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TOWARD THE UNDERSTANDING OF ORGANIZATIONAL FLEXIBILITY

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ABSTRACT

Contingency planning is widely touted as a method of preparing for and confronting disruptions to organizational activity; its attributes are proposed to promote organizational flexibility. This study examines the relationship between information sharing, internal and external collaboration, and information technology use and organizational flexibility and develops a model that will provide both academicians and practitioners with a means of determining the attributes with the highest relationship to organizational flexibility. This knowledge will allow for prioritization of resources in the planning process. A survey of 50 professionals from various sectors of the government is used to test the hypotheses developed.

Keywords

Organizational Flexibility, Contingency Planning, Antecedents to Flexibility

INTRODUCTION

The demand for effective preparation and response activities for contingencies has dramatically increased over the last two decades. Global sourcing, off-shoring, and outsourcing are examples of interdependencies evident in today's business environment. Whether a disruption event is created by a natural or man-made disaster, the impact on many businesses can result in significant losses. Approximately 40% of businesses that close after a disaster never re-open (FDEM, 2007), and U.S. firms potentially face \$300 billion in exposure to interdependence disruptions around the world (Leonard, 2005). Many organizations have numerous interdependencies and a single event can cause a ripple effect that impacts multiple operations (Peck, 2005). Interconnected organizations are particularly vulnerable to disruptions. Managing such organizations is an ever-increasing challenge in today's business environment. Higher levels of uncertainty in supply and demand, shorter technology and product life cycles, globalization of the market, and increased use of distribution, manufacturing, and logistics partners result in a complex international network and result in higher levels of risk (Christopher, 2002).

Disruptions are events that might affect the normal flow of materials and information. The study of interdependence and disruption is of interest to many as they strive to reduce their organization's risk of disruption. Several studies have found that organizations characterized by higher levels of flexibility are more capable of responding to unexpected events, such as a disruption, and that this important strategic capability requires a better understanding of the relationship between contingency (disruption) planning and organizational flexibility (hereafter flexibility) (e.g., Fawcett, Calantone and Smith, 1996). The goal of this study is to examine the attributes of the contingency planning (CP) process and assess its impact on flexibility. Flexibility is defined as the ability to adapt to disruptions or exploit an unexpected opportunity (GLRT-MSU, 1995).

THEORETICAL FOUNDATION

Contingency theory implies that firms adapt to environmental changes by modifying their competitive approach to maintain or enhance performance (Hoffer, 1975) and provides a rationale for emphasis on flexibility-based strategies aimed at emerging threats (Fawcett et al., 1996). The willingness and ability of organizations to respond to changes in their operating environment is a foundation of firm strategy and performance (Hambrick, 1983; Porter, 1980). Application of strategic planning processes focuses organizational resources to enhance performance via a competitive driver such as flexibility and is important in two major areas: 1) identification of core organizational objectives and thereby its current and future direction, and 2) strategic guides for development, organization, and allocation of resources to obtain objectives (Fawcett et al., 1996). Strategy has two major functions: 1) to coordinate, integrate long-term plans, and 2) to facilitate long-term adaptation to external environmental change (Lorange and Vancil, 1977). Environmental impacts on organizational processes has been studied with emphasis on the need for flexibility and protection from turbulent conditions (e.g., Thompson, 1967). Today's lean organizations are becoming increasingly unable to respond to such turbulence (Zsidisin, Ragatz and Melnyk, 2005). This increases risk and forces organizations to develop formalized plans to deal with potential disruptions.

In today's global and highly competitive marketplace, flexibility is characterized as speed, responsiveness, agility, or adaptability in meeting environmental changes (Stalk, 1988). If flexibility is achieved, it can be the cornerstone of an organization's ability to respond more quickly than competitors, thus achieving a position of competitive advantage (Fawcett et al., 1996). Information sharing, internal and external collaboration, and IT use are critical antecedents to successfully responding to disruption. The ability to generate, combine, and make use of information is vital. The firm's ability to capture information for use in the planning process is critical to selecting and developing appropriate capabilities to deal with disruptions (Fawcett, Calantone and Roath, 2000). Organizations need information and the ability to share that information in order to develop contingency plans, to manage the planning process, and to control daily operations (Kaplan, 1991).

Information sharing is the willingness to make strategic and tactical data available to others involved in the planning process. Sharing information enhances interconnected entities (Mentzer, 1993). Without adequate communication and information sharing, members are forced to choose between effective and efficient responses to potential disruptions (Mohr and Nevin, 1990). Organizations must be willing to share information concerning plans, best practices, and potential disruption to prevent problems and to meet customer requirements (Stank, Emmelhainz and Daugherty, 1996).

Hypothesis 1: Information sharing in the CP process is positively related to flexibility.

Knowledge increases an entity's capacity to interpret information and to ascertain what additional information is necessary to make a decision, making collaboration critical to a disruption response (Huber, 1991). Collaboration between organizations, or between elements of a single organization, can increase joint knowledge creation, expertise sharing, understanding of the other party's intentions and strategic approaches, performance, and flexibility (Sinkovics and Roath, 2004). Benefits emerge when partners, either internally or externally, are willing to work together to understand each other's viewpoints by sharing information and resources in order to achieve collective goals which in turn reduces resource duplication, creates greater relevance to customer needs, and increases flexibility in response to a changing environment (Stank, Keller and Daugherty, 2001).

Hypothesis 2: Internal collaboration in the CP process is positively related to flexibility.

Hypothesis 3: External collaboration in the CP process is positively related to flexibility.

IT capabilities include the application of hardware and software to enhance information flow and facilitate decisions and enable an organization to maintain key information in an accessible format, process requirements, and make operating and planning decisions. Information systems allow an organization to implement strategy and planning by making decisions more quickly (Stank and Lackey, 1997) and improve organizational performance (Sanders and Premus, 2005).

Hypothesis 4: IT usage in the CP process is positively related to flexibility.

METHODOLOGY AND RESULTS

A survey of practitioners was conducted in Fall, 2007 to examine the proposed model and associated hypotheses. The use of surveys is recognized as the most frequently used data collection method in organizational research for assessing phenomena that are not directly observable (Smith and Dainty, 1991) such as the perception of employees, or the relationship between process attributes on an organizational capability. A web-based survey was used and the research was performed in a manner consistent with the guidelines suggested by Flynn et al. (1990). The instrument is a combination of previously established multi-item scales. All of the above items are based on a 5-point Likert scale and come from work in interdependency literature (Fawcett et al., 1996; Stank et al., 2001; Stank et al., 1997) and can be obtained from the authors.

Our sample was 50 personnel involved in CP for a governmental organization. The participants, primarily upper- and mid-level managers, represent a wide range of functions within the organization and represent multiple facilities within numerous departments. Respondents were reminded to keep their references focused on CP, and not to include reference to other types of planning, i.e. financial, career, or operations planning. Of the 50 respondents, 22% were senior managers, 50% were middle managers, 12% were professional, and 16% were technicians. Fifty-six percent of the respondents were plan developers and 44% were plan implementers. Organizational size categories ranged from 26% less than 50 (personnel), 20% between 51 and 100, 24% between 101 and 200, 14% between 201 and 300, to 16% greater than 300. Respondents averaged 5.6 years in the current position, 10.4 years in the current organizations, and 10.6 years planning experience.

Partial Least Squares (PLS) analysis is used in this study. This method is gaining popularity among IS researchers because of its relaxed assumptions regarding normality and its ability to analyze small samples. PLS is widely used in information systems research and can be used to analyze structural models with multiple item constructs (Chin, Marcolin and Newstead, 2003; Ko, L.J. and King, 2005). PLS requires minimal sample sizes to validate a model compared with alternate structural

equation modeling techniques; the sample size of 50 was greater than the minimum required number of 10 times the number of independent constructs (Goodhue, Lewis and Thompson, 2006).

Factorial validity was assessed using the technique described by focusing on convergent and discriminant validity. Convergent validity is shown when each measurement item loads on its latent construct with a significant t-value; outer model loadings should show a T-value greater than 1.96 to demonstrate convergent validity (Gefen and Straub, 2005). Five original items did not pass this test and were eliminated from the analysis. The model contains three to five items per construct which is similar to other studies published in leading IS journals that have used between two and five indicators per construct (e.g., Ko et al., 2005). Discriminant validity is indicated when the measurement items of a construct differ from those that comprise other constructs and is shown when the correlation of latent variables show a pattern of loading highly on their assigned construct and lower on others. Examining the square root of the average variance extracted (AVE) can be used to verify the discriminant validity of an instrument. An AVE score of .5 is acceptable and the square root of the AVE should be greater than the levels of correlations involving the construct. As shown in Table 1, all the constructs met the required composite reliability score of .7 and exceed the acceptable AVE value of .5. Table 2 shows the square roots of the AVEs measured against the correlations with other constructs in the optimal model. There are no guidelines for how much larger the square root of the AVE should be than the correlation with other constructs (Gefen et al., 2005).

Construct	Items	Mean	Std Dev	Composite Reliability	Average Variance Extracted
Flexibility	3	4.30	.860	.917	.786
Information Sharing	4	3.29	1.056	.867	.621
Internal Collaboration	3	3.23	.746	.800	.573
External Collaboration	4	3.22	.778	.817	.542
IT Use	4	3.80	1.055	.942	.803

Table 1 - Confirmatory Factor Analysis of Optimal Model

	Flexibility	Info Sharing	Int Collaboration	Ext Collaboration	IT Use
Flexibility	1				
Information Sharing	.247	1			
Internal Collaboration	.408**	.507**	1		
External Collaboration	.564**	.364**	.650**	1	
IT Use	.521**	.327*	.216	.256	1
Sqrt AVE	.887	.788	.760	.736	.896

** Correlation is significant at the .01 level (2-tailed) * Correlation is significant at the .05 level (2-tailed)

Table 2 - Correlation Analysis

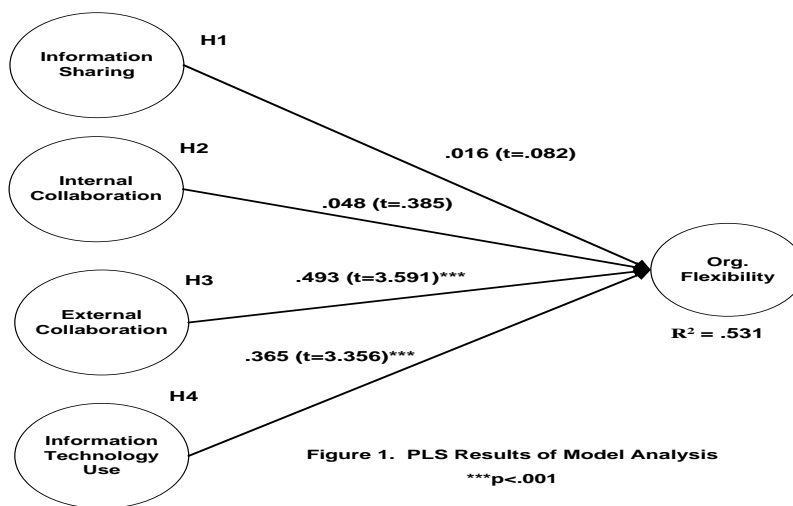


Figure 1. PLS Results of Model Analysis
***p<.001

Figure 1 shows the results of the PLS analysis. The model contains a multidimensional construct comprised of three reflective items and four reflective subconstructs that are formatively related to the multidimensional construct. Each path is labeled with its respective hypothesis, path loading, and t-value. External collaboration and IT use are significantly related to flexibility; information sharing and internal collaboration are not. Thus, only H3 and H4 are supported. However, this model explains over 53% of the variance in flexibility. When removing information sharing and internal collaboration from the model, it continues to explain an impressive 52.9% of the variance with only external collaboration and IT use as predictors.

DISCUSSION

In response to disruptions, organizations must work quickly and efficiently to identify and counteract potentially devastating conditions. Flexibility is a capability that has been shown to support such action. This study begins the investigation of the antecedents that support flexibility. Our results indicate that over half of the variance in flexibility is explained by the combination of external collaboration and IT use.

Information sharing has been shown to be an important organizational characteristic, especially in the communication of best practices and increasing response time to change (Stank et al., 1996). Clearly, our research indicates that this was not true for our sample. Perhaps the respondents' organizations do not operate in an environment of open information sharing in which case the respondents would not necessarily believe it to be important. It could also be that the respondents believe that too much sharing of information would lead to 'group think' or that the information shared from other areas of the organization was not trustworthy. Because information sharing is critical to the organization, especially in times of preparation and reaction to a disruption, immediate response is paramount for successful outcomes. Hesitation caused by a lack of information may be devastating.

Our hypothesis regarding internal collaboration was not supported. This surprising finding also has implications for reacting to extreme events. Many organizations utilize resources to build internal communications technologies and work to define processes to facilitate internal collaboration. Peer-to-peer (P2P) technology is a relatively new concept designed, in part, to support internal collaboration by facilitating inter-group knowledge transfer. Research suggests that such a system should be structured to be easy to use, work both in real time and in an asynchronous mode, give the appearance of co-location, and be interoperable across the organization (Gupta and Bostrom, 2006). If these factors are not in place, internal collaboration may be considered insignificant. If so, it is imperative that management review such technologies to ensure that they are designed properly. Lack of use of such technology may result in a dearth of critical information during a crisis, leading to response rigidity rather than flexibility (Barnett and Pratt, 2000). If, however, our findings reflect a perception of the lack of importance of internal collaboration, managers must change their focus. During an extreme event, organizations should look outside the organization, rather than inside. However, many planning processes focus first on internal issues such as human resource utilization. It is possible that an internal focus, rather than external, may cause the organization to miss critical information. Our research indicates that organizations that wish to increase their flexibility should reduce resources appropriated for internal collaboration, and instead, re-appropriate resources to external collaboration.

The hypothesis regarding external collaboration was supported and, in fact, resulted in the highest coefficient. During disruptions it is imperative that organizations focus on those elements that may have potential impact on them, such as supplier down time, increased consumer demand, or government mandates. Without being acutely attuned to its external environment, an organization may not be able to react quickly enough to prevent problems or seize opportunities. In planning for disruptions and pursuing the flexibility capability necessary for efficient reaction, organizations would be well served to appropriate resources to the area of external collaboration.

IT is a means of facilitating the flow of information necessary to react quickly in a dynamic context (Dyer, 1997; Sambamurthy and Zmud, 2000); in an extreme context, this ability is even more critical. Research indicates that some of the facilitators of flexibility include information systems that have structured data connectivity, and deep coordination-related knowledge (Gosain, Malhotra and El Sawy, 2004). The former indicates a need for consistent information bases across an organization's external network; the latter indicates that consistent interaction, planning, and practice may be required between external members in order to effect the most appropriate reaction. IT, particularly business-to-business (B2B) may be used to structure, standardize, and coordinate planning activities.

Given the results discussed above, a number of potential future directions are evident. For instance, what is it about internal collaboration that is perceived as not important to flexibility? Are there levels of internal collaboration that should be considered, such as communication between management levels? If the entire organization does not benefit from internal collaboration, it is possible that parts of the organization do? The same perspective is possible with external collaboration. What takes priority in the communication chain when resources are limited? Are traditional linkages a priority over, for instance, organizational to municipal collaboration? Future efforts might also include a longitudinal study to determine if the import of these planning attributes change over time.

As with any research effort, this study has limitations that could impact the generalizability and validity of the results. For instance, the respondents were all representatives of the federal government. While representing multiple branches and

organizations and a wide range of locations, they do ultimately belong to the same higher organization. A wider range of respondents could make the results more generalizable. The validity of the study could be affected by common method bias. These biases are a problem because they are one of the main sources of measurement error and threaten the validity of conclusions about relationships between measures (Nunnally, 1978).

CONCLUSION

This research effort contributes to our understanding of the antecedents of flexibility on two levels by adding academic rigor to practitioner relevance. While both are important, arguably the most important contribution is to the field of planning practitioners. There are many "how to" examples of what an organization should do to prepare for potential extreme events, but most have little academic rigor and many come with an attached consulting fee. This effort allows managers at multiple levels to understand the primary planning attributes to increase flexibility and therefore to expend resources effectively. In many situations both time and fiscal resources are constrained, forcing managers to focus on limited aspects of a project. The results of this effort enables managers to focus on IT use and external collaboration, areas in which they can receive the most 'bang' for their planning investment. In the world of academia, this effort meets an important need of filling a gap in planning literature. As discussed earlier in this research, much effort has been applied to strategic planning. However, little academic research has been applied specifically to designed flexibility. This research provides a foundation for examining designed flexibility in the context of extreme events.

REFERENCES

1. Barnett, C.K. and Pratt, M.G. "From Threat-Rigidity to Flexibility," *Journal of Organizational Change Management* (13:1), 2000, pp. 74.
2. Chin, W.W., Marcolin, B.L. and Newstead, P.R. "A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study," *Information Systems Research* (14:2), 2003, pp. 189-217.
3. Christopher, M. "Supply Chain Vulnerability, Report for Department of Transport, Local Government and the Regions," Cranfield University, 2002.
4. Dyer, J.H. "Effective Interfirm Collaboration: How Firms Minimize Transaction Costs and Maximize Transaction Value," *Strategic Management Journal* (18:7), 1997, pp. 535-556.
5. Fawcett, S.E., Calantone, R.J. and Roath, A. "Meeting Quality and Cost Imperatives in a Global Market," *International Journal of Physical Distribution & Logistics Management* (30:6), 2000, pp. 472.
6. Fawcett, S.E., Calantone, R.J. and Smith, S. "An Investigation of the Impact of Flexibility on Global Reach and Firm Performance," *Journal of Business Logistics* (17:2), 1996, pp. 167.
7. FDEM "Disaster Planning," 2007.
8. Flynn, B., Sakakibara, S., Schroeder, R., Bates, K. and Flynn, E. "Empirical Research Methods in Operations Management," *Journal of Operations Management* (9:2), 1990, pp. 250-284.
9. Gefen, D. and Straub, D.W. "A practical guide to factorial validity using PLS-Graph: Tutorial and annotated example," *Communications for the Association for Information Systems* (16), 2005, pp. 91-109.
10. GLRT-MSU *World Class Logistics: The Challenge of Managing Continuous Change*, Council of Logistics Management, Oak Brook, IL, 1995.
11. Goodhue, D., Lewis, W. and Thompson, R. "PLS, Small Sample Size, and Statistical Power in MIS Research," *Proceedings of the 39th Hawaii International Conference on System Sciences*, Kauai, HI, 2006.
12. Gosain, S., Malhotra, A. and El Sawy, O.A. "Coordinating for Flexibility in e-Business Supply Chains," *Journal of Management Information Systems* (21:3), 2004, pp. 7-45.
13. Gupta, S. and Bostrom, R. "Using Peer-to-Peer Technology for Collaborative Knowledge Management: Concepts, Frameworks and Research Issues," *Knowledge Management Research & Practice* (4:3), 2006, pp. 187.

14. Hambrick, D.C. "An Empirical Typology of Mature Industrial-Product Environments," *Academy of Management Journal* (26:2), 1983, pp. 213-230.
15. Hoffer, C.W. "Toward a Contingency Theory of Business Strategy," *Academy of Management Journal* (18:4), 1975, pp. 784-810.
16. Huber, G.P. "Organizational Learning: The Contributing Processes and the Literatures," *Organization Science* (2:1), 1991, pp. 88-115.
17. Kaplan, R.S. "New Systems for Measurement and Control," *The Engineering Economist* (36:3), 1991, pp. p201(18).
18. Ko, D., L.J., L. and King, W.R. "Antecedents of knowledge transfer from consultants to clients in enterprise system implementations," *MIS Quarterly* (29:1), 2005, pp. 59-85.
19. Leonard, M. "Aon 2005 Political and Economic Risk Map," Aon Trade Credit Division, 30 November 2007 2005.
20. Lorange, P. and Vancil, R. *Strategic Planning Systems*, Prentice-Hall, Englewood Cliffs, NJ, 1977.
21. Mentzer, J.T. "Managing Channel Relations in the 21st Century," *Journal of Business Logistics* (14:1), 1993, pp. 27-42.
22. Mohr, J. and Nevin, J.R. "Communication Strategies in Marketing Channels: A Theoretical Perspective," *Journal of Marketing* (54:4), 1990, pp. 36.
23. Nunnally, J.C. *Psychometric Theory*, McGraw-Hill, New York, 1978.
24. Peck, H. "Drivers of Supply Chain Vulnerability: An Integrated Framework," *International Journal of Physical Distribution & Logistics Management* (35:4), 2005, pp. 210-232.
25. Porter, M. *Competitive Strategy*, Free Press, New York, 1980.
26. Sambamurthy, V. and Zmud, R.W. "Research Commentary: The Organizing Logic for an Enterprise's IT Activities in the Digital Era--A Prognosis of Practice and a Call for Research," *Information Systems Research* (11:2), 2000, pp. 105.
27. Sanders, N.R. and Premus, R. "Modeling the Relationship Between Firm IT Capability, Collaboration, and Performance," *Journal of Business Logistics* (26:1), 2005, pp. 1-23.
28. Sinkovics, R.R. and Roath, A.S. "Strategic Orientation, Capabilities, and Performance in Manufacturer - 3PL Relationships," *Journal of Business Logistics* (25:2), 2004, pp. 43-64.
29. Smith and Dainty, P. *The Management Research Handbook*, Routledge, London; New York, 1991.
30. Stalk, G., Jr. "Time--The Next Source of Competitive Advantage," *Harvard Business Review* (66:4), 1988, pp. 41-51.
31. Stank, T.P., Emmelhainz, M.A. and Daugherty, P.J. "The Impact of Information on Supplier Performance," *Journal of Marketing Theory & Practice* (4:4), 1996, pp. 94.
32. Stank, T.P., Keller, S.B. and Daugherty, P.J. "Supply Chain Collaboration and Logistical Service Performance," *Journal of Business Logistics* (22:1), 2001, pp. 29-48.
33. Stank, T.P. and Lackey, C.W. "Enhancing Performance through Logistical Capabilities in Mexican Maquiladora Firms," *Journal of Business Logistics* (18:1), 1997, pp. 91-123.
34. Thompson, J.D. *Organizations in Action*, McGraw-Hill, New York, NY, 1967.
35. Zsidisin, G.A., Ragatz, G.L. and Melnyk, S.A. "The DARK SIDE of Supply Chain Management," *Supply Chain Management Review* (9:2), 2005, pp. 46.