

Examination of Emergency Response from Knowledge and Psychology Perspectives

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ABSTRACT

This research-in-progress examines the roles of technology and human systems in supporting emergency response management through the dual perspectives of knowledge and psychology. Task critical knowledge is linked to organizational effectiveness in delivering business value and psychological factors characterize the unique challenges of an emergency context. This exploratory research is among the first to develop a theoretical model based on these two important yet understudied theoretical aspects. The article contributes to the research development in emergency response information systems and sheds light on the organizational response management practice.

Keywords

Emergency response, knowledge, psychology, research-in-progress

INTRODUCTION

Emergency response is the process of gathering resources and acting upon the problems during and after a critical incident (Shen and Shaw 2004). Emergency incidents may be either natural or manmade cases such as traffic accidents, fire and explosion, floods, tornado, earthquakes, nuclear or biological attacks, chemical leakage, and cyber attacks. As emergency incidents pose immediate threat to human lives and properties, an effective and efficient management of incident response is critical. Effective emergency response occurs however under a variety of challenges. The limited information, unpredictable development, short time windows, high risks and impact all make incidents difficult to manage (Chen, Sharman, Rao and Upadhyaya 2007; Chen, Sharman, Chakravarti, Rao and Upadhyaya 2008). Consequently, much work is needed to better understand the factors that contribute to effective emergency as indicated by the well documented failures in the 9/11 tragedy and Hurricane Katrina (Townsend 2006).

In this research-in-progress, we examine the management of emergency incidents through both knowledge and psychology perspectives. Task critical knowledge is linked to organizational effectiveness in delivering business value (Grant 1996; Purvis, Sambamurthy and Zmud 2001; Kim, Chaudhury and Rao 2002) and psychological factors characterize the unique challenges of an emergency context (Turoff, Chumer, Van de Walle and Yao 2004; Van de Walle and Turoff 2007). This study represents an exploratory research in that it is among the first to investigate these two important yet understudied theoretical aspects. Specifically, we investigate how the emergency responders transfer, integrate, and apply response knowledge in mitigating incidents. We also examine how the responders are affected by psychological factors such as stress coping. Drawing upon relevant literature, the paper

Reviewing Statement: This paper represents work in progress, an issue for discussion, a case study, best practice or other matters of interest and has been reviewed for clarity, relevance and significance.

identifies the important antecedents that contribute to the knowledge and psychological concerns in incident response. And thus this paper contributes to the theoretical development of emergency response management.

This paper proceeds as follows: the subsequent section reviews the theoretical background of the research. It is followed by the development of the research propositions and structural model. We conclude the paper with discussion the proposed research design and implications.

THEORETICAL FOUNDATION

What are the antecedents of emergency response management performance? The research in emergency response is still too recent to draw definite conclusions. This article attempts to develop insights from the perspectives of knowledge and psychology which are strong in theory.

Knowledge in Emergency Management

Knowledge-based theories of the organization advocate that organizations are formed to leverage knowledge for improved productivity (Spender 1992; Grant 1996). Individuals, teams, and departments share and apply knowledge within an organization as they process information, make decisions, and act on existing knowledge. Knowledge may be categorized in two distinct forms: explicit knowledge which is easy to communicate and can be codified and tacit knowledge which is inextricably woven with the experiences and situational contexts (Spender 1992; Nonaka 1994).

Knowledge is the key to emergency management success. Response to incidents is challenging as it involves factoring in exigency typical of an emergency situation such as great uncertainty; sudden and unexpected events; the risk of possible mass casualty; high time pressure and urgency; severe resource shortage; large-scale impact and damage; and the disruption of infrastructure support necessary for coordination like electricity, telecommunication and transportation. This is complicated by factors such as infrastructure interdependencies; multi-authority and massive personal involvement; conflict of interest; and the high demand for timely information. The capabilities of responders to transfer knowledge in a timely manner and to apply task critical knowledge during the response period consequently determines whether the response organizations are capable of mitigating the unexpected and complicated response tasks to satisfaction (Karimi, Somers and Gupta 2004).

1) Knowledge Transfer: Contemporary organizations establish specialization and differentiation to foster knowledge (Grant 1996). The transfers of knowledge between individual, group, and organizational levels are therefore important to create synergy among different knowledge workers. In the United States of America, emergency response is organized following the principles of Incident Command System (ICS) defined by U.S. Department of Homeland Security. ICS creates specialization and differentiation by dividing response management into department such as operations, planning, logistics, and finance and administration. Each department is further divided into other multi-layered structures. To transfer knowledge, emergency responders rely on real-time communicant systems such as messaging systems, two-way radio, and mobile phones. These devices allow response agents to communicate in synchronized fashion and to share knowledge across the boundaries of individual community of practice (COP). Through inter-agency communication, knowledge is disseminated during the life cycle of incident response to support mitigation.

2) Knowledge Integration and Application: Knowledge integration and application takes place when the organizations exercise the existing knowledge in ongoing organizational activities and work processes (Purvis, Sambamurthy and Zmud ; Soo, T., Midgley and Deering 2002). The essence of organizational capability is the integration of specialist knowledge to perform a discrete productive task. The integration and application of knowledge allows firms to create value in that they improve the transformation of inputs into outputs (Grant 1996; Bhandar, Pan and Tan 2007). The existing literature categorizes mechanisms for knowledge integration and application into (1) the use of rules and directives and (2) the development of routines (Grant 1996; Purvis, Sambamurthy and Zmud). Emergency management in U.S. is guided by the National Incident Management System - NIMS (DOS 2004). Despite its detailed directives, the potential influence of NIMS on knowledge integration is contingent upon the responders in terms of how well they are acquainted with NIMS tenets. To this end, training and drills are commonly exercised in the emergency response community national wide. Governments sponsor NIMS training courses and certify responders at varying levels of learning. Scheduled local or regional drills offer the opportunities where responders transform their leaning into real world problem solving.

Psychology Issues in Emergency Management

Emergency response is unlike other organizational practices in normal context. Responders are subject to the challenges of psychological stress such as anxiety and frustration. Psychological stress emerges in that the critical incidents pose pressures and consequently result in highly stressful environment. Stressed individuals tend to underperform in their tasks and frequently make mistakes. Further, psychological stress may also reduce the ability of individuals to improvise on issues that are not addressable through routines procedures. The issues of psychological coping with stress during disasters relief has received limited attention (Flin, Strub and Martin 1997; Paton and Flin 1999). Despite the existing literature, this area remains largely understudied and much needs to be done especially as it relates to Post-Traumatic Stress Disorder (PTSD) in the aftermath of emergencies and disasters. Prior literature has found factors that relate to stress under emergency and disaster response (Flin, Strub and Martin 1997; Paton and Flin 1999). First, physical fitness or lack thereof (e.g., illness or fatigue) affects stress level. Second, psychological fitness is found to help and it may be cultivated through occupational trainings, exercises and other extrinsic structures such as counseling. Third, positive personality is suggested to help with the psychological coping. Factors such as self-efficacy, locus of control, and tolerance for ambiguity may contribute to better coping behaviors.

CONCEPTUAL MODEL AND RESEARCH PROPOSTIONS

Through the perspective of knowledge and psychology, we develop a research model to explain emergency response management. The two perspectives are chosen in this study because of their high relevance to the research context.

Knowledge transfer in emergency management is contingent upon real-time inter-agency communication with peers (Pettersson 2009). Communication among response groups leads to improvisation and dissemination of task critical knowledge. Generally, emergency incidents unfold in an unpredictable way and create unplanned-for contingencies. Improvisation is the activity that requires creativity under time constraint to meet performance objectives (Mendonca 2007). It thus offers response management flexibility in the face of changing conditions. Through knowledge sharing, response groups generate synergy and create new knowledge in allocating assets when existing plans and standard operating procedures (SOP) fail. During improvisation, the referent may be SOP or a routine learned from experience which, given the occurrence of an unplanned-for contingency, forms the basis for a new course of action. Geographically dispersed, emergency responders adopt a variety of communication systems to share knowledge (Marchese, Besana, Rizzi, Trecarichi and Vaccari 2009). When inter-agency communication is conducted in a timely manner, dissemination and improvisation of knowledge takes place. An ineffective inter-agency communication may, on the other hand, slow down the asset allocation decisions and may lead to wrong or suboptimal schemes of asset allocation. Hence,

Proposition 1: Inter-agency communication will be positively correlated with emergency management performance

Training improves knowledge integration and application in response management (Chen, Sharman, Rao, Upadhyaya and Cook-Cottone 2007). Training delivers knowledge on three distinct aspects to responders: (1) operational knowledge that covers commands and procedures in emergency operation; (2) context knowledge that covers the awareness of the settings, rules, and regulations systems; and (3) collaborative knowledge that covers how others respond and manage their tasks (Sharma and Yetton 2007). Thus, training establishes an appropriate knowledge and skill base such as information analysis, decision making, managing uncertainty, risk and vulnerability (Paton and Flin 1999). Through training, responders often get acquainted with the rules, directives, and routines in incident mitigation. This allows response teams to exercise the existing knowledge into response operations effectively. Moreover, individuals may exercise the explicit knowledge acquired in training programs to combine and transform their existing in an innovative manner (Alavi and Leidner 2001). Training also fosters a commitment to resilience. When responders realize the constraints on their existing knowledge, they are motivated towards “*building broad behavioral repertoires and the capability for improvisation*” (Vogus and Welbourne 2003). Hence,

Proposition 2: Training will be positively correlated with emergency management performance

Responders’ capabilities in transferring, integrating, and applying knowledge in emergency response may be hampered by the presence of psychological stress (Chen, Sharman, Rao and Upadhyaya 2007). Due to the fact that incidents are highly unexpected in nature and they are of high social and economic impact, emergency response introduce psychological stress which concerns the state of mental tension, preoccupation, and agitation and it is an important issue (Lemyre and Tessier 2003). Stressors may include time pressure, operational risk, and desire to

achieve acceptable results under uncertainty. Responders may also experience stress out of concern for their families who may be in the affected region (Chen, Sharman, Rao and Upadhyaya 2007). This psychological stress may lead to physical and mental disorders, prohibiting the responders from engaging in incident response. As a consequence, the stress coping ability is vital to enable and support responders in undertaking emergency management tasks. When a responder is skillful in stress coping, he or she is likely to perform well under the demanding environment of emergency incidents. We posit:

Proposition 3: Stress coping ability will be positively correlated with the emergency management performance

Coworker support is the provision of desirable resources to workers, including task-directed helping, coworker mentoring, and friendliness or positive affect. Lateral social influences from coworker are suggested to effectively mitigate certain stressors (Chiaburu and Harrison 2008). Take work overload for example. Coworkers can alleviate work overload by helping prioritizing the tasks and giving emotional support (Beehr, Jex, Stacy and Murray 2000). Marcelissen et al found preliminary evidence that social support have a causal effect upon many stressors such as role ambiguity, role overload, role conflict and job future uncertainty (Marcelissen, Winnubst, Buunk and de Wolff 1988). Coworker support is thus an important source to individual stress coping ability: high level of support received helps the responders better cope stress. Thus we posit that:

Proposition 4: Coworker support will be positively correlated with stress coping ability

DISCUSSION AND CONCLUSION

Emergency management is an important research area in that improvement in this regard may save human lives and minimize loss of properties (Chen, Sharman, Rao and Upadhyaya 2008). A vast majority of the literature explores the technical designs of emergency response information systems; they however do not provide adequate accounts that explain the success or failure in emergency management. Through the exploration of strong theoretical underpinnings, we suggest that knowledge transfer, integration, and application may positively affect the response management. In addition, we suggest that psychological factors such as coworker support and stress coping ability improve response management as well. The current study lays a foundation for the further development of theoretical models that guide and predict the response management practice.

Future study may include an empirical validation of the proposed research model. To this end, survey based research methodology is suitable to collect the required data at the aftermath of a real emergency incident. Future study may also expand the current research model by considering other theoretical underpinnings to offer a comprehensive framework that explains emergency management performance.

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