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# THE IMPACT OF E-GOVERNMENT DYNAMIC CAPABILITIES ON INFORMATION FLOW STRATEGIES IN DISASTER RELIEF SUPPLY CHAINS: AN INTER-ORGANIZATIONAL SYSTEM PERSPECTIVE

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## ABSTRACT

History has shown that local, state, and federal governments are not well-equipped with the flexible and responsive abilities necessary to manage the short supply chain life-cycle inherent in providing appropriate disaster relief resources in a timely fashion. Unfortunately, in these unique situations these inefficiencies can cause considerable harm to the citizenry, the financial economy, and the physical infrastructure of the affected area. In this study, we provide an examination of the cross-agency capabilities and relationships that impact the flow of information within disaster relief supply chains. Through an inter-organizational systems approach, a theoretical framework is provided to assess the efficacy of e-government dynamic capabilities in disaster relief supply chains. Future research plans include further developing this conceptual understanding of e-government dynamic capabilities through a qualitative research approach. The results of analyzing the qualitative data will aid in the further development of the proposed research model.

## Keywords

E-government, dynamic capabilities, inter-organizational, information flow, disaster relief supply chains

## INTRODUCTION

According to the U.S. National Hurricane Center, the Atlantic hurricane season begins on June 1st and ends on November 30th every year (National Weather Service, 2011). A search of the Federal Emergency Management Agency (FEMA) news releases produced 56 major disaster declarations across the United States over the 3-month hurricane season (Federal Emergency Management Agency, 2011). A major disaster declaration requires immediate inter-organizational action on a local, state, and federal level. As history has shown, there have been numerous occasions when the ad hoc supply chain of disaster relief resources from these three levels of government have been ineffective and inefficient (Day, Junglas, and Silva, 2009). These inefficiencies cause considerable consequences for human life, economic sustainability, and physical infrastructure. In order to improve the effectiveness of governmental responses to these unexpected events, an examination of “cross-agency capabilities” (Scherlis and Eisenberg, 2003, p. 67) and its possible impact on disaster relief supply chains is essential. IS research has highlighted the need for studies that examine the role of information systems in government (Heeks and Bailur, 2007), as well as innovative approaches to assessing e-government capabilities (Scherlis and Eisenberg, 2003). The goal of this research is to examine the inter-organizational view of e-government dynamic capabilities in disaster relief supply chains.

Effective coordination of inter-organizational relationships, referred to as dynamic capabilities (Cepeda and Vera, 2007), has been studied as a major contributing factor for a firm to carve out a competitive advantage in its market (Teece, 2007, 2009). Aside from competitive advantages, these flexible and ever-evolving capabilities can be useful in a myriad of other situations, including disaster relief efforts. Governments need to be agile yet focused in their efforts towards a common goal. Disaster relief situations are characterized as extremely uncertain situations where timely and accurate information is essential to effective response efforts (Day, et al., 2009). Research has identified information flows within a supply chain as a major building block in a strategic alliance (Zhou and Benton Jr, 2007; Vanpoucke, Boyer and Vereecke, 2009). Rather than being focused on a financial gain, the e-government alliance is geared towards providing the essential resources in critical locales in a timely fashion. This constantly evolving measure of performance is unique to disaster relief supply chains (Whybark, Melnyk, Day, and Davis, 2010) and governments still struggle to understand and effectively operate within this complex environment. Thus, examining the flow of information through e-government channels and, more specifically, how government agility impacts these information flows are critical to understanding how disaster supply chains can be effectively managed.

In this study, we adopt the view of e-government as “the relationships between governments, their customers (businesses,

other governments, and citizens), and their suppliers (again, businesses, other governments, and citizens) by the use of electronic means” (Means and Schneider, 2000). These inter-organizational relationships require high levels of coordination and flexibility, from the granular level of data requirements to the high-level assessment of which organization has jurisdictional authority. More specifically, in situations where the ultimate goal is an abstract concept of an assessment of the region’s ability to return to normal levels of operability, the effective management of these relationships requires flexibility from all parties involved. Thus, we raise the following research question: How do e-Government dynamic capabilities impact information flow strategies in disaster relief supply chains?

The remainder of this paper is organized as follows. First, the proposed research model and the theoretical framework that provides the basis for the constructs employed. In this section, we also develop our hypotheses through an in-depth discussion of each construct and each relationship. Lastly, we discuss our future research plans, with a brief explanation of the research methodology that will be used, and the contributions of this study.

**FOCUSED LITERATURE REVIEW**

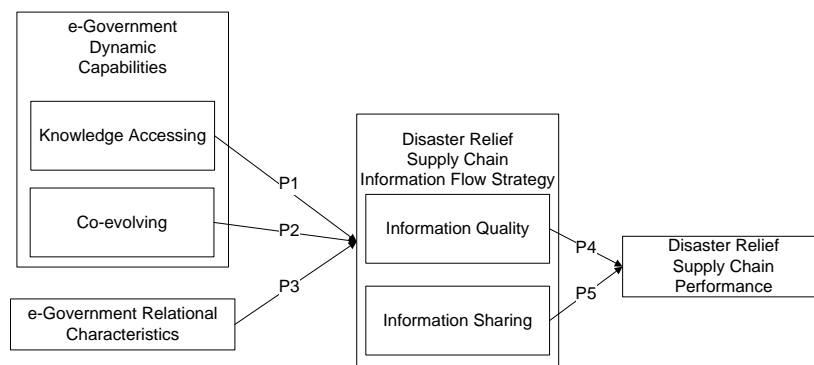
Despite the prevalence of federally declared disasters within the region, research on disaster relief supply chains is limited (Day, et al., 2009; Lu and Yang, 2010; Whybark, et al., 2010). Day et al. (2009) focused on examining the hindrances to information flows through supply chains following a large scale disaster. Through a qualitative approach, they found that information flow activities could be characterized as information collection, information processing, and information sharing. Interestingly, Day et al. (2009) found that there were social aspects of information sharing, such as unwillingness to share information, that seemed to impact the effectiveness of information flows in the disaster relief supply chains. This study extends their findings to specifically examine the relational characteristics of the disaster relief supply chain in order to assess the importance and idiosyncratic nature of these inter-organizational relationships.

Lu and Yang (2010) examined the way in which the context of natural disasters impact the extraction of social capital from the information exchanges within virtual communities. Their study examined the activities within a web forum in the aftermath of a major earthquake in a Chinese province in 2008. Again, they also highlighted the role that relationships play within the context of information exchange, especially when the timeliness of accurate information is critical. This study integrates the concepts of relational capital within the examination of the quality of information exchanged through e-government channels.

Lastly, Whybark et al. (2010) highlight the importance of studying disaster relief supply chains and the ability of the research to have far reaching implications within the public and private sector. More importantly, they highlight the need for agility in addressing issues of uncertainty, changing priorities, and changing operational needs. This study directly addresses their call to research on disaster relief supply chains through explicating the ability of firms, specifically governments, to adeptly navigate the evolution of the supply chain in a disaster relief context.

**PROPOSED RESEARCH MODEL**

Using the current research on disaster relief supply chains as a directive, Figure 1 is provided as a graphical representation of the proposed research model.



**Figure 1. Proposed Research Model**

## **E-GOVERNMENT DYNAMIC CAPABILITIES**

Governments are stereotypically seen as entities that are constantly bogged down with lots of red tape, policies, and procedures. These organizations are not known for possessing the type of dynamic capabilities necessary to quickly adapt to changes in a supply chain, as evidenced through the “poorly coordinated supply chain efforts” (Day, Junglas, and Silva, 2009, p. 638) during Hurricane Katrina in 2005. Further, dynamic capabilities can be characterized as a firm’s ability to quickly respond to changes within the environment in which they are operating. Zahra and George (2002) describe dynamic capabilities as “change-oriented capabilities that help firms redeploy and reconfigure their resource base to meet evolving customer demands and competitor strategies”. These types of capabilities would be particularly applicable in a disaster relief scenario where the three levels of government work closely with the affected locale in order to constantly assess what the resource needs are and where to provide the appropriate assistance.

The top level of governments, specifically the federal government, has a continuous long-term relationship with both state and local governments. Thus, there are established methods of communication and protocols for information transfer already in place. However, well established information transfer channels do not necessarily easily facilitate changes in the methods of data transfer. Further, as was discussed earlier, disaster relief supply chains have particularly fluctuating priorities and operational needs. To adeptly deal with these situations, governments need to be able to quickly assess the changing informational needs and adapt to the updated requirements. In an inter-organizational context, this is even more difficult to achieve as firms are attempting to manage different interest groups while still focusing on the ultimate goal of assisting the affected locale in order to accelerate the return to normal status of business operations. Thus, it is critically necessary to study two major facets of dynamic capabilities: knowledge accessing and co-evolving.

### **Knowledge Accessing**

Knowledge accessing can be characterized as “a dynamic capability held by two or more parties that fosters an understanding of the current knowledge resources possessed by each party” (Defee and Fugate, 2010, p. 188). In the context of e-government, it is essential to provide a clear and concise explanation of the roles that each level of government will play. Disaster relief supply chains require specific input from different participants in the e-government system, allowing each firm to individually assess their own capabilities and apply them in the most beneficial way to the supply chain (Defee and Fugate, 2010). This is a situation where large-scale disruptions could effectively cripple the supply chain and its intended beneficiaries. Thus, we raise the following proposition:

*P1: Knowledge accessing positively impacts the information flows in a disaster relief supply chain.*

### **Co-evolving**

Co-evolving is characterized as the multi-party development of new capabilities that create a synergistic advantage in the market place (Defee and Fugate, 2010). This is specifically the type of continuous iteration of improvement in capabilities between firms that are required in highly volatile situations like disaster relief supply chains. As sharing becomes commonplace between the firms, the participating governments are able to fully assess the supply chain to highlight any need that may have been raised. Therefore, the following proposition is:

*P2: Co-evolving positively impacts the information flows in a disaster relief supply chain.*

## **E-GOVERNMENT RELATIONAL CHARACTERISTICS**

E-Government relationships are unique types of relationships; they exhibit different characteristics as compared to a private sector inter-organizational relationship. Many local, state, and federal government agencies interact on a myriad of issues over the years. For example, the IRS is a government agency that interacts with state and federal agencies on a regular basis to assess individual tax payments. However, these relationships are mainly centered on a specific type of information transfer. Something as simple as a change in data format would require involvement from all parties to handle a change in the status quo. This is a very interesting and unique characteristic of e-governments where the existence of a long-term relationship may not necessarily translate to the ability to adapt to unexpected changes in the supply chain. Research has shown that relational characteristics have an impact on supply chain (Chang, Wang, and Kao, 2010). Day et al. (2009) highlighted “unwillingness to share” as a social antecedent to information sharing. Interestingly, even though high importance should be placed on assisting towards a situation where the supply chain is supported at all costs, firms still have a tendency to operate towards their individual best interests. Within these relational characteristics, e-governments should focus on managing these relationships in order to maximize the potential for coordination and collaboration.

### Relationship management

As in any strategic alliance, there are many factors that could influence the effectiveness of the relationship. On the one hand, good long-term relationships can positively directly impact the supply chain performance (Chang et al., 2010) as there is less competition that could negatively impact the efforts towards achieving a common goal. However, the same long-term relationship can make it difficult for firms to quickly respond to changes in the current operating environment. The mere presence of a long-term relationship does not imply that immediate benefits can be realized. Rather, there may be a certain level of relationship management that hones and crafts a relationship to the extent that it may positively impact the overall performance of the supply chain. Therefore, we raise the following proposition:

*P3: Management of key relationships positively impacts the information flows in a disaster relief supply chain.*

### DISASTER RELIEF SUPPLY CHAIN INFORMATION FLOW STRATEGY

Specifically within a supply chain context, the flow of information is critical to the successful performance of the supply chain. As Klein and Rai (2009) highlight, information within the supply chain provides the consumer firm's needs requirements to the provider organization, which in turn uses that information to effectively plan for and fulfill resource needs in a timely and effective manner. The aforementioned section briefly described Day et al.'s (2009) examination of the impediments to the normal flow of information within disaster relief supply chains. More specifically, the strategies that were employed to reduce the impact of impediments were mostly focused on improving the coordination of actions within the inter-organizational context of disaster relief supply chains. Though coordination is vital to any inter-organizational context, it is especially relevant when all parties involved may be working with ambiguous information. Uncertainty in the supply chain can cause negative consequences (Whybark et al., 2010) such as reduced responsiveness and ineffective resource management. Disruptions in the supply chain process not only have financial implications for the governments involved, but more importantly, there are human lives at stake in this scenario. The horrific scenes that were broadcast in the days following Hurricane Katrina highlighted the severe consequences caused by the lack of governmental agility. However, this study is focused on the beneficial impacts that dynamic capabilities have on the information flows within the disaster relief supply chain. An examination of the two main characteristics of information flows is essential to understanding the research model.

#### Information Quality

It is essential to ensure that the quality of information within the inter-organizational system reaches far beyond mere data checking. Information quality requires a more comprehensive approach where inconsistency, formatting, and reliability are considered as important factors in data collection, processing, and sharing (Day et al., 2009). Users must adhere strictly to the data entry requirements in order to effectively contribute to the system. This leads us to the following proposition:

*P4: The quality of information positively impacts the disaster relief supply chain performance.*

#### Information Sharing

Lastly, information sharing is a critical concept within the information flows context. Using an interpretive approach, Day et al. (2009) were able to effectively extricate the true reason behind the reason to share or not to share information that the user possessed, even amidst the high importance of resolving issues in the disaster relief supply chain. Klein and Rai (2009) highlight how firms can create value based on the "mutual exchange of strategic information" (p. 739). This "strong internal communications" (Argenti, 2002, p.109) must proliferate throughout all the organizations involved in the crisis in order to ensure that all participating firms can sufficiently endure the crisis. The inter-organizational system of e-governments would need a continuous stream of information in order to provide an organized effort to the affected areas. No one firm should bear all of the coordination costs. This leads us to the following proposition:

*P5: The extent of information sharing positively impacts the disaster relief supply chain performance.*

### DISASTER RELIEF SUPPLY CHAIN PERFORMANCE

In this study, effective coordination and constructive conflict resolution are proxies for assessing the supply chain performance (Day et al., 2009). Though there are some viable metrics available to measure supply chains in a regular business context, disaster relief supply chains are inherently unique and complex (Whybark et al., 2010). In addition to traditional financial profit and cost savings measures, there are human capital measurements that also need to be considered. This would provide a holistic approach to understanding the overall impact of e-government dynamic capabilities on information flows within a disaster supply chain.

## CONCLUSION

U.S. e-government initiatives are a burgeoning field that has the potential to have monumental impact on American citizenry and financial economy. This study attempts to begin the complex analysis of the way in which governmental agencies can develop capabilities that lend them to be proficient in being agile and responsive with high levels of uncertainty such as in disaster relief efforts. Future research plans include further developing this conceptual understanding of e-government dynamic capabilities through a qualitative research approach. This approach will primarily consist of interviews of representatives from the three levels of government who are designated to work closely with FEMA in the case of a major catastrophe. The results of analyzing the interview data will aid in further developing the research model, as well as identifying any additional constructs that should be considered. The results of this study will not only have implications in the public sector, but also in the private sector where customer responsiveness and agility to changes in the market are highly valuable skills of an organization. Lastly, this study is unique in that it develops an explanation of these dynamic capabilities in an inter-organizational context, which is typical in today's globalized environment where strategic alliances occur frequently.

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