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Abstract

The vulnerability of the tourism industry to a range of crises has attracted many scholars to investigate the crisis strategies and practices employed by destinations and tourism organizations mainly with regards to crisis preparedness, containment and damage limitation, crisis recovery and subsequent learning. One over-looked area has been that of crisis signal detection. This paper proposes a three-stage conceptual framework for crisis signal detection consisting of signal scanning, capture and transmission to the crisis response centre. With this framework as a basis, 16 corporate level executives of international tourism organizations were interviewed in order to explore the significance of signal detection in their crisis management practice and the challenges faced in each of these three stages. The findings offer insights into the design of crisis management mechanisms and open areas for further research.

Keywords: Crisis management, crisis signals, signal detection, critical incident technique, environmental scanning

1. Introduction

The tourism industry is prone to crises as it is highly fragmented and complex with many interdependencies among its sectors. These interdependencies mean that a crisis in a tourism sector will have repercussions in the others. Henderson (2007: 8) argued that a transport accident, a hotel fire or a street riot in which tourists will be caught up will impact tourist arrivals in a destination with impacts on accommodation, attraction and transport providers as well as a number of other tourism stakeholders such as tour operators, travel agents and the destination's tourism authorities. Similarly, events that are not directly connected to tourism may have a huge impact on tourism sectors as witnessed in the 1997 Asian financial crisis (De Sausmarez, 2004), the 2001 World Trade Centre terrorist attack (Ito & Lee, 2005), the SARS epidemic (Pine & McKercher, 2004), the Indian Ocean tsunami (Rittichainuwat, 2006). It is noteworthy, however, that most crises do not occur suddenly. Mitroff (1988:18) observed that "long before its actual occurrence, a crisis sends off a repeated and persistent trail of early warning signals" which could be picked up at a time where there is still opportunity to prevent it from occurring or to take measures that will minimise its impact. These early warning or crisis signals are pieces of information indicating deviation from normalcy (e.g., financial

indicators exceeding a threshold, abnormal patterns of social behaviour, etc.) that may escalate and lead to a crisis. For example, a receding ocean following an earthquake felt in the coast may be an indication of an approaching tsunami, an unusually increased number of patients with respiratory problems admitted in a hospital may be an indication of an emerging epidemic and an increased number of clashes between religious sects in a destination may indicate possible political unrest. Early detection of these signals and timely response to them might have saved a good part of the 230,000 lives claimed by the 2004 Indian Ocean tsunami, of the 41% of tourism GDP that Hong Kong has lost due to SARS in 2003 or of the more than $600 million Bahrain has lost due to the cancellation of the Formula 1 Grand Prix in 2011.

Several scholars in the field of crisis management (Boin 2003; Boin & Lagadec, 2000; Takeda & Helms, 2006) have suggested that as crises are dynamic in nature with events morphing at varying rates of acceleration and deceleration. Small changes in the parameters of a crisis may ultimately cause enormous changes in its outcome as minute initial differences are magnified and transformed by the dynamical processes at work ("butterfly effect", Lorenz, 1993) rendering the crisis extremely sensitive to the initial conditions of its evolution (Paraskevas, 2006). This sensitivity underlines the importance of early interventions in crisis development and, therefore, of processes able to capture the crisis dynamism through the detection, transmission and interpretation of the signals it emanates. With this thinking, Mitroff (1988) proposed a five phase ("five mechanisms" - in his terms) crisis management model: signal detection; preparation/prevention; containment (damage limitation); recovery; and learning. This model pre-supposes a signal detection mechanism for better crisis preparedness and even prevention of a crisis.

The subject of tourism crises has attracted the attention of several scholars in the field resulting in a significant body of literature. These studies have contributed a lot in evaluating the impact of crises on tourism (e.g., Blake & Sinclair , 2003; Eugenio-Martin, Sinclair & Yeoman, 2005; Pizam & Fleischer, 2002), addressing particular aspects of crisis management, mainly destination recovery (e.g., Beirman, 2003; Israeli & Reichel, 2003; Prideaux, 2004) or focusing on lessons learned from crises (e.g., De Sausmarez,

2004; Henderson, 2003 a,b; Miller & Ritchie, 2003). However none of them has looked at crisis signals and what Mitroff (1988) calls "crisis detection mechanism". Even the few studies that propose more strategic approaches to tourism crisis/disaster management (Faulkner, 2001; Ritchie, 2004) just touch upon crisis signal detection. Key research questions such as how should a signal detection mechanism be designed, what types of detectors it should use and for what signals it should look and where, largely remain with no answer.

This paper aims to narrow this research gap, by exploring the 'mechanism' of crisis signal detection in the context of the tourism organizations. We first look at the crisis literature within tourism and we develop a conceptual framework for the detection process of crisis signals based on a number of theories including the information communication theory and the signal detection theory. We then conduct a fieldwork with 16 corporate level executives of international tourism organizations in order to explore the significance of signal detection in their crisis management practice, the way it is designed and the challenges they are facing. The paper concludes with suggestions for further research on the topic.

2. Crisis Management in Tourism

As with the generic crisis management literature, Santana (2004: 307) concluded that 'the [tourism] literature provides no generally accepted definition of crisis" since there are several definitions for the term "tourism crisis" (e.g., Beirman, 2003; Faulkner, 2001; Glaesser, 2003; Henderson, 2007; Ritchie, 2004). The more comprehensive definition, however, is perhaps offered by Sönmez et al (1994) who state that a tourism crisis is:

> "any occurrence which can threaten the normal operation and conduct of tourism related businesses; damage a tourist destination's overall reputation for safety, attractiveness and comfort by negatively affecting visitors' perceptions of that destination; and, in turn, cause a downturn in the local travel and tourism economy and interrupt the continuity of business operations for the local travel and tourism industry by the reduction in tourist arrivals and expenditures."
>
> (Sönmez, Backman & Allen, 1994: 22)

There are four clearly defined streams of research in the area of crisis management in tourism. The first stream of research focuses on the impact of crises on tourism and started with Mihalic (1999) looking at the impact of the war in Yugoslavia's tourism industry and Henderson (1999 a,b,c) evaluating the impact of Asian financial crisis on tourism. A study with significant contribution in understanding the impact of terrorism in tourism was undertaken by Pizam and Smith (2000) who did a comprehensive analysis of terrorism events around the world during the period between 1985 and 1998. These researchers described the crisis events in detail offering authors' analyses and participants' insights about the crises under investigation as well as evaluation of its impacts on the economies of different destinations leading them to suggestions about the need for post-crisis response and actions to minimise the impacts of crises on tourism organizations and destinations.

The second stream of research focuses on the recovery aspect of crisis management by rebuilding the destination image through appropriate crisis communications and marketing initiatives (Beirman, 2003; Fall, 2004; Fall & Massey, 2006; Frisby, 2002), identifying ways by which destinations can re-establish tourist confidence (Armstrong & Ritchie, 2008; Cavlek, 2002; Huan et al., 2004) and by implementing specific business recovery strategies (Anderson, 2006; Leung & Lam, 2004; Litvin & Alderson, 2003; Lo et al., 2006). Researchers in this stream also identified the importance of the development of crisis management teams, disaster management plan testing, employee training for crises and the protection of guests from disasters (Brewton, 1987; Burby & Wagner, 1996; Drabek, 1995) at the post crisis stage. Significant contributions were made by these researchers who studied the damage limitation practices of tourism organizations. This stream is taking a more reactive approach to crisis management thus completely ignoring the possibility of crisis signals and their detection.

The third stream of crisis management research highlights the importance of pre-crisis stage and argues that both hospitality organizations and tourist destinations need to understand the causes and consequences of previous crises in order to plan and prepare

themselves for the future ones. The main focus of researchers in this stream has been the phenomenon of global terrorism (Stafford et al., 2002; Taylor & Enz, 2002; Cushnahan, 2004, etc.) as well as the two great epidemics (Foot and Mouth Disease and Severe Acute Respiratory Syndrome) which affected tourism not only in the UK, Southeast Asia and Canada but globally (Sharpley & Craven, 2001; Coles, 2003; Ritchie et al., 2004; Henderson, 2004; McKercher & Chon, 2004; Kim et al., 2005, etc.). Natural disasters ranging from hurricanes in the US (Chandler, 2004) to wildfires and floods in Australia (Faulkner & Vikulov, 2001; Armstrong, 2005; Armstrong & Ritchie, 2005) and to the devastating Indian Ocean Tsunami (Henderson, 2005; Carlsen, 2006; Rittichainuwat, 2006, etc.) have also been investigated. The study of these crises was aiming mainly at evaluating the industry's response and at identifying best practice to be used in similar situations in the future (Armstrong, 2005; Henderson, 2003 a,b; Henderson, 2004; Johnson-Tew et al., 2008). Scholars in this stream maintain that learning from the previous crises is crucial for the management of a crisis. Although this stream sets a good foundation in understanding the importance of preparedness by learning from the previous crises as well as potentially best practice in crisis response, the relevant studies do not propose a holistic crisis management strategy or a framework capturing the different "mechanisms" of crisis management, thus leaving signal detection largely out of their discussion. .

The last stream of the literature integrates the extant knowledge of generic crisis and disaster management, and proposes succinct strategies, models and frameworks for a 'holistic' crisis/disaster management in tourism (for example, Faulkner, 2001; Glaesser, 2003; Ritchie, 2004). Drawing on insights from the broader disaster management literature, Faulkner (2001) produced a generic model for analysing and developing tourism disaster management strategies. Prideaux (2004), evaluated Australia's response to tourism disasters in 2001, using Faulkner's (2001) framework and concluded that response would be far more effective should the government adopt such a framework, whereas Miller and Ritchie (2003) applied the model on the outbreak of Foot and Mouth Disease in UK and found that, due to the nature of the disaster, it would serve only as an analytical tool rather than a preventative tool for tourism organizations. Following this

study Ritchie (2004) proposed a more 'holistic' strategic approach to crisis management which starts with proactive pre-crisis planning, goes through strategy implementation and ends with evaluation and feedback. These frameworks have set a solid foundation based on which other researchers attempted to built their own disaster management models such as the one proposed by Hystad and Keller (2008) which draws from both these frameworks and the researchers experience from the Kelowna forest fires or the one proposed by Paraskevas and Arendell (2007) which aims at mitigating terrorist attacks to a destination. The models proposed in this stream touch broadly upon the concept of crisis signal detection and some make reference to early warning systems, however, they do not provide answers to key questions such as how these detection systems should be designed, where the scanning for crisis signals should take place, what types of detectors they should use and how the captured signals should be transmitted to the decision making centres. The following section draws upon the signal detection literature in order to conceptualise these questions.

3. Crisis Signals and Detection of Signals

Crisis signals were first discussed in the late 1970s and 1980s a period characterised by a number of industrial disasters and transport accidents. Turner (1976) in his "Disaster Incubation Theory" argues that disasters are caused due to the accumulation of events are at odds with organizational norms about safe operation: "…a multiplicity of minor causes, misperceptions, misunderstandings and miscommunications accumulate during this [disaster] incubation period" (Turner, 1994:216). These events remain unnoticed due to a range of communication errors which he identifies as signals known and ignored or distrusted and signals buried or distributed across the organization, hence not collated. He also coins the term 'organizational exclusivity' for cases when the organization ignores warnings coming from outsiders. Perrow (1981) in his "Normal Accidents Theory" maintains that industrial disasters are unintentional failures ("normal accidents") of systems because of their inherent complexity and that disaster signals that may be generated from potentially destructive interactions between the various agents of these systems are shielded by the technological complexity of organizations.

Crisis signals, as discussed earlier, can be any kind of information (qualitative or quantitative) that indicates a deviation from normalcy. In an organizational context can, therefore, be viewed as messages or pieces of information about anomalies (discontinuities) generated by "organizational imperfections" (failures, breakdowns, errors, incidents, near-accidents, unintentional deviations, etc.) in the external (e.g., poor quality of raw materials offered by the organization's suppliers) and/or the internal environment of the organization (e.g., a steady increase of employee absences) that "can be interpreted as symptoms or peaks in the development of a crisis" (Roux-Dufort, 2007: 231).

Some scholars have expressed their reservations about the existence of these signals claiming 'hindsight bias' – the tendency, in retrospect, to overestimate the amount of available information on a threat at the time of decision making (Dekker, 2002, Fischoff & Beyth 1975; Gephart, 1993; Woods, 2005). Nevertheless, the concept of signals that warn about an emerging crisis (or opportunity) has been widely supported in the generic management literature under different terminology such as weak signals (Ansoff, 1984), wild cards (Hiltunen, 2006), early indicators (Petersen, 1999), early warnings (Inayatullah, 1995) and emerging issues (Stevenson, 2002).

With appropriate signal detection mechanisms in place crisis signals can be picked up in time and then, some -if not all- crises can be averted before they happen. One notable attempt to investigate the factors that affect signal detection was made by Scheaffer et al., (1998) who, through their investigation of the Barings crisis, propose a model that summarises the process of "tackling early warning signals" (EWS) by identifying crisis practices, organizational characteristics and patterns that hinder signal detection. The authors suggest that the factors influencing signal detection and problem sensing are cultural, structural, psychological and professional while they acknowledge that exogenous factors may play their role as well. Although, their attempt is very helpful in many senses, the factors identified came from the investigation of a single financial crisis and the authors themselves acknowledge (p.17) that their model is "potentially useful",

yet “unsophisticated”. There have also been several attempts to create early warning systems focusing mainly on natural disasters (e.g., Zschau & Küppers, 2003), geophysics and financial markets (Sornette, 2004) and financial crises (e.g., Berg & Pattillo, 1999; Kaminsky et al, 1998), however, their predictive power has been proven questionable. A much more helpful study was the one conducted by Judith Ann Clair who investigated an insurance company and its medical division facing a possible financial as well as public relations crisis in the period prior and up to 1991, and was the first to suggest a six-step crisis signal detection framework (1993: 65-79) involving activities grouped into two categories: a) activities triggered by a need to define crisis signals (identifying potential signals, locating data in these signals and interpreting the signals); and b) activities triggered by a need to resolve a potential crisis (stabilising the potential crisis, planning a method to avert the crisis and resolving the crisis). According to Clair (1993), the signal detection process should have “interim goals” that exist at each point in detection and “ultimate consequences” (p. 65). The first goal of the process is the creation of a shared understanding about the situation and of a consensus for a commitment to the crisis response activities. The second is the establishment of accountability with regards to these response activities and the third is the reduction of key organization members’ uncertainty by creating awareness about the emerging crisis. The eventual outcomes (or consequences) of the process will be changes in the organization’s core beliefs about its vulnerability to certain threats and its procedures and structures for crisis detection. Until 1993 authors had talked about crisis signal detection as a general concept but did not specify, within the definition, what sort of action was needed for effective signal detection to take place.

After Clair (1993) very few authors in the crisis management field have explored the topic. Coombs (1999) presented a ‘crisis sensing mechanism’ from a crisis communications perspective as a three-phase process (locating information, funnelling, and analysis) and lists potential sources for information for issues management, risk assessment and reputation management. Desouza and Hensgen (2005) look at signal detection from an information management perspective concentrating on signal processing within the organization. In this sense, it is Clair’s work that sets the

foundation for this discussion. Her conception is a more systematic view of what the signal detection phase of crisis management should provide to the organization and illustrates that signal detection is a dynamic process, not only because information is moving within a system of actors, but because the information is itself evolving with the purpose of averting the crisis before it escalates. This dynamic process aims at the timely scanning for external/internal crisis signals, their capture and their transmission to the organization's decision making centre which, based on the information they carry, will decide about potential preventive action.

The following section of the review presents these key stages of the signal detection process namely; scanning for signals, signal capture and transmission.

3.1. Scanning for Signals

Environmental scanning is employed by organizations to make sense of the environment in which they operate and is a function strongly supported by business strategy authors, despite potential challenges and deterrents that a formal approach to it may present (Huffman, 2004; Okumus, 2004). Lozada & Calantone (1996) suggest that the scanning could be both structured and unstructured (spontaneous) by combining ad hoc external networks with a more formal system for information collection. Huffman (2004: 47-48) extends this suggestion by asking for "collective intuitions to synthesize a picture of future threats", "more power … to lower level managers who are the first ones to see the writing on the wall" and a need for organizations "to reduce their vulnerability". Considering that the scanning effort may be both structured and unstructured (Lozada & Calantone, 1996) or passive and active (Farh et al., 1984), it is useful to evaluate the organization's environment that should be scanned. The largest part of the business strategy literature (e.g., Aguilar, 1967; Fahey & King, 1977, etc.) divides these environments into internal (consisting of the organization's structure, culture, and resource variables), task (which includes industry force variables) and general or societal (which comprises economic, technological, socio-cultural, and political-legal variables affecting the organization). A relatively different, and perhaps more useful for the present study, perspective on the exploration of the information environment is proposed

by Alberts et al. (2001) in their research on information warfare operations who suggest a division in 3 domains: physical, informational and cognitive. In an organizational context, the *physical domain* encompasses the entire environment the organization intends to influence directly or indirectly, e.g., safe production processes and customer service, sound fiscal operations, employee training and development, competitive environment (with all its components), suppliers, and customers. The *information domain* contains all elements required for the creation, exploration and dissemination of information as well as its transformation to explicit/tacit knowledge. Within this domain all environmental scanning outputs are gathered through scanning activities undertaken by various detectors within and outside the organization and may have a variety of forms and different degrees of sensitivity (e.g., data from a direct organization/customer encounter, market analyses, situation reports, regional/national per capita consumer expenditure, competitive intelligence). The *cognitive domain* is the place where "perceptions, awareness, understanding, beliefs, and values reside and where, as a result of sense-making, decisions are made" (Alberts et al., 2001:13). Von Lubitz and Wickramasinghe (2006) include in this domain human factors that affect operations, such as education, experience, political inclinations, social attributes (behaviours and peer interactions), commitment, loyalty, open mindedness and intuition of organizational members involved in the relevant activities.

The scanning is performed by detectors which can be technical, human or a combination of the two. Technical detectors can be devices or machines that monitor critical for the organization functions or data received by its internal or external environment and are able to identify changes in them. Human detectors can be members of the organization or people external to the organization that have access to data pertinent to its functions and are willing to transmit these data to the organization's decision making centres. They may be people specifically assigned to signal detection even if this may not be their full-time occupation (Regester & Ladkin, 1997). Although Cobb (2003:81) suggested that as much as 80% of information needed by the organization already exists inside it, an effective signal detection system should include a wide network of external detectors. It is important, at this point, to make the distinction between external detectors who are

members of the organization detecting signals in the external environment and those who are independent from the organization. Several authors (Gilad, 2004; Choo, 1998, 2002) warn that organizational culture, perspective, conventional wisdom, and implicit assumptions within the organization usually hamper the ability of the former to detect the full range of signals available in the environment, whereas external independent detectors are able to detect and capture trends or discontinuities way before these manifest themselves clearly in data available to everyone.

Once signals are scanned by the organizations, they move to the acceptance/rejection stage which is known as signal capture.

3.2. Signal Capture

At this stage of signal detection process, the critical issue is the detector's diagnostic accuracy, i.e., their ability not to confuse relevant signals with non-signals and other irrelevant stimuli (Green & Swets, 1966). There are two broad categories for signal capture methods: case definition methods and pattern recognition methods. Case definition methods use previous experiences to define an "event of interest" and thus track those signals considered of greatest importance (Aamodt & Plaza, 1994; Langseth, et al., 1999). Scanning for signals based on the organization's risk assessment and vulnerability analysis would fall into this category. On the other hand, pattern recognition methods (Schalkoff, 1991) would be extremely useful in identifying signals (or sets of signals) that deviate from the expected baseline (routine) and often result in unknown or unimaginable crises. The possible outcomes of the detector's signal evaluation may be one of the following:

1. The detector captures and registers as valid a signal from an emerging threat (true alarm - hit)
2. The detector captures and rejects as noise (or non-signal) a signal from an emerging threat (missed alarm – type II error)
3. The detector captures and rejects as noise (or non-signal) a signal which is noise

4. The detector captures and registers as valid a signal which is noise (false alarm – type I error)

An 'optimal' detection performance would mean a maximum rate of hits with a minimum rate of false alarms. According to Swets (1988), the diagnostic accuracy depends on its sensitivity and on the signal specificity. Swets argues that improvement in sensitivity usually occurs at the loss of signal specificity, in other words the number of false alarms (type I errors) may increase significantly. Consequently, for any type of threat a signal detection system can either minimise the missed alarms or minimise the false alarms but never both. The optimal level of sensitivity relative to specificity depends on the consequences of false and missed alarms and they are almost never symmetrical (Puranam et al., 2006). These consequences are not fundamental properties of the detection process itself but are specific to the threats for which the detection is undertaken. For example, The Economist (2000) states "… it costs some $450,000 to prepare a kilometre of coastline for a coming storm…". An alarm that initiates highly disruptive action (e.g., closure of business, evacuation of premises, transfer to back-up facilities, etc.) may be perceived as having high economic and emotional cost. If this cost is prohibitive, the organization may weigh heavily the probability of false alarms when setting the sensitivity threshold. Other scholars too debate against a high sensitivity threshold, in that it may cause the 'cry-wolf phenomenon' (adapted from Aesop's fable) or 'false alarm effect'. Breznitz (1984), for example, talks about "the credibility loss [of a crisis signal detection system] due to a false alarm" (p.11). Crisis and disaster management theorists, however, argue that in real life situations public response to an alarm is not diminished, if the basis of a false alarm is understood (Drabek, 1994; Dow & Cutter, 1998).

Crisis signals, once generated from their source, have a finite life, they disappear and may not appear again until after an 'avoidable' crisis becomes manifest. Desouza et al. (2004) maintain that the path a crisis signal traverses through has significant bearings on whether the decision making centre will receive the intended information, given the many

opportunities the crisis signal has to be lost or rendered useless. Therefore, organizations need to transmit signals effectively to be able launch preventive measures.

3.3. Signal Transmission

The third stage of the signal detection process is the development of a clear communication platform for the timely and unobstructed transmission of crisis signals from detectors who capture them to those with the mandate of launching responsive measures. The dynamics of signal transmission between organisational members can be explained by the social exchange theory. In Social Exchange Theory, which has been successfully applied to social psychology, it is argued that relationships providing more rewards than costs lead to mutual trust (Emerson, 1981). Exchange relationships that are based on reciprocity and mutual attraction (Granovetter, 1985) enhance the knowledge flow leading to more effective organisational functioning (Tsai and Ghoshal, 1998). In particular, social relationships and exchange between the members of organizations stimulate creative ideas and new knowledge (Clercq et al., 2010) and such knowledge in turn can increase an organisation's ability to respond to the changes in a dynamic and hostile environment (Kim, 1998; Kim and Mauborgne, 1998).

Finkelstein (2003) argues that in some organizations crisis signals are captured but either the detectors who captured them do not clearly know where they should direct them or the communication platform through which these signals are transmitted is too complex and hierarchical to effectively cope with urgent information. Another reason for this is that signals may be detected in various parts of the organization or its environment that may not be linked. Adelman (1998:65) refers to it as the "dead-ending of information".

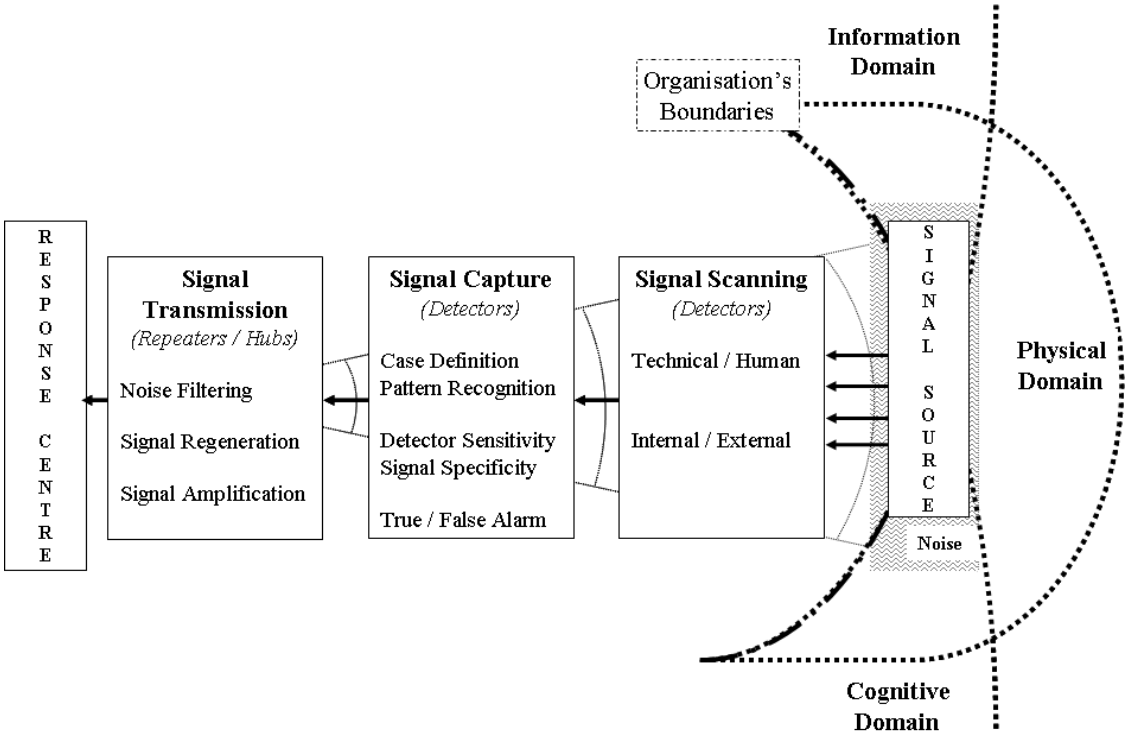
A further problem that can be observed refers to disregarding some signals due to transmission channel overload with a multitude of diverse signals that may be attributed to the complexity of the emerging crisis or the emergence of more than one crisis at the same time. As signals often carry with them some sampling noise (Lloyd & McMillan, 1956), the transmission of a multitude of diverse crisis signals through the same communication platform would only add more sampling noise that might possibly

degrade the information carried by the signal. Schmeidl (2002:78) refers to this problem as “noise” or “static” whereas Adelman (1998:65) calls it the “crushing of signals”.

Desouza and Hensgen (2005:73-78) suggest a platform consisting of multiple communication lines and a combination of transmitters which they call ‘repeaters’ and ‘hubs’. The ‘repeaters’ are components whose role is to transfer the signal to a designated destination that can be the decision making centre or a decision maker or a ‘hub’. The hub receives multiple signals, filters them from noise, regenerates them and possibly amplifies them -if needed- in order to extend their life before relaying them back to the communication channel towards the decision making centre. Normally the role of such hubs would be assumed by middle managers in the organization as they are often viewed as ‘gatekeepers’ of information flows (Awazu, 2004; Davenport et al., 1998).

The 3-stage dynamic process of crisis signal detection can therefore be conceptually summarized in the framework of Fig. 1

Figure 1 – The Crisis Signal Detection Process



Having established a conceptual model for crisis signal detection, the study moved to explore if and how crisis signal detection is practised by tourism organizations (namely: what crisis signals they are looking for; what detectors they employ; where they scan for signals; how they transmit them to decision makers) and what are the challenges that these organizations face when attempting to detect crisis signals.

4. Research Design

Since crisis signal detection has not been explored in depth in either generic or tourism-specific crisis management literature, the present study followed an inductive approach to research design placing more emphasis on the inductive representation (the "process of interpretation" according to Bogdan and Taylor, 1975:14) of a set of empirical judgments (raw data, observations, experiences) from which we could build up a set of factual propositions, explanations and knowledge about this crisis 'mechanism' (Altinay & Paraskevas, 2007; Saunders, et al. 2009).

We used a criterion sampling technique for which Patton (2002: 238) states that "the logic of criterion sampling is to review and study all cases that meet some predetermined criteria of importance". In this study, the sample had to meet four criteria: corporate level tourism professionals; working in a multi-unit national or international tourism organizations; being in charge or directly involved with decisions related to risk/crisis management; and having experienced at least one crisis incident in their organizations. The latter criterion is exactly what Patton (2002) means by 'criterion of importance'. Access was gained to a population that met the three first criteria, through the Global Council on Safety, Security and Crisis Management of the International Hotel and Restaurant Association (IH&RA) in 2006. The Global Council at the time consisted of corporate level executives specialised in the area of crisis and risk management (indicative titles: Senior Director Crisis Management & Business Continuity; Vice President Risk Management; Vice President Corporate Safety and Security; Director Corporate Security; Director of Safety and Security; Chief Security Officer) and CEOs of smaller national and international hotel chains. In order to benefit as much as possible

from the participants' crisis management expertise, it was decided for the study to explore 'critical incidents' in organizations as "focusing on specific events enables the participant to provide a fuller, more detailed description of an experience as it was lived" (Thompson et al., 1989: 138). The executives were approached and 'screened' on the basis of their experience and the critical incidents they had dealt with. Through this screening and some further 'snowballing', sixteen participants were secured for the study (Table 1).

For the collection of data we employed the Critical Incident Technique (CIT), first introduced by Flanagan (1954). Chell (1998) describes CIT as a qualitative interview procedure that facilitates the investigation of significant occurrences (events, incidents, processes, or issues) identified by the respondent, "the way they are managed, and the outcomes in terms of perceived effects" (p. 56). The choice of this technique for the current study was primarily related to its ability to allow the participants express their personal views of the described incident (Stauss & Weinlich, 1997; Walker & Truly, 1992), its inductive nature –especially when the topic being researched has not been well researched (Grove & Fisk 1997), the rich data set and powerful insights it can offer (Zeithaml & Bitner, 2003) and its 'cultural neutrality' (de Ruyter et al., 1995), in that it invites participants to offer their own perceptions on an issue, rather than indicate their perceptions to researcher-initiated questions. The CIT interview was divided in two parts. The first part of the interview aimed at the participants 're-living' a crisis they experienced; whereas the second part aimed at the participants' insights about what was learnt from the crisis with particular focus on the challenges that early detection of possible crisis signals may present (interview guide is presented in Appendix 1

In order to form a fuller picture of the context, the details and the effects of the critical incident on the organization, we also analysed documentary and other evidence provided by the participants and other sources in order to corroborate and augment the evidence from the participants accounts (internal reports, consultancy reports, meeting minutes, memos and e-mails, policy statements, standard operating procedure manuals, training manuals, articles and press coverage of the critical incidents reported, etc.). In certain

Table 1 – Study Participants

Participant	Type of Business	Scope of Business	Title	Gender	Risk/Crisis Experience	Critical Incident
A	Hotel Group	South Europe N. Africa	CEO	M	36 years	Food Poisoning
B	Hotel Group	Global	VP Risk Management	M	18 years	Water System Contamination
C	Hotel Group	EMEA	VP Corporate Security	M	23 years	Suicide Bombing
D	Hotel Group	Global	VP Risk Management	M	28 years	Averted Terrorist Attack
E	Theme Park	Global	VP Loss Prevention	M	16 years	Boycott by Conservative Groups
F	Hotel Group	Central Europe	CEO	F	13 years	Racism Rumour
G	Hotel Group	North America	Corporate Director of Security	M	14 years	Workplace Violence
H	Hotel Group	Europe South America	Chief Information Officer	M	6 years	Online Extortion
I	Hotel Group	Global	VP Business Continuity	F	7 years	Hurricane Katrina
J	Hotel Group	South Europe	CEO	M	10 years	Loss of Key Personnel
K	Hotel Group	Global	VP Global Asset Management	M	13 years	Hurricane Katrina
L	Hotel Group	Asia Pacific	Global Director of Loss Prevention	M	7 years	Food Poisoning
M	Hotel Group	North America	Director of Security	M	16 years	9/11
N	Hotel Group	North America	VP Risk Management	M	24 years	Hurricane Wilma
O	Hotel Group	Asia Pacific	VP Corporate Security & Safety	M	10 years	Car Bombing
P	Hotel Group	Risk Management Director		M	15 years	9/11

occasions, the analysis of secondary evidence indicated the need of a follow-up interview with some participants for further clarification of certain aspects of the critical incident, which was granted in every occasion. The interviews were transcribed verbatim and the transcripts were sent back to the respondents for their review of content and interpretation accuracy. Any amendments made in the transcripts were taken as primary data for the analysis and the information previously recorded was discarded. This process, also known as 'member checking', adds both internal (authenticity check) and external validity (transferability) to the overall study (Lincoln & Guba, 1985). The verified interview transcripts were coded and analysed using N-Vivo 7 which enabled us to identify themes and categories and to organise the responses according to these. In order to ensure the reliability of the analysis, we followed the accepted practice of employing third parties to perform the same analysis independently (Paraskevas, 2001). Two academics in risk management were engaged with the task to read, sort and classify the interview findings. The resulting classifications did not show significant differences from the one produced by us. To further ensure reliability with a test-retest reliability check, the two analysts were invited to perform the same task for a second time, eight weeks later. The two analyses resulted in a 96 per cent agreement which is considerable higher than the prescribed level of acceptance for exploratory research, which is "in the order of 0.6" (Paraskevas, 2001).

5. Findings

5.1. Existence of Crisis Signals

In this study, we aimed at the recall of the 'one' crisis that was so significant (shaping their view of crisis management) for the participants, that they had to think it over and over again many times in their lives with all its details. Table 1 shows that these critical incidents cover a wide range of events with a reasonable degree of overlap or similarities (9/11, hurricanes, etc.). In almost all cases (except 9/11 and the car bombing) the participants admitted that there were adequate warning signals prior to the crisis which were either ignored or misinterpreted.. In order to justify their claim, the participants were probed to offer details about these signals and in all cases they did (statistics,

metrics, reports, etc.). However, in spite of their admission of warning signals, they did not all categorically label their crisis as "predictable" but used expressions such as *"could possibly be predicted", "there were some signs that might have led us to a prediction"*, etc. (Participants B and G). The ability to make meaningful use of these signals depends on individuals (arrogance, fatalistic approach to life, denial of crisis or mere inability to understand the threat) but, according to most participants, predominantly on the culture of the organization. They have all emphasised the need for a crisis signal detection culture as part of an organization-wide *crisis culture* that should be embedded at all levels of the organization and by which everyone who notices an abnormality is responsible to report it to a decision making centre. Such culture distinguishes a 'crisis averse' from a 'crisis prone' organization. Having said that, they all agreed also in that not every crisis is predictable or emits warning signals. Participant B stated that a pre-condition for effective detection and response to an emerging crisis is the *in-depth understanding* of threats and risks the organization is facing. This, according to B *"is the cornerstone of our crisis management actions; we know that we cannot be possibly prepared for everything but our aim is to be able to limit the damage from the unthinkable"*. Such understanding, however, is not always possible, due to the *complexity* of certain crises (as in the case of Katrina – Participants I and K) or because the organizations involved are unable to capture the full scale of *cause* and *effect* (Participants B and K used the term *"crisis puzzles"*) as the effect may be the result of multiple causes or one cause may have multiple effects. Participant B stressed the need of a wide range of detectors paralleling signal detection with a radio: *"if you are tuned to only one frequency, you will catch the signals broadcasted only in that frequency"*. Pointing out that they had all the crisis signals for a hurricane and they were prepared for it, Participant K stated that they could never expect *a "package of three crises in one: hurricane, flood and social unrest"*. In other cases (e.g., 9/11) crises may simply be *unthinkable* (all participants used this term during the interviews). Several participants (A, B, J, L, M, P) also noted that some crises may be known for quite some time and emit clear signals but as they continuously evolve together (*co-evolve*) with the prevention/mitigation measures in a form of "arms race" (e.g., terrorism, cybercrime, etc.), their final form and impact cannot be easily predicted. Participant F made the point that signals may be there but are not always specific. She

further argued that in most cases where crisis signals exist, they point towards a "*range of possible courses"* that a crisis may take.

5.2. Scanning for Crisis Signals

All participants agreed that signal detection should be at the centre of any crisis management effort in the organization and should become its "*first line of* [crisis] *defence"*. The first step that was suggested (Participants B, D, N, P) was to look for specific signals such as *"lagging and leading indicators"* identified through the analysis, understanding and prioritisation of known threats. These signals can be complemented by ad hoc information gathered by random and expert networks. The participants used terms such as "structured", "planned", "targeted" and "robust" to differentiate this type of signal detection process from the passive, ad hoc capture of crisis signals from random sources. A good part of the participants (A, B, C, D, G, H, N and P) related this condition with formal risk assessment and business impact analysis practices and emphasised the development of specific indicators for emerging threats. One participant commented: *"This should not be a 'one-off' exercise … [but] a continuous process … because threats evolve and so should the signals"*.

Most participants admitted that their signal scanning activities are looking for 'ground truth', for 'what is out there' and not 'what will possibly be'. Only participants B and I organised 'retreats' for scenario planning, situational awareness and exploration of key employees' perceptions of the future (typically though from their risk management divisions rather that the entire organization) in a form of active, unstructured scanning for emerging crisis signals.

5.3. Signal Detectors

The terms most used by the participants to describe the process of signal detection was *"network"* (74 mentions in all 16 interviews) and *"grid"* (23 mentions in 10 interviews). The analysis of the interviews showed that the panellists understand this network as consisting of three parts (Table 2).

Table 2 – A Typology of Crisis Signal Detectors (Human)

	Non-specialist	Specialist
Core Detectors	• All members of the organization • Key suppliers • Key customers • Government Agencies • Industry Bodies	• Assigned detection specialists (e.g., risk analysts, security experts, etc.) • Intelligence vendors (e.g., business intelligence services, internet scanning, press clipping, media monitoring, etc.)
Ad Hoc Detectors	• Customers • Competitors	• Crisis-specific vendors (e.g., security agencies, disaster recovery services, business continuity services, crisis counselling, etc.)
Expert Detectors		• Crisis consultants • Think-tanks

First, a *core signal detection network* where the detectors are predominantly members of the organization spread in every part of it but also a number of detectors outside the organization that are formally connected with the organization. The panellists agree that the role of detector should be assumed by everyone in the organization (participants D, H, G), however, some of them (B, I, K, L) believe that there should also be people especially assigned (detection specialists) to perform this task ("watchdog", "counter-terrorism expert", "risk analyst", etc.). Other detectors that could be part of the core signal detection network might be non-specialist detectors not directly employed by the organization such as regular suppliers, key customers, government agencies (non-specialist because their primary function is not the one of signal detection) and specialist detectors such as vendors of intelligence services (business intelligence, internet scanning, press clipping and media monitoring services, etc.) formally employed by the organization. A second part of the organization's signal detection network is a set of short-lived random networks that can provide useful information and warning signals when a situation arises. Normally, these networks are formed 'ad hoc' by customers (participants A, D, F, G, O), competitors (participants B, D, E, F, N) or vendors

specialised in crisis-specific services (participants D, E, I, J, O) such as security, disaster recovery, business continuity, crisis counselling, etc. and last only for a short period of time when an issue is evolving into a crisis. Finally, according to the participants (D, G, H, I, M, O), the organization's signal detection network can also include a third part, the expert networks to which it can connect either formally (consultants) or informally (think tanks) when needed.

5.4. Signal Capture

When discussing about signal capture, the participants mainly talked about the ability of detectors to recognise patterns outside the normal. Participant F suggested that her revenue manager should be able to identify a subtle but unusual spate of cancellations when a viral online rumour got out about racist practices in their hotel chain, way before this escalated into a full blown crisis. Several participants noted that organizations fail to learn from crisis experiences because they do not have established mechanisms needed to formalise, codify and share the lessons learned. Others (A, C, D, G, M) talked about the need for the creation of a *crisis knowledge database* (some used the term *'repository'*) which will help both the detectors and the decision makers in the organization to identify similarities with past crises when an abnormality occur. Participant O emphasised that such a database would also offer a *'repertoire'* of responses thus enabling a faster reaction of management to a given series of crisis signals. However, although many participants agreed in principle with the idea, they dismissed it from a practical point of view. Participant I argued that *"such a database will be impossible to be created by one organisation; we are not the CIA!"* When prompted about a 'repertoire', Participant L was very sceptical saying that it may limit response to more complex crises: "*this matching of information approach will direct us respond according to what this repertoire suggests rather than the crisis we actually experience. When your only tool is a hammer, all problems will look like nails."* Other respondents though suggested that some forms of crisis knowledge databases already exist, mentioning organizations such as FEMA and OSAC who also issue warnings when they capture signals indicating abnormalities in certain geographic locations and gave examples on how they were exploiting this 'knowledge'. The proponents of crisis knowledge repositories suggested

that such an endeavour could also be achieved at industry level through private-public partnerships or even through the UNWTO.

The main challenges for signal capture according to the participants are the *background noise* (unclear or confusing signals) and the *information overload* (multiple and diverse crisis signals). Participant I illustrated her response by saying that on the first day of the hurricane Katrina, the group's hotels in the region received at least nine reports of levee breeches and eight other reports for major flooding. However, at the same time the Army Corps of Engineers insisted that they were no levee breaches and FEMA was claiming that they were coping. With several communication gaps due to the hurricane itself the hotels could not really understand what signals were genuine and what not. However, in such situations another challenge with signal capturing is the one described by participant N as *"the cocktail party effect"* in which the detector may focus on a particular set of signals, ignoring completely others that may exist. Participant L illustrates this by stating when describing a case of a group food poisoning in a hotel in South East Asia that *"the crisis was not caused because we did not see the warning signs. In this part of the world food hygiene standards are not always the highest possible and we got slack in maintaining a good level in all our kitchens. We knew the problem but fixing it had not been a priority for us. We concentrated on the wrong priorities."*

5.6. Signal Transmission

Tightly intertwined with the detection culture mentioned in 5.1 is the existence of appropriate communication platforms for the transmission of captured signals to the crisis response centre. Participant J emphasised the need for all detectors to know *"how"* and *"to whom"* they should send their captured crisis signals. Most participants argued that, with the advances in information and communication technology, the transmission of signals should not present many problems even for organizations whose crisis maturity level is quite low. Participants A and G stated that they had recently made substantial investment in developing their organization's intranet and that they thought that this alone was enough. Strong supporters of 'abundant and redundant' communication platforms were participants C, D and P who gave several examples of the platforms they

use, however, it is noteworthy that these are all very large international hotel groups. Participant B stressed the need for availability of multiple connections as, in his experience, *"…if you have only a couple of communication lines, signals will be congested and eventually lost"*. Participant I also suggested that every detector should be able to communicate with *"at the very least two persons at the next level of the communication chain"* in order to ensure that the captured signal is not stopped by communication failures. However, when possible lack of financial resources was brought up, many participants argued that a basic communication platform with a dedicated phone number and an internet address would suffice as long as there is a structured crisis signal transmission process.

For the participants, the major challenges in signal transmission are related not with the technology but with the human transmitters. Participant O, for example, who experienced a car bombing, suggested that two hotel gardeners had reported to the front office suspicious activity of people in a car outside the hotel but the information was ignored *"because the receptionists thought that these uneducated peasants were not able to judge what behaviour is suspicious and what not"*. Similar experiences were reported by other participants about housekeepers, stewards and porters whose warnings were consistently ignored by staff in 'higher status' positions. Participant N talked about *"tribalism"* between departments and levels of hierarchy: *"In some organizations there are first rate and second rate staff. In hotels, managers and receptionists tend to be taken more seriously whereas housekeepers, waiters and porters less."* He added that, prior to hurricane Wilma, housekeepers' warnings that some guestroom window frames were not strong enough to withstand the hurricane force were completely ignored, resulting in a number of guest injuries and lawsuits. A similar problem was reported by a number of participants (A, D, F, G, and K) who talked about *"silos"* and *"silo mentality"* within the organization which blocks the transmission of certain crisis signals to the decision makers. For example, participant G who experienced a case of lethal workplace violence maintained that that there was knowledge kept 'locally', within the perpetrator's department and argued that *"there should be a way for this knowledge to cross the*

department's silos and reach persons who would be able to recognise these signals as potentially threatening".

A further challenge brought up in the interviews was related with information overload and the cumulative background noise during the process of signal transmission. Many participants underscored the need for a "*signal filtering and fusion*" during the transmission process so that the response centre will receive a more coherent picture of the situation. Participants B, D and E talked about *"fusion centres"* whereas most participants used the term *"hubs"* in the sense of information gatekeepers or filters. Some participants (e.g., E and I) had already dedicated crisis information fusion centres. Not all participants agreed, however, with this idea with concerns concentrated mainly on the technology side of the issue as the decision support systems available have a significant cost without, thus far, having proved their value. Participant J, although agreeing in principle with the concept, dismissed the idea unfeasible for his organization stating that the cost of decision support technology or expert groups required went beyond their crisis management budget. This view was shared by several participants who argued that the collation and sense-making of the signals is done anyway by the decision makers in the end of the signal detection network. On the other hand, participant B suggested that *"there is no need for specialists in order to filter and collate crisis signals"* since, in his view, "*we have to trust our staff at property, area and region level to perform this task"*.

6. Discussion

Flanagan's (1954:338) definition of a critical incident focuses on "extreme" events whereas later definitions (such as the one provided by Bitner et al., 1990 or Grove and Fisk, 1997) talk about events that make a significant contribution, either positively or negatively, to an activity or phenomenon. The study took Flanagan's (1954) 'extreme' approach as the question focused not at any crisis the participants had faced in their careers but the one "that has changed their perspective on organizational crisis management". This emphasis was purposeful because CIT has often been criticised as

having a design that may be flawed by recall bias (Michel, 2001) or other undesirable bias, such as consistency errors or memory lapses (Singh & Wilkes, 1996).

The response that the crises described were predictable and that there were signals which should trigger preventive or earlier responsive action was not surprising, given the significant body of literature (Dekker, 2002, Fischoff & Beyth 1975; Woods, 2005) that talks about 'hindsight bias'. This literature offers empirical evidence that people, in hindsight, have the tendency to believe that some events were more predictable than they actually were. Clearly, the distinction between predictable and non-predictable crisis is a difficult task since it largely depends on the availability of an adequate quantity and quality of pre-crisis signals. The participants linked these signals with varying degrees of predictability, confirming the view that crisis events cannot simply be predictable or unpredictable but lie in a continuum of predictability (Tetlock, 2005). However, the participants conceded that it is not the mere existence of these signals that makes a crisis more or less predictable but the ability firstly of the detectors and, most importantly, of the decision makers to interpret these signals and trigger the responsive action.

This presupposes first a critical mass of competent detectors that can capture a wide range of different signals (the radio metaphor of participant B) and of decision makers who share strong ideas about what is important and what not, something that is not always a norm in an organization. In most situations, the interpretation of signals and, therefore, the definition of the unfolding crisis and its causes remain contested and requires much trial-and-error (especially in complex, multidimensional crises as reported by participants I and K), rearguard infighting and political U-turns. On the other hand, excessive homogeneity and conformity in detectors and decision makers leads to the phenomenon of groupthink hindering the 'out of the box' interpretation of signals, which is often necessary for newly emerging crises.

A second factor one needs to consider, according to the responses, is that signal detection does not just happen by itself but it is rather a reflection of the crisis culture in the organization and of the organization's structure and priorities. Consistent with the work

of Scheaffer et al (1998), participants reported departmental tribalism, silo mentality and cognitive arrogance as factors that hinder signal detection. Gilad (2004) argued that "functional silos" (p.17) are a consequence of organizations failing to integrate their different functional areas. He also posited that quite often organizations create information "firewalls" (p.254) within them when some signals detected in the environment are deemed too sensitive to be broadly shared or certain channels for transmission of such signals are cumbersome to use. Bazerman and Chugh (2006) used the term "bounded awareness" that occurs when "cognitive blinders prevent a person from seeing, seeking, using, or sharing highly relevant, easily accessible, and readily perceivable information during the decision-making process" (p.88). The question of priorities is also equally important. Participant L admission that they had all the warnings but concentrated in the "wrong priorities" reflects a not uncommon perception of some managers that it is preferable to avoid a cost (of responding to a series of warning signals) in the present when the benefits of this action may appear in the longer term or when the reward for responding is uncertain.

With regards to where to look for and what types of signals, the participants' responses were consistent with Alberts et al (2001) who argue that organizations tend to scan more their physical domain (through passive data collection and reporting of changes) as well as their informational domain (through more active and targeted scanning towards specific information that can signal changes and discontinuities which may constitute emerging threats). The ideas of leading and lagging indicators as warning signals for known crises are also consistent with the approaches proposed by the traditional crisis and disaster management literature (Berg & Pattillo, 1999; Kaminsky et al, 1998; Sornette, 2004). However, as the participants indicated, in complex situations and in newly emerging crises these signal detection approaches are not adequate. When considering the topic of environmental scanning, most participants admitted that their signal scanning activities are looking for 'ground truth', for 'what is out there' (physical and informational domains) and not 'what will possibly be' in the terms of Alberts et al. (2001) which can only be achieved by scanning the organization's cognitive domain. Collins (1997) argues that the intelligence of the people within an organization goes

beyond databases and knowledge repositories and, apparently, very few organizations in this study tap on it (B and I with 'retreats' for scenario planning, situational awareness and exploration of perceptions of the future).

As far as the detectors are concerned, the extant literature on signal detection (e.g., Adelman, 1998; Desouza et al., 2004; Finkelstein, 2003) underlined the importance of networks and the importance of connectivity and cooperation between them. However, the identification and classification of networks in this study departs from the traditional literature which broadly divides the detectors into internal and external, technical and non-technical (human). Focusing the discussion on human detectors, one can notice that, for example, Turner (1976) talks about members and non-members of the organization, Mitroff (2004) talks about internal detectors and gossip networks on the one hand and external communities, special interest groups and industry trade groups on the other and Regester and Ladkin (1997) about specially appointed internal detectors. During the interviews it was made clear that the participants did not assume clear boundaries between the organization and its external environment but considered these boundaries as blurred and dynamic. When considering employees, suppliers and customers as detectors one has to accept that they are also part of other special interest groups as well as of the wider community. Their family members and their friends may work for competitors, the government or industry regulators and through their relationship they may be able to scan a different set of signals. Contracted specialist service providers may be considered at the same time as internal and external detectors. In the current study the participants used as criteria their specialism on crisis signal detection and the strength of relationship with the organization (formal/strong, informal/weak).

An important aspect of signal capture by the detectors but also a point of reference for possible responsive action for the decision makers is the proposed by many respondents crisis knowledge database. Such a database is consistent with Mitroff's (1988) model which includes a learning mechanism as well as with other models proposed by crisis management scholars such as Heath (1995) and Gonzales-Herrero and Pratt (1998). The idea of a continuously evolving point of reference for detectors (and decision makers) to

facilitate the recognition of signal patterns or even enable them define a case as an emerging crisis was further elaborated by Mitroff (2004) who suggested that organizations need "world-class Crisis Learning Centers" (p.20) to study patterns associated with past crises (own and others'), distil critical lessons from them and ensure that these will shape the organization's crisis planning in order to reduce the potential for future crises. Clearly, however, the cost implications of such an endeavor make it rather a desirable 'add-on' rather than an essential element for the signal detection system. The proposition of an industry-level (or UNWTO-level) knowledge database appears to be more realistic; however, there are still important practicalities to be taken into consideration, such as the difficulties in the codification and storage of complex multi-dimensional crisis information (e.g., the 2004 hurricane Katrina or the 2011 Tohoku earthquake) or the possible bias in terms of responsive action that the information retrieval system may cause as a result of this codification (not every crisis is the same crisis). In any case, normally knowledge is local, so that any single detector or manager cannot have knowledge of the entire organization and its universe as a whole. Experts will notice signals that non-experts will not, people working inside the organization will notice things that externals will not and vice versa. In that way, local knowledge added piece by piece can fill in for the holistic knowledge a database can provide.

However, this brings up two issues. First, the problem that arises from the structural, cultural and priority issues raised above. Nilson (1995) discusses a self-imposed censorship where beliefs about what may be possible and what not lead the detectors to ignore certain signals and focus on certain others. Seeger et al (2003: 68) called this type of signal bracketing *"selective attention"* and related it with the detector's background, history, previous commitments, capacity, ease, or with the prominence of some signals. And second, the need for crisis signal fusion (collation) as the first step towards sense-making and consequently decision making about crisis response. Normally when the integrated information reaches the response centre, it is compared with a repertoire of existing crisis experiences and knowledge thus validating (or not) the potential threat. The proposed fusion hubs should have or develop the competence to sense complete patterns where signals are ambiguous and data incomplete through a constant

reconfiguration of mental models using 'bricolage', scenario planning and mindfulness in order for them to reach a state of a 'collective mind' (Weick & Roberts, 1993). Once such level of competence is achieved, the crisis response team will be able to consciously respond to crisis signals based more on their shared sense of purpose and less on their 'repertoire' of responses.

Finally, the study revealed that with the advances of information and communication technology, the transmission of signals should not be a problem for an organization. There are different levels of communication platforms' sophistication ranging from dedicated hot lines and whistle blow lines or sites to simple e-mail, phones or paper reporting. The participants stressed that it is not the complexity or sophistication of the communication platforms that matters here as much as the wider awareness of how they can be effectively used by the detectors.

7. Conclusions

The aim of this paper was to explore the concept of crisis signal detection in the context of the tourism industry. We first looked at the crisis literature within tourism which showed that tourism organizations have made significant progress towards addressing issues associated with crisis preparedness, containment and damage limitation, crisis recovery and learning from crisis. However, the extant research has not yet explored in depth the significant component of crisis management called crisis signal detection. Using basic concepts and ideas from Signal Detection Theory and the generic crisis management literature, we developed a conceptual framework for a three-stage process of crisis signals detection consisting of signal scanning, signal capture and signal transmission to the crisis response centre. With this framework as a basis, we then conducted a study on 16 corporate level executives of international tourism organizations in order to explore the significance of signal detection in their crisis management practice and the challenges they are facing.

The study showed that there is a wide consensus that many crises emit warning signals before they manifest themselves and that although this is not a universal rule, signal

detection can become (in the words of a participant) an organization's "first line of defence". This line of defence would help in reducing the organization's exposure to the adverse effects of a crisis and, perhaps in certain cases, prevent the crisis itself. Of course, the sophistication of this defence will vary depending on the organization's crisis culture, size and financial capacity but most importantly on the ability of the detectors and the response decision makers to make sense of these signals. There are many challenges in doing so due to a number of causes which range from what is called 'bounded awareness' to internal politics and hidden agendas. The executives in these organizations underscore the importance of an organization-wide crisis culture where everybody is responsible for identifying, capturing and reporting any signals that may indicate an emerging crisis.

The effectiveness of crisis signal detection depends primarily on the organization's ability to scan its environments and identify the signals that are relevant to it. In designing a crisis signal detection mechanism organizations should purposefully use a combination of core, ad hoc and expert detector networks as presented in Table 2 which enable the scanning for crisis signals of not only 'what is out there' (organization's physical and informational domains) but also of 'what will possibly be' (organization's cognitive domain). The study showed that the latter is not being actively pursued indicating that many opportunities of proactive action are missed.

The importance of learning from crises and managing the knowledge acquired from the response to them was highlighted by many participants as a pre-condition for successful signal detection and capture through case definition and pattern recognition. However, the idea of centralisation and exploitation of this knowledge within an organisation appears to present several practical challenges (financial and technology limitations in the analysis, storage and retrieval of past experience) including the danger that a successful response in one crisis situation may not be appropriate for a similar crisis situation in the future. It became apparent that a timely response depends in most cases on 'local knowledge' which is quite difficult to be captured and centralised in its entirety, especially when signal detection relies on a complex network of detectors.

Another interesting finding, related with the premise of 'local knowledge', was that the transmission of signals from the detectors to the decision makers should be relatively straightforward without many 'hubs' in between. Hubs may perhaps offer the benefit of filtering signals from noise and collating them in a way that may facilitate the decision makers to make sense of them, however, this is done at the expense of a timely response and it may cause the loss of important signals in the process. Therefore, the emphasis should be put more in the availability of communication platforms for the detectors to transmit the captured signals to the decision makers rather than on complex, sophisticated (and expensive) 'fusion hubs' and filtering mechanisms. Ultimately, the successful signal detection depends more on the 'collective mind' and the shared sense of purpose within the organisation rather than on predetermined repertoires and databases. Consistent with the social exchange theory principles discussed earlier in the paper, the first and most basic stage of crisis signal detection may simply be the sharing of time sensitive information and existing knowledge in an opportune fashion (for example the DHS's "See Something - Say Something" campaign for terrorism). However, social exchange theory alone cannot capture the complexity of signal detection since, at more advanced levels of maturity, signal detection and the 'collective mind' move from the opportune transmission of 'what is' to identifying 'what could possibly be' and where the signals of known and unknown crises could be captured.

These findings have particular significance to tourism organisations since, due to their high interconnectivity with all aspects of society (political, economic, social, technological and environmental), they are more vulnerable to crises and are affected by every possible disruption from normalcy whether this is political or civil unrest, a natural catastrophe, economic recession, etc. Therefore, these findings may help practitioners who embark in the design of crisis management mechanisms in creating a basic framework of actors and conditions for the effective detection of crisis signal in their organization. The findings will help them identify detectors they can employ, scanning approaches, scanning domains and issues to be taken into consideration in the three stages of the detection process. For academic researchers, apart from the deeper

exploration of three stages of the crisis signal detection, this study opens a wide range of areas for further investigation. For example, of great interest would be to investigate how the 'crisis culture' to which the participants in this study so often referred to can be developed and embedded throughout an organization. Another interesting area for research would be to investigate how a detection network can be populated and maintained, what strategies could be used for detector recruitment and engagement in both core and 'ad hoc' networks and how can these detectors could be maintained active and productive. Moreover, the scanning methodologies and approaches in the three organizational domains (physical, informational and cognitive) will differ significantly and this is an area that offers a wide scope for further research. One obvious direction for research would be to examine the efficacy of these methodologies in case studies of actual crises. The issue of crisis knowledge management appears to be another interesting avenue of research with significant implications in the design and exploitation of a signal detection system. Also, this study is based only on insights and views of corporate executives. Practitioners at other levels of the organization, i.e., regional VPs, area managers, hotel general managers and chief security officers may not completely share these views and may offer different insights on crisis signal detection in general or in particular aspects of it such as detection network, reliability of 'ad hoc' detectors, attributes of 'core' detectors, etc. Finally, it is worth pointing out that early interventions may prevent a crisis but may also merely change its course and, as a dynamic phenomenon, evolve in a different form of crisis. Further interventions may cause further evolution of the crisis and this process of co-evolution offers scope for the exploration of all crisis management components through the lens of chaos and complexity theories.

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Appendix 1

1. Please recall a crisis that you had to deal with in your career and that has changed your perception of organizational crisis management.	• Why did it change your perception of crisis management?
2. What went right in your response and what could have gone better?	• What did you and your organization learn from this incident?
3. In your opinion, was this crisis preventable? In retrospect, do you think that there were any warning signals for this crisis?	• Where (cognitive, physical, information domain)?
4. Who should detect them and how should these be communicated?	• Any special crisis communication platform or plan?
5. Were there any challenges in this detection process and how can they be overcome?	