be identified - forgetting can be accidental or intentional, and can be from the existing stock of knowledge or newly innovated knowledge (De Holan). In order for tourism destinations to maximize their recovery from a disaster, strategies to minimize organizational forgetting are needed.

Zhang et al (2002) developed a comprehensive model for disaster relief and humanitarian assistance organizations in a disaster situation. Their model includes the prediction of the nature and trend of the disaster, an evaluation of disaster severity so that planning, training, and stockpiling can be done quickly. The generation of timely warnings to local authorities in the disaster region is critical, thereby reducing effects on resources and population. Disaster mitigation, planning and coordination of relief actions are important functions also. Humanitarian relief organizations collect, analyze, store and communicate facts and figures, and make relief decisions in uncertainty due to the dynamically changing situation. All of these are knowledge-based processes. The model relates well to tourism destinations since much of the destination relief efforts are humanitarian in nature.

The challenges for relief organizations in real time decision situations are how to gather relevant, timely, accurate information; how to store, organize, manage information so resources are accessed and shared; and how to reuse knowledge or past experience to facilitate current decision-making. This model is appropriate for adapting to the tourism situation and the next section will create a knowledge management framework for destination assistance based on this model.

4. Knowledge management framework for tourism assistance

This section will explain a knowledge framework for tourism disaster management at the public sector level. Destinations in crisis mode need to share information and knowledge, but first that knowledge must be made explicit and encoded in some kind of an information system. Destination management systems (DMS) are the closest thing to the idea of a KM system in tourism, but they rarely house disaster information or any applications to assist in planning or recovery.
At the destination level a shared knowledge system is needed to address crises and disaster with all tourism stakeholders involved in the creation of such a system. Destinations need knowledge in the three stages of disaster management identified by numerous authors as: pre crisis, crisis and post crisis phases. Ritchie calls these three stages, namely prevention and planning (pro-active planning and strategy formulation); strategic implementation (strategic evaluation and strategic control, crisis communication and control, resource management, collaborating with stakeholders); and evaluation and feedback (resolution and normality). He notes that there needs to be flexibility, evaluation and potential modification to strategy, depending on its nature and stakeholder response.

Each stage needs its particular knowledge base and this paper attempts to develop an overall knowledge framework incorporating these knowledge bases, focusing mainly on those for the first two stages (pre crisis planning and disaster management) with little attention to the knowledge base for the third stage (recovery planning). The framework identifies and structures the information and processes necessary to build the particular knowledge base. These three stages are shown in Figure 1 in terms of their respective knowledge bases – KB1 is for preventative planning (that is the pre crisis stage), KB 2 is the management plan for the tourism disaster (that is the crisis stage) and KB3 for recovery handling (the post crisis stage). Of course all are interconnected and in fact part of one system, so that the content of each knowledge base is centrally accessed and is not duplicated.

The three steps of building the knowledge framework or system are shown in Figure 1, and align with these three crisis stages. In the first two steps the knowledge is retrieved and stored, then processed in order to develop the knowledge base 1, for preventative planning, the pre crisis stage. The third step of knowledge dissemination and action aligns with Knowledge Base KB2, the management plan for the tourism disaster, the crisis stage. This ultimately leads to Knowledge Base KB3, recovery planning the post crises stage.
FIGURE 1

In the first pre-crisis or preventative planning stage, the destination needs first to assess possible disasters. This will involve a historic study of previous disasters, an examination of changes in the current local, national and global situation that could affect the destination in ways previously unexperienced. Once a list of possible scenarios is developed and is as comprehensive as possible, the assignment of probabilities to those scenarios must be given. This will involve the government authorities in combination with appropriate scientists and others knowledgeable in the field. The second step is for the destination to carry out a capacity audit for recovery planning. This will lead to knowledge of what outside sources and emergency relief are needed so that the destination can be fully prepared. In small destinations such as islands, the capacity for recovery planning may be quite limited, and assistance will be needed from other destinations.
Once the first two steps have been completed, acquisition of knowledge from various sources into the knowledge base is necessary. In a tourism destination, data and information are widely distributed and owned by a large number of organizations. This makes both proactive planning and coordination of immediate and appropriate response very complex. Also, information needs vary in different phases of the disaster and also for different people. The need to share and collaborate with comprehensive, timely and reliable information is paramount.

The knowledge base consists of information from two sources, the first being tourism disaster information from local expertise, best practices and story-telling in previous disasters. This can be used to obtain situation awareness about a particular disaster event, and as input to needs assessment, and to facilitate decision making at the time of the disaster. This includes knowledge from tourism operators, community volunteers and organizations, from experts (tourism, medical, technical, scientific, government and private consultants), and from local government. The second major source of information is from external knowledge and expertise in other destinations or locations. Similarly there will be other community knowledge and expertise on a particular type of disaster, best practices and story telling, and knowledge form experts as at the local level, and government organizations.

These two sources will generate a knowledge repository composed of a collection of storage devices containing historical and new information for pre-disaster prediction or systemic disaster analysis. Typical databases that will be included (as shown in Figure 1) are: disaster relief agencies, funding agencies, human experts and resources, investors, insurance firms, environmental and social scanning devices (such as spatial satellite mapping). For each, a catalogue of the organizations’ duties in disaster relief, their locations and contact information will be a minimum. A case base of tourism disasters of each type in other destinations similar to those that the destinations potentially face and the recommended successful actions is also an important component. Knowledge from these sources provide recommendations of courses of action for destination decision makers, and enables information and knowledge sharing, and functions as a federated resource for creating new knowledge. Another type of knowledge needed in the system is tourism disaster prevention/mitigation strategies which are represented in production rules combined with some heuristics.

As part of the building of this system, the destination must determine which information is required, who needs it, from where it could be obtained and what relationships exist among different information sources. No raw data is typically contained with the knowledge base, rather data that has already been processed to generate useful information and knowledge. The development of a set of standard protocols of information collection and process is important. The next step requires knowledge processing for decision-making purposes. This includes processes such as data acquisition, filtering, categorization, linking, indexing, sharing, creation and maintenance.

Once this data has been processed it is put into the first section of the knowledge base (KB1) – used for Preventative Planning as shown in Figure 1. Due to the complexity of disaster situations, collaborative technologies, for example web based groupware and online bulletin boards, should be integrated in the system. To facilitate dissemination of information, a web client interface enables users to specify and submit requests to the knowledge base and display results. This knowledge needs to be articulated with wider disaster plans in the region, and together the establishment of policies and priorities is necessary. In some cases this may give rise to legislation or regulation. It is suggested that policy manuals be created for different level of operations in the destination. These could be web-based
manuals or hard-copy manuals, and constitute part of KB1. The policies will require ongoing regular trial, testing and review by stakeholders in the destination so that pre disaster planning for tourism is always maximized in its preparedness for a disaster situation.

These policies and manuals together with the preventative planning knowledge base underpin the formulation of an integrated management plan for the disaster possibilities – Knowledge Base (KB3). When a disaster strikes, and triggers the knowledge dissemination and action part of the disaster plan. The immediate activation of a Tourism Central Command Center (TCCC) is necessary which needs to be in moment-to-moment communication with the general crisis center of the region. The activation of this command center initiates the enactment of the policies and procedures previously determined, and ensures that all stakeholders in the destination are informed. The development of a real-time casualty status is the next step so that families and friends have a central place to locate information on loved ones. Information will be communicated to the media by the TCCC to inform the travel industry locally and in market areas of the status of the disaster impact. Teams made up of representatives from local government, travel and tourism professionals, and community leaders are recommended to lobby to source funding to provide support facilities, including communication strategies (PR, marketing, information coordination, fund-raising) to deal with consumer and industry inquiries.

The question of what types of organizations should be responsible for the TCC is central to its performance value during and beyond the crisis or disaster. Probably, an analogy can be made in terms of this question for electronic national tourist destination marketing systems (DMS). Notwithstanding their trend to partnership formation (WTO, 1996), there are still challenges for sustainable public and private sector partnerships, including ‘factors surrounding their organisation structure, dilemmas of involvement of the public and private sector in various stages of DMS development…. Clearly the nature and extent of public and private sector involvement in national electronic DMS remains unresolved in terms of their respective roles in the initiation, development and operation of DMS (Choy, 1993 and Palmer (1996) in Mistilis and Daniele, 2004). However, the development and management responsibility for the TCCC may be best indicated by the ownership of and responsibility for the various stages of the wider destination disaster management plans, albeit, as recommended, in consultation with all the stakeholders, including those in the private sector.

Ongoing situation awareness is necessary after the trigger of the crisis and the TCCC is activated. Situation awareness refers to the need to make sense of the environment and create a complete clear picture of it (Zhang et al, 2002). Therefore situation awareness implies an understanding ‘what is going on’ - even in a dynamically changing environment. Situation awareness is indispensable to effective decision-making, and it relies greatly on the applicability and quality of information (Wiig, 2003). It can be well supported by a knowledge base. In the suggested knowledge framework, KB2 which contains the management plan for tourism disasters would facilitate situation awareness by providing a recognized and tested process to automate the knowledge base search, retrieve relevant information, integrate and present results to decision makers. Without KB2, information would have to be gathered from widely spread sources, delaying effective decision-making and response to the disaster; this in turn could also ultimately delay recovery.
From a sociological perspective, it is important to have such a resource. Faulkner (2001) has noted that the immediate response to a disaster situation has been observed as including several phases. These result in delayed response, namely:

- shock at both the individual and the collective level, where the unexpected nature of the event and the severity of its impacts cause stress and a sense of helplessness and disorientation;
- denial or defensive retreat - denial being an attempt to reach back to the safety of the known, or an attempt to avoid the crisis by repressing it; defensive retreat may involve either evacuation from the elected area, or a strategic withdrawal to safe places within the area.

To handle situations competently, there are four aspects that need to be considered (Wiig (2003: 1):

1. situation recognition models
2. decision-making /problem solving models
3) execution method models,
4) governance approach models.

Tourism is a multi-cultural industry, and when a crisis occurs, the context differs by culture, organizational style and political structure. It is therefore necessary that a knowledge system honor these differences. Faulkner (2001) notes that community background factors affect the capacity of a community to cope in addition to factors relating to the specific event and the impact of the event. Ritchie, Smallman and Weir (1999) suggest that organizations need to communicate more effectively and consider their organizational culture. Pro-active planning and implementation may not help if communication styles are autocratic and the organizational culture is introverted. Tribe (1997) suggests that organizational structure and culture tend to evolve reactively and that rigid management structures may not be appropriate. There is a need for more flexible structures. KM requires moving beyond simplistic models of information exchange to more challenging problems of leveraging social interactions to the advantage of the enterprise.

Problems that can occur with the timely implementation of a disaster system are communication failures, the availability and deployment of resources, and the lack of coordination and a team approach. Information technology and the knowledge system can assist with all of the above. The interaction of multiple stakeholders and disaster relief agencies in a destination at the time of a crisis must be smooth. Interaction management is typically not included in the knowledge management literature but is essential in tourism because of the diversity of stakeholders. It includes three components. First clarification or understanding what things mean, second, understanding who has authority, and third, what behavior is acceptable without which risk of taking any action may be crippling (Giddens 1984). Processes of interaction can be facilitated with the new generations of software that facilitates such interactions (Kakaihara and Sorensen). Interaction is not strictly limited to communication, or the technical process of exchanging information. Technology facilitates this management task by providing channels for interaction that circumvent impediments associated with problems of authority.

The third knowledge base is KB3, one that assist with recovery planning. As a result of this the destination can return to stability so that human life can return to normal, and then become a place that has some attractivity and safety for tourism.

5. Conclusion and further research

Tourism is especially vulnerable to disasters and, being fragmented, often its response is difficult to initiate and coordinate. This paper explained how knowledge management could assist destinations in
preparing for and handling tourism disasters and crises, which could also act as basis for planning ultimate recovery of the destination – in effect its sustainability. For a destination to achieve sustainability, it must address disaster management.

This paper attempts to fill this gap by describing a knowledge management framework, through which the learning destination can be developed. The framework discusses how knowledge is collected, stored, processed and disseminated for preventative planning and action at the time of the disaster and beyond to recovery planning. Adoption of such an approach would lead to the development of a learning destination, one with a knowledge base to prevent tourism disasters and maximizing the required response, thereby facilitating a speedy recovery to normal tourism business activity.

The paper suggests that the knowledge framework be developed as an integral part of the wider destination disaster plan, not separate and unrelated. It is not only the knowledge base itself, which is central to developing the learning destination; but also the actual process of constructing it over several years, with ongoing reviews and modifications. This involves participation of and interaction between stakeholders – the human element vital to the successful use of the knowledge framework. Tourism is an important economic component of the destination, having special needs previously neglected by the wider destination disaster management plans.

Further research in this area is clearly needed to assist destinations in the effective creation and use of a knowledge base for disasters. Issues such as the integration of electronic and non-electronic knowledge, the process for capturing tacit knowledge after a disaster and making it explicit, and a model for appropriate personnel to design and manage the system are fruitful areas of research. In all research efforts, it is imperative to recognize that knowledge capture, processing and dissemination are ongoing, dynamic processes.
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