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Organizational responses to uncertainty in the airline industry: Changes in patterns of communication networks

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ABSTRACT

Changing environmental conditions introduce uncertainty into organizational operations, and airlines respond in various ways. Scholars traditionally explore responses to environmental uncertainty by drawing upon theories of communication networks, coordination, organizational resilience, and high reliability organizing. Yet, the research has competing communication predictions, which makes planning and designing organizational responses challenging, as the level and type of uncertainty changes over time. Research also does not address variations in responses across different groups of employees. Using longitudinal network data from the United Airlines operations tower in Newark Airport (USA), this research examines communication for the purpose of relational coordination in a dynamically adaptive organizational network. Results reveal different patterns of organizational communication as different employee groups (frontline, cross-functional boundary spanners, and managers) face varying conditions of uncertainty. This paper concludes with theoretical contributions and practical recommendations for managing complex communication networks to respond to dynamic conditions of uncertainty in the airline operations settings.

1. Introduction

Changing environmental conditions often present challenges for organizational performance, particularly the uncertainty related to the unpredictable occurrence of external threats. Traditionally, high reliability organizations (HROs) —organizations that strive to maintain high levels of reliability as they operate in environments where high uncertainty occur infrequently— such as airline operations control centers (OCCs), have attempted to manage environmental uncertainty through a variety of responses, including the creation of organizational networks that support communication to facilitate the coordination of integrated work tasks (Gittell and Douglass, 2012; Gittell et al., 2010; Siomkos, 2000). Despite the wealth of research on workplace coordination, there is contradictory evidence regarding the ways in which formal work structures and hierarchically different categories of employees deal with environmental uncertainty. Furthermore, little research exists to date on the ways less formal, horizontal networks respond to different levels and types of environmental uncertainty in the airline industry (Bamber et al., 2009).

Several theoretical perspectives exist regarding how organizational structures best cope with organizational uncertainty. Some scholars suggest that communication will progress from vertical, hierarchical patterns to more horizontal, non-hierarchical patterns to meet the increased information processing demands that accompany increased uncertainty (Erhardt et al., 2009; Galbraith, 1972; Gittell, 2016). Others argue that HROs tend to respond by becoming increasingly centralized, with rigid organizational structures characterized by restricted information flow and increased control (Staw et al., 1981). A third school of thought suggests that impending uncertainty necessitates a redistribution

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of control toward players in the organization who hold the necessary expertise, regardless of where these players are situated in the organizational hierarchy (Weick et al., 1999). These theories offer competing views of the communication patterns taking place beyond formal, preordained hierarchical channels, particularly in dynamically adaptive organizational networks.

Our research seeks to contribute and provide insight into these competing predictions by drawing on relational coordination theory in HROs, and to shed light on: first, how HROs leverage formal hierarchical responses or more flat dynamics when responding to various levels of uncertainty (Weick and Sutcliffe, 2001); second: to what extent different actors (i.e., management, cross-functional boundary spanners or 'reliability professionals' (Gittell, 2005; Marrone, 2010; O'leary et al., 2011), and front-line employees) respond to uncertainty; and finally, what are the managerial implications for HROs with respect to preparing its workforce to effectively operate in a context of on-going levels of uncertainty?

As such, our research team sought to study workplace communication network dynamics in United Airlines' OCC tower at Newark's Liberty Airport, which operates in an environment with changing levels and types of uncertainty and where the consequences of errors are high. The OCC tower naturally provides opportunities to observe and collect data on how HROs organize horizontal communication to support relational coordination among different employee groups working under different levels of uncertainty. Hence, we contend that the OCC is an HRO, offering unique opportunities for the study of relational coordination and decision making across formal work roles. We collected social network data, which is a suitable method to study workplace relationships and the impact of levels of uncertainty on dynamic workplace communication networks. The study includes a unique dataset of three types of employees: frontline employees, cross-functional boundary spanner employees and managers. Using social network analysis, this research examines an HRO's dynamic work networks over six days representing three different conditions of organizational uncertainty: low (i.e. normal operating days), medium (i.e. holidays such as Thanksgiving and Christmas Eve), and high (i.e. unanticipated snow days).

The following section is organized by examining the relevant literature on organizational uncertainty, organizational resilience and communication networks in HROs, highlighting their often competing findings and predictions.

2. Theoretical background

2.1. HROs, resilience and relational coordination

Weick and Sutcliffe (2001) describe HROs as a type of organization that has succeeded under trying conditions, in particular in the face of severe threats that are highly uncertain in nature. Reliability is defined as the capacity to continuously and effectively manage working conditions, even those that fluctuate widely and are extremely hazardous and unpredictable (Weick et al., 1999). Building on the work of Wildavsky (1988), the literature defines resilience as the ability to persevere, sustain, and bounce back when faced with a threat (Sutcliffe and Vogus, 2003), as well as the capacity to maintain desirable functions or outcomes in the face of external pressure (Bunderson and Sutcliffe, 2002). One contribution of the resilience literature is the development of a framework to classify the nature of the threats that organizations and, specifically, HROs' employees face.

The literature defines threat as an impending event with potentially negative consequences (Sutcliffe and Vogus, 2003). Thus, organizational responses may be required for both actual and impending threats. Smoldering crises that originate from an organization's environment and threaten their organizational members include strategic threats such as economic pressure and customer-related demands, as well as operational threats such as changes in supplier capacity or changes in demand. Although these contingencies pose different levels of threat to organizational members, they all potentially impact work processes, decision-making and coordination. Furthermore, time pressure intensifies strategic and operational threats and uncertainty (Argote et al., 1989). Even when a threat is impending, such as low-cost competitors poised to enter into one's market so service quality may be drastically changed, the potential threat can turn into an actual threat with real consequences if not responded to in a timely way. That is, the speed at which an airline must respond to a threat amplifies the level of the threat (Leveson et al., 2009).

The resilience literature suggests a further distinction between types of threats based on the degree to which they can be predicted in advance, thus introducing the notion of uncertainty (Wildavsky, 1988). For example, some research focuses on uncertainties resulting from complex information-processing requirements, where the appropriate response or solution is unclear (e.g., Gittell, 2002). Resilient responses to external threats are not inevitable however. Organizational members can also respond to threat in a non-resilient way by withdrawing support from each other, losing sight of their common goals, and failing to provide critical information in a timely way.

Certain HROs such as nuclear power plants, airlines, and fire-fighting crews develop ways of acting and styles of leading that enable them to manage uncertainty and threats (Bigley and Roberts, 2001; Roberts, 1990; Weick and Roberts, 1993). The HRO literature has presented several arguments to explain and predict organizational responses to uncertainty, notably the “threat/rigidity” approach and the relational coordination or “dynamic deference to expertise” approach.

Several scholars note that coordination is likely to centralize under threatening conditions, or when decision-making is needed quickly. Conventional organizational theorists (e.g., Burns and Stalker, 1961) generally argue that deferring to expertise is equivalent to deferring to managers. The threat/rigidity view suggests that increasing the centrality of those in positions of formal authority represents a rigid response to threat. For example, Staw et al. (1981) suggest that stress due to external uncertainty tends to cause information and control processes to become more rigid, leading to a more centralized organizational structure and reliance on formal procedures. That is, during looming external threats, leadership has a tendency to resume control even in an otherwise empowering organizational structure.

Conversely, high reliability theory suggests that authority should gravitate toward those with the most relevant expertise, without regard for hierarchical position (Weick et al., 1999). Expertise in the contemporary workplace may be widely distributed, and thus may not follow hierarchical lines. By implication, organizational coordination could become more or less centralized, depending upon where the relevant expertise happens to reside. Increasing centrality of those who hold relevant expertise, whether or not they are in positions of formal authority, is a resilient response to threat.

While Staw et al. (1981) argue that sometimes a rigid response is appropriate, others more recently argue that in airline OCC these rigid responses would be ineffective (Igbo et al., 2013). The day-to-day OCC is a very structured environment with pre-established decision-making patterns: formal hierarchy regulates the workplace and standard operating procedures (SOPs) govern in any given situation (Bruce, 2016). However, for OCCs and HROs at large, organizational rigidity and goal disparity could carry negative consequences between certain operations—such as the need to