

The Managerial Realities of Emergency Planning and Response, at Natural Disasters In Small Communities: How Can We Help? Natalie C. Simpson, Associate Professor, Department of Operations Management and Strategy 351 Jacobs Management Center, University at Buffalo, Buffalo, NY 14260-4000, Email: nsimpson@buffalo.edu Philip G. Hancock, Visiting Assistant Professor, Department of Operations Management and Strategy, 351 Jacobs Management Center, University at Buffalo, Buffalo, NY 14260-4000, Email: phancock@buffalo.edu.

Introduction: Emergency services respond to and resolve various disruptions within the communities they serve. Large-scale emergencies, or disasters, are usually marked by the need for several distinct organizations to spontaneously meld their respective operations into a single larger system for the purpose of response. Disasters can even be argued as relatively frequent when viewed from a global perspective [1], and organizational disruptions can likewise be argued as inevitable [2], contrary to the usual connotations of these terms.

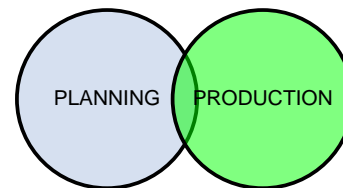
In the United States, the process of amalgamating various organizations confronted with disaster is often governed by the Incident Command System (ICS), a set of generative rules for temporary organization. Nonetheless, despite heavy promotion and strong support from the federal government, there exists disturbing anecdotal evidence that ICS may not be a solution universal to the management of all organizations and all disasters [3]. Furthermore, recent events have brought attention to a lack meaningful performance metrics of large scale response [4], as the very definition of disaster logistics remains ambiguous [5]. In this paper, we posit that these difficulties are indicative of a current lack of recognition of those elements that strongly characterize emergency conditions, and thus failure to address these forces when developing plans and evaluating responses. Here we will discuss a selection of these ‘managerial realities’ in the next section, followed by a brief introduction of promising concepts which communities may find helpful in the future.

Managerial Realities: The three managerial realities we will discuss here are the nature of semi-structured problems, the inherent inseparability of planning and production, and the breakdown of ‘efficiency’ as a meaningful measure of good management.

The nature of semi-structured problems. A highly structured problem is one in which all elements are ‘knowable’ and can be stated explicitly. Emergencies and disaster response invariably present as semi-structured at best [6][7], meaning that there is a mix of known data such as the layout of a community and a tally of its pre-disaster resources, and emergent issues such as the exact scope and timing of the disruption. Unfortunately, the majority of research done in support of disaster operations has relied on mathematical pro-

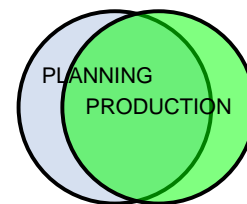
gramming, an approach that presumes a high degree of structure. The design of computer-based decision support systems likewise presumes an underlying model which can be stated with confidence in advance of any field application [6]. Applying the traditional planning paradigm to a semi-structure problem typically results in such a proliferation of explicit contingencies to address the unknowable elements in the mix, the well-known phenomenon of ‘paralysis by analysis’ commonly overtakes the process.

The inherent inseparability of planning and production. Most managerial practices presume that those activities we associate with ‘planning’ are separable from and thus natural precede implementation. This distinction was first noted as that of ‘industrial making’ versus ‘artful making’ in the study of creative activities such as rapid software development and theatre production [8]:



‘INDUSTRIAL MAKING’

- **Emphasizes detailed planning**
- **Producing = Replicating**
- **Creating form from *organized* materials**
- **Processes are *buffered* from variation.**



‘ARTFUL MAKING’

- **Emphasizes cheap and rapid iteration**
- **Producing = Reconciling**
- **Creating form from *disorganized* materials**
- **Processes are *driven* by variation.**

The managerial reality of decision-making during disaster response fits the ‘artful making’ framework, in that the essential challenge is to bring back form from a disorganized setting, often implementing solutions before the full extent of the problem is known. Yet there exist haunting similarities between the difficulties noted in [8] associated with organizations clinging to an industrial paradigm in the face of a creative endeavor, and the difficulties of ‘paralysis by analysis’ sometimes observed in disaster response.

The breakdown of ‘efficiency’. Efficiency, the ratio of value utilized to value provided, is a fundamental performance measure in managerial decision-making. In use, however, efficiency typically presumes a designed system. Disaster response inevitably involves emergent solutions, and these often fail expectations that would be reasonable when evaluating any designed system. As an example staging of inventory, splitting of shipments, and dispatching carriers with less-than-load deliveries are rarely witnessed in any modern commercial supply chain, as these are relatively inefficient activities. In contrast, these activities are commonplace in the provision of disaster relief, where operation must begin before the structure of the supply chain is fully established. *Effectiveness* is arguably the central goal under emergency conditions, but failure to recognize and respect this distinction can lead to erroneous conclusions in both planning and assessment.

Potential Solutions: Recent attention to the managerial realities of emergency response have brought a variety of concepts to light that show promise in developing practical solutions for community leaders commissioned with decision-making in the face of disaster.

ICS and ‘plug and play’ teaming. The Incident Command System remains a solid template for the construction of a temporary organization, even if issues concerning successful assimilation of unlike organizations and converging volunteers remain to be addressed. Future progress likely lies with the observation that coordination under uncertain and evolving conditions appears to be enhanced by so-called ‘plug and play’ teaming arrangements, emphasizing role orientation within the temporary organizational structure [9].

Adaptive capacity and capability-based planning. Central to any successful emergency response are the powerful concepts of adaptive capacity and capability-based planning. In operations management, most systems are the result of sophisticated designs, and we naturally associate their potential with the output they have been carefully designed to provide. Adaptive capacity and capability-based planning require a re-assessment of systems, looking not at what they are

designed to do, but what they are capable of doing if necessary. Note that the issue of efficiency can be a confounding distracter in this context, in that any system will be less efficient when pressed into uses beyond its designed purpose. Application of these concepts allows the creative reconfiguration of existing systems, typically for emergency conditions and disruption management. Capabilities-based planning is currently found largely in military literature, while the term adaptive capacity originated in ecology. Disaster logistics and disruption management both represent areas which could benefit highly from further work in this direction, as there currently exists an alarming gap in related literature [10].

Table-top simulation. One difficulty central to the study of semi-structured problems is that their very nature resists computer simulation, particularly in a disaster context as many of the current unknowns involve the relative degree of knowledge and actions of a variety of interdependent human agents. Table-top simulation, in which human decision-makers interact with various programmed elements to simulate an emergency response, is a well established training tool. However, the use of table-top simulation in research is relatively rare, despite the fact that it may be the only practical method of replicating response conditions for the purpose of further study [7].

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