AN ANALYSIS OF THE DETERMINANTS OF RECOVERY OF

BUSINESSES AFTER A NATURAL DISASTER USING

A MULTI-PARADIGM APPROACH

Phyllis Flott, B.S., MBA
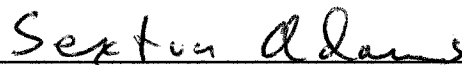
APPROVED:

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Major Professor

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Minor Professor

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Committee Member

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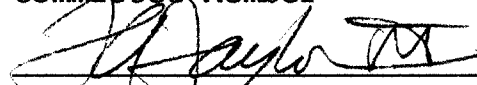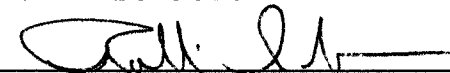
Committee Member

_____

Chair of the Department of Management

_____

Dean of the College of Business
Administration

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Dean of the Robert B. Toulouse School of
Graduate Studies

AN ANALYSIS OF THE DETERMINANTS OF RECOVERY OF

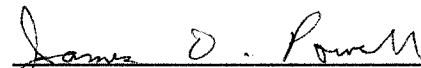BUSINESSES AFTER A NATURAL DISASTER

USING A MULTI-PARADIGM APPROACH

DISSERTATION

Presented to the Graduate Council of the

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This study examines the recovery process of businesses in Homestead, Florida after Hurricane Andrew in 1992. The goal of this study was to determine which organizational characteristics were useful in predicting the level of physical damage and the length of time to reopen for affected businesses. The organizational characteristics examined were age, size, pre-disaster gross sales, ownership of the business location, membership in the Chamber of Commerce, and property insurance. Three-hundred and fifty businesses in the area were surveyed.

Because of the complexity of the recovery process, the disaster experiences of businesses were examined using three paradigms; organizational ecology, contingency theory, and configuration theory. Models were developed and tested for each paradigm. The models used the contextual variables to explain the outcome variables; level of physical damage and length of time to reopen.

The SIC was modified so that it could form the framework for a taxonomic examination of the businesses.

The organizations were examined at the level of division, class, subclass, and order. While the taxa had consistent levels of physical damage, the length of time needed to reopen varied greatly. The homogeneous level of damage within the groups is linked to similarity in assets and transformation processes.

When examined using the contingency perspective, there were no significant relationships between the level of physical damage and the contextual variables. Only pre-disaster gross sales and level of physical damage had moderate strength associations with the length of time to reopen. The configuration perspective was applied by identifying clusters of organizations using the contextual variables. Clusters were identified and examined to determine if they had significantly different disaster experiences. The clusters varied significantly only by the length of time to reopen. The disaster experience of businesses is conceptualized as a process of accumulation-deaccumulation-reaccumulation. The level of physical damage is driven by selection while the length of time to reopen is determined by both adaptation and selection.

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CHAPTER I

INTRODUCTION

Overview

The United Nations, under resolution 42/169 of 1987,

declared 1990 to 2000 the International Decade for Natural

Disaster Reduction (Bates, Dynes & Quarantelli, 1991). The

United States National Research Counsel (USNRC) has issued

two reports detailing efforts on natural disaster reduction

in this country (U.S. National Research Council, 1987,

1989). One goal of the USNRC is to halve the impact of

natural disasters by the year 2000. In response to the U.N.

declaration and the U.S. National Research Counsel's goals,

Bates et al., (1991) state that a natural hazard reduction

program must take place "within specific political, economic

and socio-cultural contexts. Natural hazard reduction

programs undertaken without an understanding of these social

dimensions are destined to fail" (p. 288).

The economic consequences of natural disaster are

considerable. A review of the Federal Emergency Management

Administration (FEMA) funding for natural disasters shows

that between 1980 and 1989, FEMA disbursed $3,371,205,778

for various disaster relief programs. A single disaster, Hurricane Hugo in 1989, accounted for $1,426,618,882 or 42% of the total (FEMA, 1993a,b). More recent disasters that were not included in the above period are the Loma Prieta Earthquake, Hurricane Andrew, the Midwest Flooding of 1993, the 1993-1994 Winter Storms in the Northeastern U.S. and the Northridge earthquake in California.

As of April 1994, $2.523 billion had been disbursed by the Federal government for relief from Midwest Flooding. This amount included disbursements from FEMA (Federal Emergency Management Agency) SBA (Small Business Administration) HUD (Housing and Urban Development) USDA (U.S. Department of Agriculture) and FHA (Federal Highway Administration) (Kliesen, 1994).

The Impact of Natural Disaster and Industrial
Accidents on Business

While natural disasters have been the subject of inquiry in organizational research for some time (Hermann, 1963; Lanzetta, 1955; Thompson and Hawkes, 1962; Williams, 1957; Smart and Vertinsky 1977; Turner, 1976; Dynes and Quarantelli, 1968), the upsurge in both the number and magnitude of crises experienced by organizations in the 1980's increased researchers' awareness of this area. Although natural disasters have had a significant impact on businesses, industrial accidents have received the most

attention. The Three Mile Island accident in 1979, the pesticide leak at a Union Carbide plant in Bhopal in India in 1984, the Chernobyl nuclear reactor fire in 1986, and the Exxon Valdez oil spill in 1989 were all technological or industrial accidents that made headlines worldwide.

In addition to these events, organizations experienced crises associated with tampering and sabotage, terrorism, and financial collapse. Proctor & Gamble had to withdraw Rely tampons in 1980 after they were linked to the Toxic Shock Syndrome. Johnson & Johnson tried to save the Tylenol brand after product tampering in 1982 and 1986. Audi struggled to restore consumer confidence after the Audi 5000 automobile was blamed for several deaths caused by runaway acceleration. The offices of Motorola in 1983 and IBM and Honeywell in 1984 were bombed. The banking and savings and loan industry experienced unparalleled financial collapse (Wisenblit, 1989).

The incident at Three Mile Island has been the subject of much study (Mileti et al., 1984; Bromet and Dunn, 1981). While most researchers focused on the impact of the event on the local population, others were examining the organizational qualities that can lead to disaster. Perrow (1984) postulated that the normal operation of complex organizations lead to a chain of events that create an environment where technological accidents should be expected to happen.

In 1984, a pesticide leak at a manufacturing plant in Bhopal, India, killed approximately 3000 nearby residents (Shrivastava, 1992). This event greatly increased the interest in disasters among management researchers. Several journals devoted special issues to the topic of industrial crises and disasters. Two of these were the Journal of Management Studies (1988) and the Columbia Journal of World Business (1987). The Industrial Crisis Quarterly began publication shortly after the Bhopal incident.

Within the field of organizational research, several researchers proposed frameworks for understanding how businesses cope with a wide variety of organizational crises. Mitroff et al. (1989) developed cultural profiles of organizations to determine if certain types of organizational cultures were more conducive to accidents and disasters. Their research found that crisis prone organizations were more likely to be narcissistic, defensive and have a fatalistic attitude toward the possibility of technological accidents.

Most recent researchers have moved toward a unified crisis plan or a multi-hazard approach to planning and coping with disasters (Smith and Sipika, 1993). Greater emphasis is placed on developing proactive disaster plans by identifying potential hazards before they contribute to an organizational crisis (Wisenblit, 1989; Pearson and Mitroff, 1993). Smith (1990) emphasized that planning has limits

because not all contingencies can be foreseen. The goal of the crisis plan should be to maintain organizational legitimacy.

Effects of Disaster and Disaster Preparedness on Organizations

Experts in the area of disasters predict that the number of disasters will increase (Dacy and Kunreuther, 1969, Shrivastava and Mitroff, 1987; Mitroff, Pauchant and Shrivastava, 1989). Do these disasters affect businesses? "It is no longer a question of if a major crisis will strike, but rather of when, how, and who will be affected" (Mitroff and McWinney, 1987). One survey of Fortune 1000 companies found that these companies, on average, experienced 10 crises per year (Mitroff, Pauchant and Shrivastava, 1989). Corporate crises included natural disaster as well as technological disaster, product tampering and sabotage and a variety of organizational crises.

The Midwest flooding of 1993 illustrated how businesses were affected by the flooding. Kliesen (1994) found that disruption in transportation was probably the greatest impact of the flooding. Emergency tracks had to be laid to manufacturers, especially those in the automotive industry. These plants used a just-in-time inventory system and were in danger of shutting down because many of them only carried

one or two days of inventory. The American Association of

Railroads estimated that they incurred $131 million in

direct losses and possibly as much as $150 million in

indirect losses (Kliesen, 1994). Indirect losses are such

costs as rerouting trains, business interruption and lost

revenue.

While most of the economic impact of disaster is felt

at the local level, severe disaster can affect other regions

of the country as well. Kliesen cites the severe winter

storms that occurred along the East Coast in 1993 as an

example of a regional disaster having national economic

impact.

> At the beginning of 1993, most economists were
> predicting the economy to grow at about a 3
> percent rate. When the first quarter 1993 GDP
> growth rate came in substantially below
> expectations at 0.8 percent, many economists
> attributed it to the adverse weather, because
> important measures ;uch as retail sales and
> construction activity fell sharply (p. 10).

In recognition of the impact of disasters, the federal

government has required certain types of businesses to have

disaster plans. The Health Care Financing Administration

(HCFA) has increased its emphasis on disaster planning for

nursing homes. To satisfy the requirements of the HCFA,

employees must be trained to cope with disasters. Nursing

homes must have a detailed written plan and document and

report risk-related incidents (Verona, 1992).

All federal credit unions are required to have a

disaster recovery plan and periodically test the plan (Mink,
1992). The Federal Deposit Insurance Corporation's
Statement of Policy 5306 and the Federal Financial
Institution's Examination Council ruling of 1989 require
that banks have a detailed disaster recovery plan (Shaw,
1991).

Statement of the Problem

There is a lack of empirical studies exploring the
impact of natural disasters on businesses. Most of the
researchers developing models of crisis management for
business organizations specifically exclude natural disaster
from consideration (Denis, 1991; Mitroff et al. 1989;
Wisenblit, 1989; Mitroff, 1988; Smith, 1990; Smith and
Sipika, 1993; Pearson and Mitroff, 1993). While there is a
substantial body of research on natural disasters in the
field of sociology, little attention has been directed
toward businesses (Scanlon, 1988; Drabek, 1986; Sorensen et
al. 1987; Quarantelli, 1987). This dearth of research makes
building an empirical base of knowledge on the impact of
natural disaster on businesses even more critical. This
basic knowledge of the impact of natural disaster is a
necessary precursor to the development of empirically sound
models for crisis management that deals with recovery from
natural disaster.

Purpose of Research

The purpose of this study is to ascertain which organizational characteristics are determinants of The level of physical damage and organizational recovery after a natural disaster. In addition, this study examines the utility of the selection and adaptation perspectives in understanding the disaster experiences of businesses.

This research is an initial step in providing business owners and decision makers with needed information to predict their disaster experience based on the contextual organizational variables of their organizations. This study seeks to answer two research questions:

1. Are the selected contextual variables relevant in understanding the disaster experience?
2. Is disaster recovery a selection or adaptation process?

Significance of Research

This study adds to the body of knowledge on disaster and organizations by examining the impact of disasters on businesses. While a few researchers are developing typologies of crises that include natural disasters (Shrivastava and Mitroff 1987), industrial or technological accidents have been the primary focus of study. The majority of work in this area has used the individual,

family and community as the unit of analysis. Studies of organizations are generally limited to the study of disaster relief organizations. Research focusing on the business organization is almost nonexistent. Because of this, little is known about how organizations survive and recover from disasters.

Examining the experiences of organizations after a natural disaster is the first step in developing a model for business recovery. This study examines the relationship between organizational characteristics and their disaster experience.

Ideally, this research should provide information for managers and business owners to help them know what actions to take to increase the chances of organizational survival. Development of a taxonomy would allow business owners, credit sources, urban planners, and researchers to use the characteristics of businesses to predict the impact of a natural disaster on the business. The taxonomy would also be useful in estimating reasonable expenditures for a particular business in disaster preparation and mitigation activities, insurance planning and risk management.

Theoretical Basis for the Proposed Research

This study is based on previous research of disasters and organizational theory. There is an extensive body of research examining the social and physical impacts of

disaster and a growing interest among organizational

theorists concerning crises in an organizational context.

Defining Disaster

There are a variety of definitions of disaster. The

definitions generally fall into four categories; 1. the

physical agent, 2. the physical impact, 3. the way the

impact of the physical agent is evaluated, and 4. the social

disruption (Dynes, 1974). Generally, disaster has four key

properties; 1. it is an event that occurs in a designated

time and space, 2. it has physical impacts, 3. it involves

social units, and 4. response occurs as a result.

This paper will examine both the physical and economic

damage caused by natural disaster. The level of physical

damage is immediately evident while indirect losses from

business disruption are often underestimated. The social

and economic disruption of the disaster agent leads to

indirect losses for business organizations that can be as

severe or more severe than the physical damage (Kliesen,

1994)

Crises in an Organizational Context

Efforts to define and classify crises in organizations

are in the initial stages. Within the organizational

research literature, the term crisis is generally used

rather than disaster. Shrivastava and Mitroff (1987) have

developed a typology of organizational crises and categorize

natural disaster as an organizational event caused by

external forces that can be characterized as technical/economic.

Definition and classification are problematic in conceptualizing organizational crises. Organizational crises are increasingly being viewed as a system failure. (Smith, 1990; Wisenblit, 1989; Perrow, 1984). Shrivastava (1987) recognized that there are typically multiple systems failures involved in many disasters. Smith (1990) postulated that all complex systems will inevitably experience systems failures that lead to crises.

Differentiating Industrial Accidents from Natural Disasters

One goal of this study is to integrate two bodies of research; the studies of disaster from the field of sociology and organizational theory as developed in the field of management. Because these two fields have different perspectives of the business organization, it is important to look at each area's emphasis in order to integrate the two areas. While sociologists have investigated natural disaster and industrial crises, organizational theorists have concentrated on industrial crises.

Shrivastava et. al., (1988) described five characteristics that can be used to differentiate industrial accidents from natural disaster: 1. cause of the event, 2. degree of localization, 3. specific time period, 4. event life cycles, and 5. organizational context. Evidence is

presented that disputes the validity of the first three
characteristics and lends some support to the last two. The
event life cycle and organizational context are probably the
two characteristics that most clearly differentiate the two
types of crises.

While there are differences between the two types of
crises, the previous analysis shows that the events have a
considerable amount of commonality. Warheit (1976) and
Drabek (1986) both take the view that some aspects of the
two areas should be integrated. This paper will integrate
findings from studies of industrial accidents when the
findings assist in the understanding of the impact of
natural disasters on organizations.

The Process of Disaster Recovery

A number of systems have been developed to explain the
disaster recovery process (Carr, 1932; Powell, 1954;
Stoddard, 1968; Drabek, 1986). While these systems aided
researchers in organizing research efforts, each had
weaknesses, the primary one being the emphasis on a linear
recovery pattern. Different stages of recovery can be
occurring at the same time and groups and individuals will
experience varying recovery patterns (Neal, 1994).

Examination of the business literature suggests that
certain activities typically occur after a disaster affects
a business organization. These events do not necessarily
occur in the order presented and some events may not occur

at all, depending on the type of impact the disaster agent has on the organization. The first stage is discovery of the impact and arrival at the disaster site. Once organizational members are aware of the impact, they typically contact emergency responders either within or outside the organization. Depending on the type of impact, the next stage may be locating and accounting for organizational members. Next, it is critical to limit the impact of disasters on the organization by stopping any additional damage caused by the disaster agent and impacts from secondary agents. The disaster impact may expose business assets to the elements and the secondary water damage associated with many types of severe weather may cause more financial losses than the initial impact.

Once initial actions are taken to limit the physical damage, organizational stakeholders such as employees, clients and vendors, should be notified. If the impact is significant, managers will need to be prepared to deal with the media. In the case of massive disasters such as Hurricane Andrew and Hugo, organizations may be responsible for meeting employees' basic needs for shelter, water and food.

The next step is to find a way to resume production activities. A temporary site may be needed. Critical records and equipment will have to be repaired or replaced. Utilities will have to be restored. If the original site

cannot be restored, managers will locate a new site for permanent operations.

Typically, the last stage in the recovery process is an evaluation of recovery activity and incorporating the experience into the organizational disaster plan. This process serves two purposes, improving organizational effectiveness in future crises and placing closure on the event (Martin, 1988).

Long Term Impacts of Disaster on Business

Long-term impact can be divided into two categories, positive and impacts negative impacts on the organization. Two positive outcomes of disaster are increases in revenue and acceleration of needed change. Some organizations have increased revenue because their products and services replace those lost after the disaster. Examples are hotels and motels, alternative transportation, storage facilities, hardware stores and furniture stores.

Loss of physical assets and business location may give managers a chance to implement organizational and procedural changes (Dixon, 1988). Other organizations have reported increases in morale and motivation (Vasilash, 1993). Leonard (1991a) found that managers reported an increase in interorganizational cooperation and team building.

The most common negative impacts are damaged facilities, lost inventory, lack of supplies and transportation problems. Indirect losses such as declines

in property values also occur (Montz and Tobin, 1988; Murdoch, Singh & Thayer, 1993). Other organizations experience a loss of management direction and suffer excessive property losses. Powell (1991) suggests that some businesses may suffer from post-traumatic stress disorder at the organizational level.

Organizational Variables

In order to understand how the characteristics of businesses affect their level of disaster experience, each variable considered will be discussed. The variables selected are size, age, pre-disaster gross sales, industry, membership in the chamber of commerce, insurance, and ownership of business site. These variables were selected because they appeared to be relevant based on existing literature (Daft, 1992; Drabek, 1986; Bluedorn, 1993; Gooding and Wagner, 1985; Quinn and Cameron, 1983)

Development of a Taxonomy

The goal of this study is to develop a taxonomy to classify organizations so that findings can be generalized to specific types of businesses. Cluster analysis and discriminant analysis will be used to analyze the data and the techniques of numerical taxonomy will be used to develop the classification schema.

Definition of Terms

The following terms are defined for the purposes of this study.

1. Adaptation--Adaptation occurs when organizational
   decision makers make "designed changes in the strategy
   and structure of individual organizations in response
   to environmental changes, threats, and opportunities
   (Hannan and Freeman, 1989)."

2. Cladistics--The study of evolutionary branching sequences
   with an emphasis on the recency of the branching
   points.

3. Classification--McKelvey (1982) "The actual construction
   of a classification scheme and the identification and
   assignment of organizational forms to formally
   designated classes" (p. 13). Sneath and Sokal (1973)
   offer the following definition, "Classification is the
   ordering of organisms into groups (or sets) on the
   basis of their relationships" (p. 3).

4. Cluster--These are sets of OTU's in phenetic hyperspace
   that exhibit neither random nor regular distribution
   patterns and that meet one or more of various criteria
   imposed by a particular cluster definition (Sneath and
   Sokal, 1973).

5. Configuration--the logical ordering of the character
   states in the vectors, as in an ordered process such as
   a life history, where data matrix rows representing
   characters cannot be meaningfully interchanged (Sneath
   and Sokal, 1973). A second meaning is also used in

this study. The second meaning has to do with the paradigm of organizational configuration.

6. Crisis - The point at which a situation or event threatens the organization's survival.

7. Dendrogram--a graphic device used to illustrate relationships among OTUs. A phenogram is based on observable characteristics while a cladogram is based on evolutionary branching points.

8. Disaster - Disaster will be used as a sensitizing concept, as proposed by Quarantelli (1987) and Kreps (1984a). The term references a number of related stages that encompass the entire experience including warning, impact, reconstruction and recovery. Each phase of disaster will be defined.

9. Homology--homologous characters are corresponding characters. This is an area of controversy because of the emphasis of phenetic as well as phylogenic characteristics. Homology occurs when the taxonomist compares the same parts of two different subjects. McKelvey's (1982) example of classification of lizards is useful in clarifying this term. Homology would be violated if a taxonomist compared the front legs of a lizard with the back legs of another and then concluded they were different species. Front legs should be compared to front legs. An example relating to organizations would be comparing case workers in a

social service agency with workers in other
organizations that have direct contact with clients or
customers. The comparison between case workers and
long-haul truck drivers would not be a homologous
comparison of characteristics.

10. Impact - This is the actual physical destruction caused
by the physical agent of the disaster. The destruction
of buildings that was caused by hurricane Andrew is
an example of disaster impact.

11. Losses--Direct losses are assets destroyed by the
physical agent of the disaster. Examples are
buildings, inventory and machinery. Indirect losses
are economic losses related to the disruption of
business. Examples are lost revenue because customers
are out of business due to the disaster, losses in tax
revenue, losses of infrastructure for transportation.
(Kliesen, 1994).

12. Monothetic group--An OTU can belong to the group if it
possess all the attributes used to define the group.

13. Monothetic keys--Classification is based on a single
characteristic that is used to separate the different
OTUs into classes.

14. OTU-operational taxonomic unit.

15. Polythetic group--The members of the group share most
attributes in common but are not required to have all
attributes for group membership.

16. Polythetic keys--Several attributes are used to sort OTUs into different classes.

17. Phenotypic relationships--Relationships based on observable characteristics

18. Phylogenitic relationships--Relationships based on common ancestry. This approach focuses on developing linages and evolutionary relationships and related to cladistic characteristics.

19. Profile--The vector of character states of an OTU over the suite of n characters. The order of the characters is of no consequence as long as homologous characters and character states are found in the same row of the original data matrix.

20. Reconstruction - This is the long-term recovery phase. Drabek (1986) suggests that this phase of recovery has not been investigated as well as the other stages in disaster recovery.

21. Recovery - Both bodies of literature, management of business turnarounds and the sociology of disaster, have different definitions of recovery. When used in the literature of business turnarounds, the recovery stage begins at the point at which decline has been stopped and the managers of the firm must decide whether to pursue the original organizational strategy or develop a growth strategy (Robbins and Pearce, 1992; Bibeault, 1982).

Drabek (1986) inventoried the sociological findings of human system responses to disaster. He divided the recovery phase into two time periods. Restoration is the period of short-term recovery that occurs after the disaster event. Reconstruction is long-term recovery that often involves mitigation activities and organizational system changes.

For the purposes of this study, recovery will be used in a way that is consistent with the literature of business turnarounds. Recovery is considered to have occurred when a business is able to reopen for business. While many if not the majority of business are far from their pre-disaster condition, by resuming business operations their decline has been stopped.

Organizations begin to acquire resources through business operations that are needed to regain their pre-disaster state.

22. Restoration - This is the short-term recovery period. This period is typically the first six months after the disaster (Drabek, 1986).

23. Selection--The selection view holds that inertial forces make changing the strategy and structure developed at organizational inception problematic. Variation among organizations is primarily caused by the extinction of existing forms and the creation of new forms.

24. Species--Slobodchikoff (1974) defined species as ". . . a system of genetically similar individuals maintained as a cohesive unit by a set of selection pressures that balance the disruptive forces imposed by environmental factors, mutation, or genetic recombination".

25. Systematics-- The scientific study of the kinds and diversity of organisms and of any kind and all relationships among them (Simpson, 1961). McKelvey (1982) defines systematics as "The science given over to the study of the diversity of form" (p. 462).

26. Taxonomy--"The development of theories and methods for separating organizations into different kinds, including the understanding of the causes of the stability of organizational forms over time, as well as the mechanism by which they evolve as the result of environmental forces, or in other words, a theory of classification" (McKelvey, 1982, p. 13). Simpson (1961) defines taxonomy as a study of the theoretical principles procedures and rules that are the foundation of classification. Generally, taxonomy is theoretical and classification is the practical application.

26. Turnaround - "A term that denotes a strong emphasis by the firm on cost and asset reductions as a way to mitigate the conditions responsible for financial downturn" (Robbins and Pearce, 1992, p. 287).

Chapter Summary

Organizations experience many types of crisis and research shows that the size and number of crises are increasing. This study focuses on a specific type of organizational crisis, natural disaster. Researchers in the area of organizational theory are in the initial stages of understanding how organizational and environmental characteristics moderate the effects of disaster. Understanding and predicting the impact of disasters is an important part of organizational survival. This study will attempt to add to the body of knowledge concerning the impact of natural disaster on businesses.

CHAPTER II

LITERATURE REVIEW

The literature review will be presented in four

sections. First, the concept of disaster will be reviewed.

The organizational recovery process will be detailed in the

second section. The third section will contain a discussion

of the causes of differential recovery patterns among

disaster victims. In the final section, the research model

will be presented.

Defining Disaster

This section consists of three parts: disaster in a

sociological context, disaster in organizational theory, the

differences and similarities of industrial crises.

Disaster in a sociological context

The field of disaster research is in a pre-paradigmatic

state concerning the definition of disaster (Quarantelli,

1987). The level of over-specialization and lack of cross-

disciplinary research that characterizes the field of

natural disasters has contributed to this lack of a central

paradigm (Alexander, 1991).

The most extensive body of work concerning disaster is

of a sociological nature. Prince's (1920) examination of the Halifax explosion is one of the earliest empirical examinations of disaster.

Quarantelli would prefer the term crises if the field were to start over, "...the word "crises" is even better (and would be our own choice if the field were to be miraculously restarted as it was in the 1950's)" (Quarantelli, 1987 p. 21). He suggests that;

> The word disaster should be thought of as a sensitizing concept, in Blumer's use of sensitizing. As such, it should give us general guidance. Both as a word tool and as a sensitizing concept, the term, thus, will not, and need not, be ultra precise. (p. 22)

In a similar vein, Kreps (1984a) states:

> the term disaster serves only (albeit usefully) as a sensitizing concept; one, like many other global concepts used in science, that calls attention to a number of characteristics related to some phenomenon and gives it a label. (p. 311)

The definition developed by Fritz (1961) is one of the earliest definitions of disaster put forth. While it does refer to social disruption, it also includes references to the physical agent and its impacts:

> an event, concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of society, undergoes severe danger, and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented. (p. 655)

Fritz's definition has four key properties: events that can be designated in time and space, impacts, social units

and responses. While this definition was an important step in developing a framework for the study of disasters, it had several limitations.

The perception of a disaster as being concentrated in a specific place and time is partially a result of the interest of funding agencies in the 40's and 50's. These agencies were primarily interested in civil defense and military issues (Quarantelli, 1978). The emphasis on a clearly defined time frame excludes slow moving and diffuse disasters such as drought. The use of the concept of space in this context implies that the space that the disaster occurs in is entirely determined by the disaster agent. This definition ignores the fact that typically, marginal, fringe or powerless members of society are more severely affected by disasters than other members of the community (Bates et al, 1963; Olsen and Olsen, 1977; Lechat, 1976).

This definition also assumes that there is agreement about the disaster and the appropriate response. The literature suggests that this is often not an accurate assessment of the situation. Quarantelli and Dynes (1977) point to previous research that developed the concept of dissensus and consensus types of crisis.

> Dissensus types of crises are conflict-containing situations where there are sharply contrasting views of the nature of the situation, what brought it about, and what should be done to resolve it. ... Consensus-type crises are those where there is agreement on the meaning of the situation, the norms and values that are appropriate, and priorities that should be followed... (p. 23)

Since Fritz's pioneering work in the field, researchers have attempted to identify the multiple perspectives of disaster that exist in the literature. Alexander (1991) divided approaches to disaster into two groups; the technocentric and the development school. The technocentric school emphasizes technological and complex systems approaches to managing disaster. Members of the development school argue that these interventions are inappropriate for human systems, particularly those in developing areas because they do not have the resources to adopt such measures.

Dynes (1974) found that there were four major references for the term disaster; the physical agent, the physical impact or consequences, the way the impact of the physical agent is evaluated, and the social disruption caused by the physical agent and its impact. Britton (1987) suggests that definitions of disaster fall into three categories:

> The first category, which incorporates the majority of the definitions, describes the social and environmental effects of impact (for example, Fritz's 1961 contribution). The second category interprets disaster as a collective stress situation and renders expected conditions and goals unattainable to the degree customarily considered essential . . . A third category defines disaster in terms of the demands of the disaster situation exceeding the capacities and the precautions of society which, prior to the impact, had been culturally accepted as adequate. . . (p. 39).

This paper will use the term disaster agent when referring to the forces of nature that caused the physical damage and social disruption. The term disaster impact will refer to the physical damage caused by the disaster agent. The term disaster will be used as a global concept (Kreps, 1984b) meaning the entire disaster experience from the initial warnings to organizational recovery. The disaster that will be examined in this paper is Hurricane Andrew's effect on Homestead and Florida City, Florida in 1992. While the physical impact of the disaster will be examined, the focus of this research will be on the economic and human systems disruption caused by Hurricane Andrew. Quarantelli (1987) states that:

> The definition of disaster should be exclusively in social terms. References to physical phenomena ought to be absent, and references to space and time should be to social time and space, a point Sorokin and Mertin made a long time ago about sociological concepts. High impact ratio notions, for example, are not social dimensions, nor are they involved in most formulations which struggle with physical agent characteristics or features. (pp. 22-23)

Crises in an Organizational Context

Efforts to define disaster in the organizational context are in the preliminary stages. The terms crisis and disaster are often used interchangeably. Denis (1991) suggests that the term disaster may be more palatable to managers because it implies that the event was beyond their control. In many cases, neither term is defined (Mitroff,

Pauchant, Finney and Pearson, 1989; Smith and Sipika, 1993; Bishop, 1991). When the terms are defined, two different perspectives emerge.

One group of researchers view disaster or crisis as a rare event with severe consequences (Denis, 1991; Harrald, Marcus and Wallace, 1990; Barton, 1993; Gordon, 1991). The idea of "event" is similar to Fritz's (1961) definition that emphasized that disasters are "concentrated in time and space". A crisis is generally characterized as a single, swift event that overtakes the organization. Gordon (1991) offers a competing view that rather than fast moving events, disasters can be slow moving, diffuse events.

Generally, these definitions state or imply that a disaster or crisis has not occurred unless the physical impact reaches a level that threatens the organization's survival (Shrivastava and Mitroff, 1987; Pearson and Mitroff, 1993; Modzelewski, 1990; Sorensen and Mileti, 1987; Bowman and Kunreuther, 1988; D'Aveni and MacMillian, 1990). In an examination of industrial accidents, Mitroff (1988) defined a major accident as an event that caused 50 or more deaths. Shrivastava and Mitroff (1987) call crises a new class of strategic problems. Their definition combines the idea of a rare or low probability event with high impact on organizational stakeholders. This definition recognizes that crises affect those outside the organization as well as organizational members.

Reilly (1987) and Modzelewski (1990) examined managers' definitions of organizational crisis. Reilly (1987) found that practitioners defined crises as an event having five characteristics; high magnitude, require immediate action, an element of surprise, the need for taking action, and are outside the organization's complete control. Modzelewski (1990) found that managers defined disasters in terms of the degree of damage to the organization. If an event damaged the image of the firm, caused prices to decline, or reduced market share, then the event would be considered a crisis. These definitions are consistent with those proffered by academicians that view crises as low probability, high impact events that can lead to physical and economic damage to the firm.

Rather than emphasizing a specific event or damage, the second perspective considers crises the result of a systems failure (Smith, 1990; Wisenblit, 1989; Kurstedt and Mendes, 1990; Shrivastava, 1987; Perrow, 1984; Raphael, 1986; Reilly, 1987; Shrivastava, Miller, and Miglani, 1991; Starbuck and Milliken, 1988; Perrow, 1984). While Raphael (1986) envisioned crises as events that cause organizational disequilibrium, Wisenblit (1989) found that crises are situations that exceed the capacity of existing organizational operating procedures. Smith (1991) postulated that all complex systems will inevitably experience systems failures that lead to crises. Perrow

(1984) called these inevitable events "normal accidents".

Much of the research that focuses on systems failures examines a specific type of organizational crises, industrial accidents (Shrivastava, Miller and Miglani, 1991). Perrow (1984) defines an accident as an occurrence that "involves damage to subsystems or the systems as a whole, stopping the intended output or affecting it to the extent that it must be halted promptly" (p. 70). Industrial accidents can be regarded as a by-product of developing or adopting complex, high risk technologies. Rather than a single event, industrial accidents result from failures in multiple systems including organizational, technological, and societal (Shrivastava, 1987).

The second group of definitions has commonalities with the earlier definitions of disaster used by sociologists such as Barton (1970) and Quarantelli (1987). Barton considered disaster to be a failure in the social system. As a result of the disaster, the social system was no longer able to meet the needs of its members.

Two typologies have been developed that attempt to integrate all types of organizational crises. These typologies were selected because they integrate natural disasters into the broader class of organizational crises. The first typology discussed in this study was initially introduced by Mitroff (1988) and presented with further refinements by Pearson and Mitroff (1993).

As shown in Figure 1, crises are classified along two dimensions, severity and underlying cause. The types of crises described as severe are characterized by unpredictability and being initiated by forces external to the organization. Terrorism, executive kidnaping and extortion are among the more severe, externally generated crises. Yet even these have a certain amount of predictability. Awareness of the social and political environment along with reasonable security precautions can mitigate these events much as natural disasters can be mitigated against.

Recalls, product defects, and counterfeiting are events that are classified as normal. These events occur as a result of the normal operations of business. Organizations are likely to have procedures in place in case of these types of events. Events such as flooded basements and loss of electricity because of storms would be similar in that they are considered normal events.

While this typology is relatively detailed in its classification of crises types, it does not include natural disaster. However, it is important in that it suggests that organizational crises can be placed into categories and responses developed for each category, rather than an agent specific approach.

Figure 1. Types of Crises Grouped by Shared Characteristics

Technical/Economic

External
Information Attacks

Copyright Infringement
Loss of Information
Counterfeiting
Rumors

Breaks

Recalls
Product Defects
Plant Defects
Computer Breakdowns
Poor Operator/Errors
Poor Security

Normal

Perceptual

Damage to
Reputation

Occupational
Health
Diseases

External
Economic Attacks

Extortion
Bribery
Boycotts
Hostile Takeovers

Mega Damage
Environmental
Accidents

Psychological

Terrorism
Copycats
On-site Sabotage/Tampering
Off-site Sabotage/Tampering
Executive Kidnappings
Sexual Harassment
Rumors

Severe

Human/Social

Note. From "From crisis prone to crisis prepared: a framework for crisis management," by C. M. Pearson and I. I. Mitroff, 1993, Academy of Management Executive, 7(1), p.50.

A second typology was developed by Shrivastava and Mitroff (1987). This typology is presented in Figure 2. Crises are classified along an internal-external dimension and by underlying cause. Like the previous typology, crises are arranged into dichotomies.

Natural disasters are placed in the external-technical/economic cell. The characterization of natural disasters as external and caused by technical/economic factors is overly restrictive. The relationship between natural disaster and human activity will be explored in greater detail in the following section.

Both typologies attempt to include all types of organizational crises and are an important step in integrating strategies for recovering from natural disasters and technological crises. As with the previous typology, this classification allows managers to develop a generic strategy for each cell. While it could be argued that there is still an overemphasis on separating types of organizational crises by cause, these typologies move closer to the multi-hazard approach of integrated emergency management (Drabek, 1986).

These classifications of crises are useful as tools that provide managers with cognitive maps. However, neither of the typologies provide guidance in separating disruptive events from those that threaten the continuing existence of the organization.

Figure 2. Different Types of Corporate Crises Triggering Events.

Technical/economic

Cell 1

Major industrial accidents
Product injuries
Computer breakdown
Defective, undisclosed
 information

Cell 2

Widespread environmental
 damage
Natural disasters
Hostile takeover
Societal Crises (Civil or
 Political)
Large Scale Systems failure

Internal

External

Cell 3

Failure to adapt/change
Sabotage by insiders
Organizational breakdown
Communication breakdown
On-site product tampering
Illegal activities
Occupational health diseases

Cell 4

Symbolic projection
Sabotage by outsiders
Terrorism, executive
 kidnaping
Off-site product tampering
Counterfeiting

Human/Organizational/Social

Note. From "Strategic Management of Corporate Crises." by P. Shrivastava and I. I. Mitroff, 1987, Columbia Journal of World Business, 22(1), p. 7.

Integrating Natural Disaster and Industrial Crises:

the Multihazard Approach

It is important to explore the differences and
similarities between industrial crises and natural
disasters. One of the goals of this research is to
integrate both the literature from the sociology of disaster
and organizational studies in the field of management.
Because sociology has concentrated on natural disasters and
organizational theory emphasizes industrial accidents,
understanding the commonalities between these two phenomena
is one stage of the integration process.

The multihazard approach to emergency planning has been
adopted as national policy through the Integrated Emergency
Management System (Drabek, 1986). The National Governors
Association (Comprehensive emergency management, 1979) has
also adopted an integrated approach to dealing with
technological and man-made hazards with natural disasters
(Drabek, 1986). The adoption of this approach by the
National Governors Association is an important development
because state governors must determine if an event requires
federal assistance and make a request to the federal
government before a formal disaster declaration can be made.

Researchers in the field of natural disasters have
suggested that the two areas, industrial crises and natural
disasters, could be enhanced by a expanded conceptualization
of the term disaster (Quarantelli, 1987; Britton, 1987).
Warheit (1976) and Drabek (1986) have urged that the

conclusions from both bodies of research be integrated.
Drabek (1986) has suggested that the development of a
taxonomy of disaster events could greatly aid in this
process.

The key difference in most definitions of the two
phenomena is the cause or origin of the events. Natural
disasters are events caused by the forces of nature while
industrial crises have their origins in the social,
technological, and organizational systems failures
associated with industrial activity.

Shirvastava, et. al. (1988) described five significant
differences between industrial crises and natural disasters:
1. cause, 2. degree of localization, 3. specific time
period, 4. event life cycles, and 5. organizational context.
The following section will present evidence that suggests
that these two categories of events are not as divergent as
they initially appear.

Cause

The first characteristic discussed is cause. According
to Shrivastava et al. (1988), natural disasters are acts of
nature or "acts of God" but industrial crises are caused by
human agencies and the social order. While it is accurate
to state that natural events such as heavy rains,
earthquakes and hurricanes lead to natural disasters, the
disaster agents alone do not lead to disaster impact.
Without a human system present, there could not be disaster.
For disaster to occur, there must be hazard, an impacted

human system and a triggering event (Billings, Milburn and Schallman, 1980).

An example that clarifies the concept of disaster as an event that requires all three components is the series of earthquakes that took place along the New Madrid fault between 1811 and 1812 (Jibson and Keefer, 1988). As shown in Figure 3 below, The New Madrid Fault runs through the central Mississippi Valley located along the borders of Kentucky, Missouri, Tennessee, Arkansas and Mississippi.

These earthquakes may have been the highest magnitude quakes to have occurred since European settlement of North America. Nuttli and Herrmann (1984) estimate that the earthquakes had a surface wave-magnitude of 8.4 to 8.8. In comparison, the Loma Prieta Earthquake that shook San Francisco in 1989 registered 7.1 (Bolin, 1993) and the Northridge Earthquake that occurred Los Angeles in 1994 registered at 6.7 (The magnitude, 1994).

The hazard present during the New Madrid Earthquake was the New Madrid fault. The triggering events were the three severe earthquakes which occurred in a three month period from December 16th of 1811 to February 7th of 1812. At that time there was no significant impact on a human system by the agent or triggering event so disaster did not occur. Yet, if that same earthquake were to occur today, the impact would be devastating. The disaster agent has not changed but a human system is now impacted by the disaster agent.

Figure 3. The New Madrid Fault and Sites of Earthquakes in 1811 and 1812.
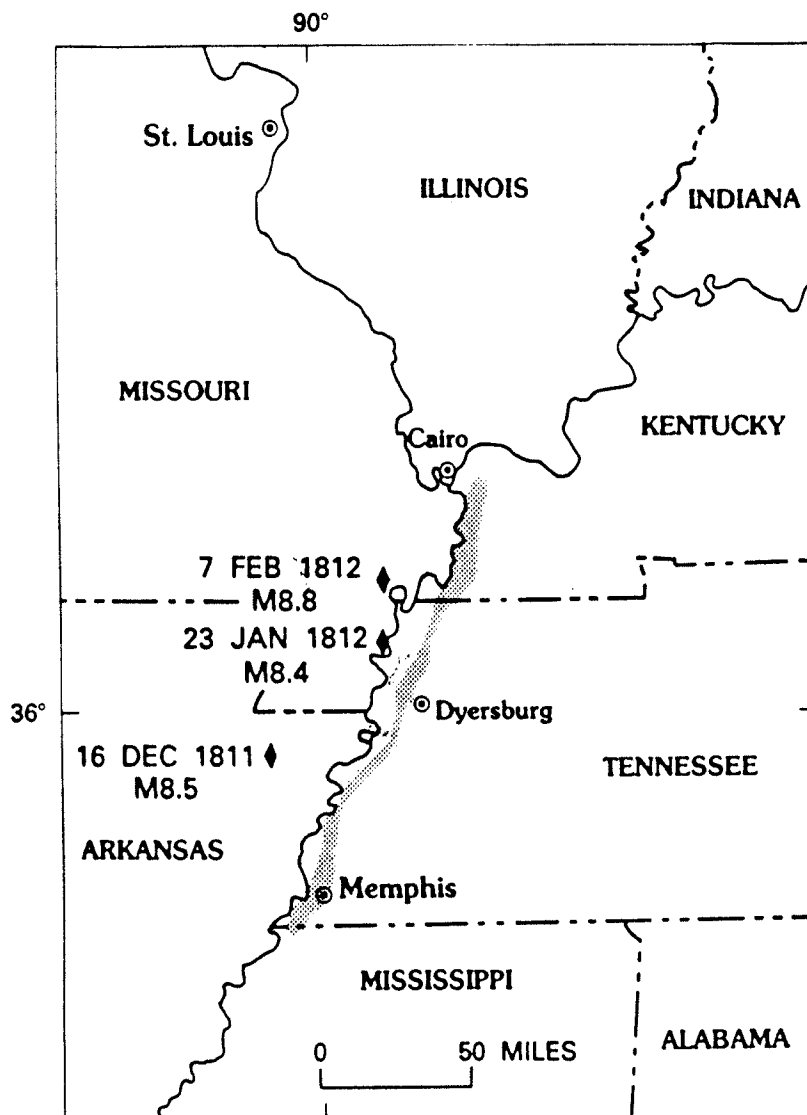
When industrial accidents occur, the same three components must be present. The hazard is created by the members of the human systems that develop high risk technologies. The triggering event could be an action taken by members of the human system, such as sabotage or operator error, or the triggering force could be external to the human system such as a natural event like a flood or an earthquake. All three components must still be present in some form.

Two examples of technological disasters that were triggered by natural events were the fires in the Houston Ship Channel and in several small towns near Durunka, Egypt, both occurring in October of 1994. In the Houston Shipping Channel, four pipelines ruptured after heavy flooding along the San Jacinto River. McLemore (1994) reported that approximately 10,000 people had to be evacuated and about 120 were treated for inhalation of smoke and fumes. The hazard, the pipelines in the Houston Shipping Channel, was created by the members of the human system while the triggering event, flooding, was caused by forces of nature.

In Egypt, unusually heavy rains caused a bridge to collapse which crushed two fuel storage tanks. The contents of the tanks caught fire and the flood waters carried the burning fuel into the nearby towns, killing hundreds of people. From reports at the scene, fuel lines were not immediately shut off and local residents trying to leave the

area blocked roads thereby preventing emergency vehicles from entering the area (Murphy, 1994). In this incident, the floods were the triggering event.

This case illustrates an especially troubling aspect of technology transfer from more developed nations to less developed nations. In less developed nations, the human systems impacted often do not have the resources or experience needed to cope with technological disasters (Alexander, 1991; Shrivastava, 1992). In these settings, the disaster is a function of the existence of human systems and the level of development serves to further blur the distinction between natural and technological disasters.

Degree of Localization and Time

The characteristics of time and space are interrelated. Typically, when one thinks of natural disasters, one thinks of tornadoes, floods, or other weather or geologic agents. One characteristic that these agents share is that their impact is sudden and dramatic. These events are termed "rapid onset disasters" (Goltz, Russell and Bourque, 1992).

Yet many natural disasters do not fit into this category of rapid onset. Two examples are drought and soil subsidence. Drought would not only be difficult to place in a certain time frame but would probably have indefinite geographical borders. Another example of a natural disaster with indefinite geographical borders would be the Midwest Flood of 1993. While it was possible to physically identify

property that was submerged under flood waters, the impact of the flood was much greater than just the flooded areas. Because of the central location of the flooded area and destruction of bridges crossing the Mississippi, land transportation routes were blocked. Water traffic on the Mississippi was brought to a halt. Even though the area of flooding could be reasonably well defined, the area affected was much greater and less well defined.

Event Life Cycle and Organizational Context

The last two characteristics, event life cycle and organizational context are arguably the two characteristics that significantly differentiate between industrial crises and natural disasters. In general, the impact of natural disasters tend to lessen over time. However, natural disasters can in turn contribute to or cause technological disasters that change the event's life cycle. For example, the Northridge Earthquake caused serious fires in the Los Angeles area after gas lines ruptured. The Midwest floods uncovered barrels of toxic waste that had been improperly disposed of.

Natural disasters typically have their greatest impact immediately after occurrence and tend to lessen over time while industrial crises can reach their point of peak impact long after any initial event that triggered the crisis. The toxic waste pollution at Love Canal in New York may be one of the most well known examples of this.

By definition, industrial crises take place within organizations. They would not occur without industrialization. Natural disasters occur independent of the level of industrialization of a society. However, the level of industrialization can have a significant influence on the impact of natural disasters.

Weick (1976) and Perrow (1984) developed the concept of the organizational linkages as being a critical component in determining the severity of an industrial crisis or natural disaster in an organizational or societal context. Perrow (1984) classifies many accidents as systems accidents. A characteristic of modern industrial systems is the complexity in which different parts of the system interact. Minor production incidents can become major industrial accidents if an event in one part of the organization interacts with other parts of the organization in unforeseen ways. These minor incidents can be either technological or naturally occurring.

If a system is loosely coupled, the processes occurring are slow and interaction between organizational areas can be stopped. If a system is tightly coupled:

> processes happen very fast and can't be turned off, the failed parts cannot be isolated from other parts, or there is no other way to keep the production going safely. Then recovery from the initial disturbance is not possible; it will spread quickly and irretrievably for at least some time. Indeed, operator action or the safety systems may make it worse, since for a time it is not known what the problem really is (Perrow 1984, pp. 4-5).

Perrow's (1984) work focuses on crises that are initiated by some type of industrial accident within an industrialized society. Highly industrialized societies are characterized by tightly coupled systems. When a triggering or initiating event affects these complex and interconnected systems, unforseen interactions can occur. Once the process is initiated, it is not relevant whether the initial event was an industrial accident or natural disaster.

While it is important to differentiate between the types of crises in order to better understand and predict their impact, excessive differentiation can be an impediment to advancing the understanding of the recovery process of organizations affected by natural disaster or an industrial accident. This paper will integrate findings from industrial crises research when the findings assist in the understanding or organizational adaptation to both industrial crises as well as natural disaster.

The Process of Disaster Recovery

A variety of schemes have been developed to describe the stages or phases disaster victims go through in order to recover from the disaster impact. Carr (1932), Powell (1954), and Stoddard (1968) developed early classification systems. While these initial works were valuable for providing researchers with a conceptual framework, Stoddard noted that they placed too much emphasis on the time spent

in each phase of recovery and were not comprehensive enough

to incorporate all the disaster research.

Drabek (1986) adapted an earlier classification scheme

to more closely fit a schema developed by the National

Governor's Association Report (1979). Drabek's

classification scheme used four stages; preparedness,

response, recovery and mitigation. Preparedness included

planning and warning while response was divided into pre-

and post-impact mobilization. The recovery period was

divided into two time periods: restoration occurring during

the first six months and reconstruction activities beginning

after this time period. Mitigation included both

adjustments to and perceptions of disaster.

While Drabek's (1986) classification systems remains

the standard method of categorizing disaster related

activities, Neal (1994) points out that there has been

significant work done in the area of recovery since Drabek's

schema was proposed. In addition the schema has been

criticized for being too linear, arbitrary, and not

accounting for differences in recovery rates among different

groups affected by the same disaster.

Additional examination of the adaption processes of

complex organizations to the effects of natural disasters is

warranted before this or any other schema is accepted as an

accurate model of organizational adaptation. The

preponderance of research examining adapting to disasters

has been at the individual, family, and group level (Drabek, 1986).

The recovery process for organizations will be explored in the next section. A detailed description of the process will be presented. The long-term impact of disaster on organizations, both positive and negative, will conclude the section.

The Process of Restoration and Reconstruction

Examination of the literature suggests that there are certain recovery activities that are common to all organizations. While the phases in the restoration and reconstruction phases are arranged in time order, events may not follow this order and not all stages will be relevant to every disaster.

Discovery of Impact and Arrival at Disaster Site

Discovery of impact may happen in a variety of ways. In the case of hurricanes and floods, business owners and managers may have warning and an opportunity to protect their property from oncoming impacts. In other disasters such as fires and tornadoes, there may be little or no advanced warning.

After the discovery of impact, owners and managers of business organizations need to reach the site to assess damage. In some cases, they may be present during the disaster impact. They are most likely to be present if there was warning of disaster impact or if the impact

occurred during normal operating hours. Quick action immediately after the impact is a major step in reducing long-term organizational effect (Bean, 1989). Conversely, Ramee (1987a,b) emphasizes defining the event before any action is taken. The organizational decision maker needs to be certain that the situation is really a crisis and determine what the probable impact is.

Mass convergence at the site of a disaster is a well documented phenomenon in the disaster literature (Drabek, 1986; Alexander, 1991). Immediately after the impact, there is a mass convergence of relief organizations, emergency responders, volunteers, supplies, and equipment (Barton, 1970). In addition, there is usually a gathering of the merely curious that do not participate in the relief efforts.

Supplies generally arrive in such great volume as to overwhelm those coordinating relief efforts. Individuals spend time sorting, organizing and storing supplies rather than participating in needed relief efforts (Dynes, 1970).

A review of the literature did uncover one recorded case of mass convergence at the site of a business that experienced natural disaster. Bennett (1992) describes convergence behavior at the site of a grocery store that had burned down. Approximately 50 residents helped the owner take inventory after the disaster. This convergence

behavior was attributed to the grocer's previous involvement in the local community.

Contact External and Internal Emergency Responders

Typically, external responders are firefighters, police, and emergency medical responders. Organizations that have a high potential for industrial accidents may have company firefighters or medical responders.

As part of the mitigation process, organizations should designate individuals as members of an emergency response team before the disaster. Ideally, this team would be cross functional. These individuals are responsible for most of the recovery activities. In addition to directing recovery activities, an organizational spokesperson is usually selected from this group. In larger organizations, the teams may set up an Emergency Operations Center (EOC) (Emerson, 1989). Once the center is operational, relevant parties should be notified and a detailed damage assessment should be conducted. According to Emerson, whatever steps the organization takes, the emphasis of the recovery actions must be business resumption.

Members of this group should also have the responsibility for contacting insurance agents. However, Mulcahy (1990) found that most agents were unprepared for disaster. In cases of widespread impact, the agent or agencies responsible for coverage may not be operational. In addition, those organizations that are most vulnerable to

disaster may have the least amount of insurance. In a study of homeowners, Cochrane (1975) found that the lowest income group had the lowest rates of coverage while the highest income group had the highest rate of coverage and the highest amount of the value of the home covered.

The tasks performed during this period could be described as emergent rather than routine. These are tasks that develop in response to the disaster impact and are not typical organizational tasks. While they are not typical, they are generally related to routine tasks. An example of an emergent task would for an auditor to be involved in cost containment of the disaster recovery process (Zink and Mason, 1988) or to develop control procedures to use during the recovery period (Thomas, 1991).

Locating and Accounting for Organizational Members

In small organizations or disasters with limited impact, the task of finding and accounting for organizational members may be very straightforward. In larger organizations or more widespread disasters, this may be more problematic. After the underground flood in downtown Chicago, 250,000 people were evacuated and power was shut off to approximately 100 buildings (Vosti, 1992).

Stopping the Disaster Agent

The activity needed to stop the disaster agent depends on the type of agent. Stopping the agent can be the

responsibility of both the internal and external emergency responders.

In the case of flood related disasters, examples of stopping the impact of the agent would be to place barriers to the water over windows, place sandbags around foundations and doors and use water pumps to remove water.

Reduce any Additional Damage Caused by Exposure to Secondary Disaster or the Elements

Efforts to combat the disaster agent can lead to secondary impacts. Water damage caused by firefighting efforts is often as serious as the damage caused by the fire. After a fire in the Pender County Farm Bureau Insurance office, files were soaked by water and quickly began to mold. In order to reduce secondary damage, the files were taken to a butcher shop and frozen and then hung in a tobacco barn to dry (Dixon, 1988). After a roof of a 260,000 square foot distribution center collapsed, managers of Highland Superstores were able to limit secondary damage by moving quickly to stop the elements from entering the storage area (Bean, 1989).

Notify employees, clients, vendors and other organizational stakeholders

Employees should be notified as to their expected participation in the recovery process (Leonard, 1991). If they are needed for recovery, a method of contact should be developed that is not dependent on phone calls from a

central office. If employee records are lost in the disaster impact, other sources for contacting employees should be available. One alternative is to have employee records, especially phone numbers, stored off site (Gioffre, 1988). Another alternative is a phone tree. A phone tree is developed when each employee has the numbers of a group of employees that they are responsible for contacting. This allows employee notification even if records are lost or phones are not working at the disaster site.

Clients should be contacted so that they can make alternative arrangements for services. Vendors should be notified immediately so that lost inventory and materials can be replaced. Maintaining positive relationships with clients and vendors is critical to the long-term recovery of the organization (Smith, 1989). Lukaszewski (1987) suggests that after responding to actual events the manager should notify required government agencies. This could become especially critical if a natural disaster has the potential for creating a multi-hazard event involving technological hazards.

Coping with media organizations and public relations

Quarantelli (1979) states that "there was almost universal condemnation by other organizational personnel of mass media representatives" after the Viont dam overflow. Wenger (1980) found that 62% of public officials believed that the media exaggerated the degree of destruction. In

addition, 33.3% of the media representatives agreed with public officials in that the media tends to sensationalize reports concerning disasters.

In addition to concerns about over-sensationalized reports, managers may lack control over information being reported about the organization. Managers are typically accustomed to a high degree of control of information within their organization. Unlike internal communication, dealing with the media involves a high degree of uncertainty and risk (Cox, 1988). Because of manager apprehension, stonewalling is a common reaction. However, if the press is not given information, they will find alternative sources (Stedman, 1988). Timely information is critical since the public generally forms an opinion in the first few hours of a crisis (Newman, 1989).

Managers of organizations that are involved in industrial crises often engage in spin control. Katz (1988) defined spin control as "the ability to manage the way an event is reported by the media." Spin control, even if successful, is at best a short term solution. If the media obtains information that the organization was lax in safety or a government organization blames the company any positive effects of spin control will evaporate (Siomkos, 1992).

Klepper (1992) suggests that managers select one of three strategies, disassociation, missassociation and association. If the strategy of disassociation is selected, the organization distances itself from the disaster or

attempts to "prorate" blame. Managers using missassociation attack critics and adversaries and question their tactics and motives. The company is available to media and take full responsibility for their own misdeeds when applying the association strategy. The organization should present their plans for lessening the impact on others.

It might seem unnecessary for managers to be concerned about media or public perceptions of the organization after a natural disaster, especially since these are often thought to be "acts of God." Drabek (1986) found that the attitudes of victims are changing. Earlier research suggested that victims considered natural disasters an act of God. However, more recently:

> . . . the American Experience of the past three decades seems to be one wherein God is losing ground very rapidly. Increasingly, disaster victims engage in a blame assignation process. And when a culprit has been identified, their interpretations of the event and its impacts on them and those involved in recovery may reflect processes that do not occur when they view their plight as "God's doing" (pp.200-201).

Find Temporary Office/Production/Warehouse Space

If damage from the disaster cannot be repaired quickly, locating an alternate site for production and administrative functions is the next step in business recovery. Among the options for alternative locations are hotels, other locations owned by the business, vacant properties, and leasing of production units not at capacity. After Hurricane Andrew, Burger King relocated their corporate

headquarters to a hotel. Vining (1989) points to the option of relocating production needs among facilities within an organization.

Restore Equipment, Utilities and Records

Once a temporary site is found, replacement of equipment, restoration of utilities and recovery of records is critical to business continuation. Gauthier and Buchanan (1989) estimate that by the seventh day of a computer outage, the average service firm would be losing one fifth of its daily revenue. An average manufacturer would lose 25% while the typical bank would be losing 40% of its daily revenue. Not only is computer down time expensive for the organization, loss of computer systems after major disasters appears to be the norm. Cerullo and McDuffie (1991) surveyed firms affected by Hurricane Hugo. Of the 41 firms responding, only 2 did not experience down time.

Considering the amount of lost revenue, the cost of providing a cold site is relatively modest. Shao (1989) estimated that the cost of a cold site, which included the site, empty office space, special flooring, ventilation and wiring, was only about $1000 a month. While this figure would be beyond many small organizations, the cost would be a reasonable precaution for larger organizations.

After the First Interstate fire, 2500 employees and three business entities had to be relocated. Employees had to cooperate with other operating units to obtain space and

equipment (Gorman and McGee, 1990). After fire destroyed the headquarters of the National Rural Electric Cooperative (NREC), equipment was replaced by reallocating existing equipment (Carter, 1988). In both cases, the organizations had enough slack resources to replace equipment from within the organization. Even when equipment was available, some organizations reported that their recovery was slowed due to unfamiliarity with the replacement equipment (Carter, 1988).

After damaged or destroyed equipment is replaced, power is needed to run the equipment. While this statement might seem obvious, disaster recovery plans often assume that basic utilities will be available after disaster (Pauchant, Mitroff and Ventolo, 1992). As a result of the Chicago underground flood, 100 buildings in the central loop were without electricity (Vossi, 1992). Booker and Nash (1992) found that the major impediment to business resumption was not the water but the resulting power and telecommunications outages. After Hurricane Andrew, many retailers found that they could not resume operations because cash registers and other devices had no power (Rebuilding MIS, 1992). Platt (1992) suggests that loss of telecommunications can be dealt with by hiring a professional answering service and investing in call forwarding.

Replacing records may pose a more difficult challenge. Several organizations learned after their disaster how important basic record protection was. NREC's recovery was

accelerated because their data were stored in a vault (Carter, 1988). Use of microfilming, fire walls, steel cabinets also played a significant role in NREC's recovery.

Move Operations to a Permanent Site

Businesses have three options for permanent relocation. The business can be moved back to the original site, a new site can be located or the temporary site can become permanent. Individuals had two patterns of relocation. Homeowners tended to relocate on the original site while renters took longer to find a new home and often never returned to the original site (Quarantelli, 1982). After severe disasters, temporary housing is provided by various relief agencies. Research has shown that temporary housing has a tendency to become permanent (Davis, 1977). Oliver-Smith (1991) found that people generally resist resettlement.

Providing Employee Assistance

Employee counseling has become an important part of the post-disaster recovery process. This is especially important in disasters that have a high degree of horrification (Drabek, 1986). Horrification is generally related to seeing or handling dead bodies, especially those of children. Generally, responders have more potential for this type of trauma than victims. Counseling seems to more prevalent in larger organizations (Gorman and McGee, 1990; Mathes 1992). Klompeen (1991) found that there were five

tasks that directly affected the emotional state of employees. Managers need to: 1. know how to contact emergency response officials, 2. decide if rescue operations should be undertaken, 3. determine if surviving employees will have to handle dead bodies, 4. plan for emotional trauma, 5. debrief employees after the incident. While these activities seem to have the potential for inflicting emotional trauma, studies have shown that most victims react in a rational manner and have few long term psychological problems.

In large scale disasters that affect the surrounding community as well as business organizations, managers have found themselves responsible for providing for employees' physical needs. After Hurricane Andrew, banks became providers of housing, food and medical supplies for their employees. SunBank in Miami made loans and grants available to employees to meet their immediate needs (Morrall, 1993). BellSouth Advertising & Publishing Co. employees throughout the southeastern United States sent supplies to employees in Southern Florida. In addition, the company had counselors provide employees with psychological counseling (Kruse, 1993).

The Asten Group Inc., an industrial fabrics manufacturer, also found it necessary to help employees. The organization arranged for generators, bottled water, and batteries to be delivered to employees who needed them

(Leonard, 1991). In both disasters, Hurricane Hugo and Hurricane Andrew, it should be noted that the disasters were of such magnitude that the activities of daily living were nearly impossible without some assistance. In these cases the social disruption was so great that recovery shifted away from immediate business recovery to employee recovery.

Dynes (1970) developed a typology classifying the different types of tasks organizations undertake after a disaster. Figure four displays the typology. Type I organizations are those that would typically be expected to be involved in disaster response. They are highly organized and are experienced in dealing with social disruption. Police and fire departments are Type I organizations. If the demands of the disaster impact are too great for Type I

Figure 4. Types of Organized Behavior in Disasters.

TASKS

		Regular	Non-regular
STRUCTURE	Old	Type I Established	Type III Extending
	New	Type II Expanding	Type IV Emergent

Note. From Organized Behavior in Disaster (p. 138), by R. R. Dynes, 1970, Lexington, MA: Heath Lexington Books.

organizations, Type II organizations become involved in disaster response.

The best known example of a Type II organization is the American Red Cross. During non-emergency periods, this organization operates with a small core group of members and expands to meet needs after a disaster occurs.

Type III organizations are those that have resources or skills that can be diverted to disaster relief. Business organizations that take on disaster relief activities would typically fall into this category.

Type IV organizations emerge as a result of the disaster. These groups form to meet needs not met by the other groups and are associated with more severe disasters (Dynes and Quarantelli, 1968). The activities of these groups can range from assisting in relief activities to engaging in political activity (Neal and Phillips, 1990).

Evaluate Disaster Recovery Activity and Incorporate Experience into Disaster Plan

In order to evaluate recovery, managers determine if the organization has returned to its pre-disaster state. Measures may have to be developed that are appropriate for the type of disaster and the type of impact on the organization. While Kabak and Irwin (1992) focus on developing recovery measures after a product harm crisis, their basic thesis would be applicable to most types of organizational crises. Managers would select measures that

deal with the areas of the organization that were affected and look for their return to pre-disaster levels.

After the organization has recovered from the disaster impact and business operations have returned to normal, the final step is to plan for the next crisis (Ramme, 1987b). Pre-existing disaster plans should be evaluated for their utility during the crisis and needed changes should be made. Knowledge gained from the experience should be integrated into the strategic planning process. Organizations that are dependent on complex technologies, especially telecommunications, should develop plans for business continuation not if, but when these technologies fail (Pauchant et. al., 1992). An additional benefit of evaluating organizational performance after disaster is that this activity places closure on the event (Martin 1988).

After evaluating the affects of the disaster organizations may form groups that allow them to share resources in the event of a disaster. Robins (1988) describes an example of interorganizational cooperation among banks that would typically interact as competitors. In 1978, 30 banks in the Minneapolis-St. Paul area met and agreed that there was a need for a disaster recovery site in the area. Out of this discussion, the Eloigne Corporation was established. The organization provided a cold site for computer recovery and hot site capabilities were added in

1985. After the hot site was opened, member banks could be back in operation within eight hours.

Long Term Impacts of Disaster on Business

While there have been studies of the reconstruction phase of the disaster experience, more research is in order. Drabek (1986) finds many of the studies of this phase are characterized by design flaws, small sample sizes, and high sample mortality.

Positive impacts

There were two types of positive impacts on organizations, increases in revenue and acceleration of needed change. After disaster impact, damaged goods are replaced and survivors seek temporary shelter. Hotels and motels, alternative transport, hardware stores and furniture stores can potentially benefit from a disaster (Scanlon, 1988). The Copper Valley Telephone Cooperative filled 3750 service orders for new phone service after the Exxon Valdez ran aground in its service area (Felter, 1989).

In two cases, organizations attributed increased revenues to additional services offered after the disaster. The editor of The San Jose Mercury News attributed their 7000 paper increase in circulation to their extensive coverage of a massive street fire (Stein, 1991). Allen Miliam of Miliam's IGA in Miami believes that their 19% post disaster increase in sales was due to customer service offered after Hurricane Andrew. Despite damage, he opened

his store the day after the Hurricane to sell essentials (Garry, 1993).

The second type of positive impact that disasters have on organizations is the opportunity to implement change. Loss of physical assets may present managers with an opportunity to reorganize office and production procedures (Dixon, 1988). Hirose (1982) examined the impact of a volcanic eruption on tourism. While short-term revenue was depressed, Hirose predicted that the extensive modernization of resort facilities would increase the locals' competitive advantage in the long-term. Several organizations have reported increases in motivation and morale (Vaslilash, 1993) while others have reported an increase in interorganizational cooperation and team building (Leonard, 1991).

These findings of improved levels of organizational functioning mirror those reported by individuals. Because they were able to cope with the disaster, disaster victims reported a sense of personal empowerment and confidence in their ability to handle future problems (Taylor, 1977).

Other organizations were able to utilize the disruption caused by the disaster to undertake major reorganization. "Disaster provides an unstructured social situation that enables persons and groups to perceive the possibility of introducing desired innovations into the social system (Fritz, 1961, p. 685).

Offices of the Environmental Protection Agency were forced to decentralize after a disaster in California. Despite initial concerns, managers found that their production was actually improved even though the change was forced upon them by the disaster (Landon, 1991). After Hurricane Andrew severely damaged their corporate headquarters, Burger King implemented many new policies. "After the disaster, Burger King changed its corporate power structure by eliminating the dress code, offering flex-time working hours, and allowing employees to bring their children into work for day care" (Burger King Changes, 1993).

These changes are consistent with the findings of Perry and Lindell (1990). In a study of the adjustment of families and individuals after the eruption of Mt. St. Helens, they determined that the greater the degree of impact, the greater the degree of adjustment and planning for future disasters. Burger King, which made major changes in their corporate norms, suffered a devastating disaster that rendered their corporate headquarters unusable for an extended period of time. The severity of the impact may be the factor that allowed major changes in organizational culture.

Anderson (1970) studied the adaptation of emergency organizations after the Alaskan earthquake in 1964. The organizations studied either adopted new patterns of change

or the emergency response accelerated the rate of planned change. Anderson (1970) suggested that specific conditions had to be present for organizational change to occur.

> Conditions under which maximum disaster-related long-term change occurred in an organization seemed to be as follows: 1. a number of changes were planned in the organization or were in the process of being realized when the disaster occurred, and these changes became relevant because of the disaster; 2. new strains were generated or old ones were made more critical by the disaster; 3. the organization experiences so great an alteration in its relation to its environment that new demands were placed on it. 4. Alternative organizational procedures and norms were suggested by the disaster experience; and 5. increased external support was given to the organization following the disaster. (p. 115)

One explanation for the acceleration of needed change is that the organization was able to temporarily overcome structural inertia. While inertial forces severely constrain adaptation, the disaster may have disrupted the inertial forces, thereby allowing adaption to take place.

Negative impacts

With disaster comes the problems of damaged facilities, lost inventory, lack of supplies and transportation problems. Even if facilities are not destroyed, their value may decline due to a perception that they may be disaster prone. In studies of individuals, Vinso (1977) found that debt was much higher two years after disaster. This pattern of increased debt may be a problem for businesses as they attempt to replace damaged assets and repair buildings.

In a study of commercial real estate values, Montz and Tobin (1988) found that the degree of recovery in value was in proportion to the degree of flooding. Buildings with 18 inches of water recovered their values fairly quickly while those with 10 feet of water did not. Murdoch, Singh and Thayer (1993) found that the Loma Prieta Earthquake had caused long-term declines in real estate values in the affected area. While this was a loss to the organizations or individuals owning property, these declines in values may have resulted in opportunities for other organizations or individuals to purchase real estate at reduced values.

Because of the nature of their business activities, some industries may experience a disproportionate amount of loss. An example of this would be the commercial fishing operations in the Prince William Sound area. Many of the other types of organizations actually profited from the impact of the Exxon Valdez oil spill due to spending by cleanup operations and Exxon. The distribution of the economic windfall was uneven throughout the business community (Cohen, 1993). The largest disasters have the potential for triggering a regional recession (Cochrane et.al., 1974).

Two organizations reported negative outcomes related to problems in recovery plans. Cantor Fitzgerald lost an estimated 3 to 5 million dollars because of their slow recovery from the World Trade Center bombing (Davis, 1993).

Credit Agricole found that their emergency plan had never been tested using operating employees. In addition, upper managers of the bank had no idea what type of equipment was needed and the type of room needed (Klein, 1992). These problems with their plans led to delays in their recovery after the underground flood in downtown Chicago.

While some organizations seem to survive disaster and even use it as an opportunity to improve their operations, others seem to lose management direction and suffer excessive losses. It is difficult to accurately estimate the proportion of businesses that have negative outcomes because most information is self-reported and there may be reluctance to report negative outcomes.

Powell (1991) suggests that businesses may suffer from post-traumatic stress disorder at the organizational level. The event causes trauma by contradicting and invalidating strongly held organizational worldviews. While the organization may need to make radical changes to rebuild, trauma induced rigidity and detachment may make this difficult.

In some ways, Powell's observations are similar to Lewin's (1947) model of organizational change. Powell's description of shattered worldviews is similar to Lewin's unfreezing of behavior. However, in Powell's model, organizational members are not given a new cognitive map or are too traumatized to adapt to the map. Friesema at al.,

(1979) reported that there was a form of instantaneous social destruction that occurred in the month that followed the disaster. There were increased death rates, divorce petitions and unemployment applications during this 30 day period. These findings emphasize the importance of counseling for employees immediately after the disaster.

Determinants of Organizational Survival

In this section, the determinants of organizational recovery will be examined. First, the causes of recovery differentials in the individual and organizational levels of human systems will be examined. Next, the variables in the area of organizational survival will be examined.

Causes of Recovery Differentials

After a disaster, there is a massive influx of resources into the impacted area (Taylor, Zurcherm, and Key, 1970). Even with these resources, not all victims appear to recover from the disaster. Perry and Lindell (1978) proposed three classes of variables that could explain differential impacts and recovery patterns; (1). characteristics of the disaster impact, (2). characteristics of the individual, and (3). characteristic of the social system.

Characteristics of the Disaster Impact

The disaster impact is described in terms of its forewarning, duration, and scope of impact (Perry and

Lindell, 1978). Other researchers have suggested that the degree of intentionality also determines the level of disaster impact (Drabek, 1986; Anderson, 1977; Gleser, Green and Wingert, 1981). Lifton and Olson (1976) determined that the Buffalo Creek disaster had several characteristics that impeded recovery. The onset was sudden and without warning, it was caused by human action, callousness and irresponsibility, and the survivors worked in the mines and had continuing contact with the forces that caused the disaster. Conversely, recovery was rapid after the Teton disaster (Golec, 1983). Before the disaster impact, there was warning and a low rate of death and physical injuries.

Boileau et al. (as cited in Drabek, 1986) found that victims characterized themselves as lucky and felt that others had greater losses. Respondents reported lower levels of relative depravation than other disaster victims. While luck may be a factor, there is considerable empirical evidence that the characteristics of the victims are a major determinant of recovery differentials.

Characteristics of the Victims

Age, race, gender, and SES appear to have significant influence of the level of recovery. Generally, older disaster victims had more difficulty in recovering. The elderly generally received less aid and outside assistance (Drabek and Key, 1984; Erickson et al., 1976; Kilijanek and Drabek, 1979; Rossi et al., 1983). The elderly were less

likely to have household insurance (Bolin, 1982) The elderly also had more difficulty in qualifying for loans to rebuild after disaster (Bolin, 1985). Non-white victims tended to have the same difficulties in recovery as those reported by the elderly (Drabek and Key, 1984). Females experienced greater role disruption after the disaster (Mileti, Drabek and Hass, 1975). Disaster victims that belong to more than one of the more vulnerable groups previously mentioned are likely to experience lower rates of recovery.

As with the elderly, the poor did not qualify for loans (Bolin, 1985), received less aid from external groups (Drabek and Key, 1984; Erickson et al., 1976), and were less likely to have household insurance (Bolin, 1982). Social isolation also decreased the likelihood of receiving assistance (Drabek and Key, 1984). Maintenance of social networks was a major factor in victim recovery (McBride, 1979).

Affluent victims were more likely to have insurance and generally had higher levels of coverage (Bolin, 1982). Holy (1980) determined that wealthier victims recovered faster because even after severe losses, they were still in a relatively good position compared to the poor. Feld (1973) offered an insightful examination of the differences in recovery experienced by members of different socioeconomic groups.

...a direct relationship exists between one's economic means and the available choices. The flood did not wash away that reality. People who had more options available before the flood were in a position of having more desirable choices when dealing with the system after the flood . . .When mobile homes became available, the people with fewer options had to accept them, though the sites were densely populated and frequently located in a remote area. However, land owners could put their mobile homes on their own land. . . Rentals were scarce and those who could afford to pay more had a greater number from which to choose" (p. 48).

Ownership of the primary residence has proven to be a significant determinant in recovery from disaster. Individuals that rented their homes had greater difficulty in re-gaining their pre-disaster status (Rossi et al., 1983). Renters had a more difficult time reestablishing themselves and were more likely not to return to the area (Quarantelli, 1982). This may be partially caused by the lower rate of household insurance by renters as compared to those that owned their homes (Rossi et al., 1983). Individuals that rented their homes not only tended to be less likely to have insurance but also tended to have lower rates of coverage. Cochrane (1975) found that the lowest income group were insured at a rate of 53% with 54% of their value of their house covered. The highest income group was insured at a rate of 85% with 84% of the value of the structure covered.

Home ownership is closely related to the impact of relocation on disaster victims. This factor is closely

associated with insurance because the existence of property coverage can provide a resource to businesses and individuals that gives them more options to use when selecting their various relocation and sheltering options. Most individuals prefer to return to their original location (Quarantelli, 1982; Cochrane at al., 1979). Bates, Farrell and Glittenberg (1979) examined relocation patterns in Guatemala after most of the housing stock was destroyed by an earthquake. They found that approximately 80% of the respondents were either living in the same house after repairs or had rebuilt on the same site.

After recovery, many victims reported increases in quality of housing (Snarr and Brown, 1978). Vinso (1977) examined recovery levels two years after a major disaster. He found that households not only recovered but had increased levels of assets. Conversely, the level of debt was also much higher. This high level of debt could make recovery difficult if the victims experience further disaster impacts. In addition, these studies emphasize the importance of access to credit in the recovery process for businesses.

Characteristics of the Social System

A characteristics of the social system that affects disaster experience is the level of industrialization. As previously discussed, increased industrialization causes systems within a society to become highly integrated and

tightly coupled. When systems are tightly coupled, industrial accidents or natural disaster impact on one system has the potential to cause failures in other systems.

Disasters tend to increase pre-existing differences in social status (Bates, 1982; Holy, 1980; Copans, 1979). Existing patterns of instability and inequality are strengthened (Feldman and McCarthy, 1983). Douty (1977) suggested that disaster merely strengthens economic trends as well. The results of his study indicate that the decline in the manufacturing base of the metropolitan area under study was intensified by disaster. Douglas and Hobbs (1979) found that disaster intensified decline because business owners were reluctant to undertake capital improvements in declining businesses. These findings suggest that organizations in declining or mature industries may be less likely to recover. This research indicates that it should be possible to build a configuration of variables that can be useful in predicting which individuals are more likely to have difficulties in recovery from natural disaster.

Uncertainty about decisions made by public officials can act as an impediment to rebuilding (Birnbaum, Coplon and Scharff, 1973). After a severe tornado in Texas, building owners were unsure what structures would be demolished and local officials were uncertain about new zoning regulations and other regulations (Bolin, 1982). If the shortage of

properties is severe, temporary housing tends to become
permanent (Davis, 1975).

Organizational Characteristics

In this section, the characteristics of organizations
that contribute to recovery will be examined. In his
extensive review of the literature, Drabek (1986) examined
the impact of disaster on organizations. One major finding
of this review was that with the exception of relief
organizations, little attention has been paid to
organizational recovery. In the next section, the
characteristics of disaster victims that act as recovery
determinants will be examined. The characteristics under
consideration are; industry, age, size, pre-disaster gross
sales, interorganizational competition and cooperation,
ownership of business location and property insurance.

Industry

Of the organizational characteristics that are under
consideration, industry is unique to business organizations.
Isomorphism and inertia combine to create a level of
homogeneity among the members of particular industries or
groups of organizations.

The munificence of the niche that the industry occupies
is a driving force in determining the characteristics of the
industry. Steiner and Belschan (1991) suggest that
selection of the correct environment for the firm to attempt

to survive in is the primary determinant of organizational survival. Organizations may attempt to leave environments that are extremely hostile. Firms may experience difficulties in withdrawing from hostile environments because of high exit costs. Deily (1988) determined that high exit costs are the major factor in production overcapacity in the steel industry.

Once managers have selected the environment the firm has the greatest chances of survival in, the organization must adapt to the chosen domain. Haverman (1992) found that most change in the environment enhances financial performance. Hall (1980) suggests that low cost producer and differentiation strategies are the most appropriate approaches to adapting to a hostile environment. Managers may have to select strategies that were previously unavailable or undesirable if the firm is to survive in a less munificent environment (Morgan, Foreman, Poh, 1994).

Based on an examination of published accounts, organizations within different industries seem to have different disaster experiences and different recovery processes. A theme that emerges from looking at industry specific recovery is cooperation among organizations. In the majority of cases, organizations in similar types of industries provided assistance to other organization affected by the disaster. In most cases the cooperation is an informal relationship where the organizations have agreed

to mutual aid before the disaster (Chung, 1987). In other cases, formal organizations or trade organizations provide assistance in case of disaster (Waterways association, 1988).

The majority of these reports of disaster experience are self-reported. There may be a tendency to overlook management failures that may have exacerbated the disaster impact. In addition, businesses that have had extremely negative experiences may be hesitant to report this (Abrahamson and Park, 1994).

Credit unions and banks. These organizations are somewhat unique in that they are required by federal law to have disaster recovery plans (Mink, 1992). Probably because of this, all but one report on these financial institutions showed quick recovery and responsiveness to community needs. Before the disaster struck, several institutions reported stockpiling water and other supplies as well as cash. Barnett Banks warehoused cash in anticipation of Hurricane Andrew. The organization also stockpiled 10,000 gallons of fuel at strategic locations for standby generators and had vendors on a ready-alert to step in with ATMs, satellite dishes and other emergency equipment (Post-Andrew banking, 1992). After the disaster impact, many institutions offered loan deferments and distributed cash on "good faith" (Gregg and Lanphear, 1989). In addition to cash, financial

institutions distributed supplies and necessities to members and employees.

The managers of Credit Agricole found that their disaster recovery plan did not function well after the Chicago underground flood. Operations employees had not been involved in testing the plans and managers did not know what type of equipment or work site was needed to restore operations (Klein, 1992).

The literature portrays banks and similar financial institutions are well prepared and surprisingly proactive in planing for short-term recovery. Long-term recovery is a different matter. Marston (1984) studied the 12 largest home mortgage lenders in California. She found that banks took little if no action to protect themselves from the economic losses associated with a region-wide disaster, especially earthquakes. The primary reason for this was the expectation that the federal government would provide assistance. This belief was based on prior experience and linkages between the economic and political systems.

Nursing homes and hospitals. If the organizations survive the initial impact, they become important resources for the community and other similar organizations that did not survive the impact. After Hurricane Andrew, Heartland Health Care nursing home facility was damaged to an extent that all 130 resident had to be relocated. The residents were relocated to five other nursing homes owned by the same

parent corporation (Allen, 1992). The center rented buses and medical charts and medications were placed on wheeled carts and moved with the residents. Sabatino (1992) found that nursing homes and home health care providers were less prepared than hospitals. Their major problem was a lack of backup power.

Of the eight hospitals in Miami, three were closed after Hurricane Andrew (Greene, 1992). The surviving hospitals became shelters after the local shelter network lost its communication system. Sabatino (1992) suggests that hospitals have a two part recovery plan; one that covers the first 72 hours and one that deals with recovery for the next several weeks. Since hospitals can potentially become alternative shelters, hospitals may want to have access to portable toilets and mattresses as well as other shelter equipment and supplies.

Retailers. From a survey conducted after Hurricane Andrew, Dun and Bradstreet found that the organizations that were the most affected were those that were small and well-established (Retailers see light, 1992). Another survey of retailers found that most had not taken the most basic disaster preparations. The most often cited reason given for the lack of preparation was the cost. A common problem was a lack of power to run cash registers and communication equipment (Rebuilding MIS, 1992).

Bean (1989) examined the recovery process of Highland Superstores after the roof of their distribution center collapsed. The key to limiting losses was to stop secondary damage and use high speed reconstruction techniques for speedy business resumption.

Administrative and service organizations. This is a catchall category that included organizations whose focus or product was an administrative service. Reports on corporate headquarters as well as insurance, advertising, and travel agencies are covered here.

Burger King's corporate headquarters was destroyed by Hurricane Andrew. Operations were temporarily relocated to a hotel (Hume, 1992). One of the functions the organization undertook was to provide employees with basic necessities such as water, food and shelter. The organization set up a toll-free hotline and reported the daily progress of restoring the corporate headquarters. Payroll was disbursed early and food was served outside the damaged headquarters (Mathes, 1992).

Mulcahy (1990) examined the disaster experiences of insurance agencies. She found that by and large, they were unprepared for disaster. Employees had difficulty in preforming tasks because of a lack of basic necessities. In addition, policyholders had difficulty in contacting agencies because of the lack of telephone and utility service. Mulcahy suggests that due to their unique part in

disaster recovery, agencies should be prepared to operate after disasters and should run advertising in newspapers explaining to policy holders how to contact the agency. Rather than rely on local adjusters in cases of catastrophic disasters, insurance companies form "CAT" teams or teams of adjusters to work catastrophic disasters (Berry, 1989).

Advertising agencies were also hard hit during Hurricane Andrew (Zbar, 1992). One agency was anticipating a closure of six months. Zbar found that many of the agency problems were related to the collapse of high-technology telephone systems.

Milo and Yoder (1991) found that an important factor in the recovery of a specific travel destination was to develop relationships with travel writers. They also found that recovery was aided when agencies and other travel related businesses maintained close relationships with the chamber of commerce, tourism board or convention bureau.

Media organizations. The Miami Herald managed to survive Hurricane Andrew relatively unscathed. Power was not discontinued because the paper had emergency generators and the building was built to withstand 250 mile per hour winds (Kerwin, 1992). Conversely, The South Dade Newsletter was shut down because they lost their roof and the offices and pressrooms were extensively damaged. Television stations were simulcasting on radio stations for those listeners without power (Lambert, 1992).

<u>Public utilities.</u> The Los Angeles Department of Water and Power had a formidable task after the Los Angeles Riots. The utility had to restore power to 51,000 customers. Various poles, lines and circuits were knocked out and a customer service office was destroyed by fire. The utility company scheduled eight hour updates for the media and constantly updated a phone message that was available 24 hours a day. They received 30,000 calls a day (Cotton, 1993).

After a major disaster, utility companies involved in normal waste removal may be overwhelmed. After Hurricane Andrew, waste management companies found that there was approximately 1 million tons of debris to remove. Dymon (1993) reported that the volume of debris created by Hurricane Andrew was the equivalent of 15 normal years of landfill operations. Because of the massive nature of the task, the National Guard assisted in the cleanup.

Mileti, Drabek and Hass (1975) found that public works departments adapted well to disaster situations. The reasons for this ease in transition are that; the tasks are similar, the personnel expect to be involved in disaster relief, personnel can be rapidly deployed, the departments have slack resources, and while they can work autonomously, organizational members are experienced in coordinating with other organizations and departments.

Age

Based on a review of the literature, increased age is linked to increased organizational survival. While this could seem to be a circular relationship, only survivors increase in age, organizational discontinuance occurs disproportionally among the youngest organizations. Nearly every study that examined age and discontinuance supported Strincombe's (1965) liability of newness hypothesis that younger organizations have higher mortality rates (Ireland and Van Auken, 1987; Cooper, Dunkelberg & Woo, 1988; Boyle & Desai 1991; Levinthal, 1991; Evans, 1987). Ireland and Van Auken (1987) found that near one-half of business start-ups fail within 18 months. Another study found that 67% of new businesses fail with four years (Cooper, Dunkelberg and Woo, 1988).

While previous research has supported the link between age and survival, two studies arrived at different conclusions. Brunderl and Schussler (1990) found that organizational mortality followed an inverted U-shaped curve. This high failure rate at the beginning of the organizational life cycle is consistent with previously cited studies. The increasing mortality rate at the other end of the curve suggests that other variables come into play in the survival of older organizations.

Baker and Cullen (1993) found that older organizations experienced higher levels of inertia when attempting to

adapt to environmental changes and therefore leading to higher mortality rates. Even though organizational decline acted as a stimulus for change within an organization, older organizations had difficulty in overcoming inertia. The researchers found that these two forces, stimulus for change caused by decline and organizational inertia, acted as competing forces within the organization. Inertia may partially explain Brunderl and Schussler's findings.

There have been a variety of factors suggested to explain the relationship between age and survival. Organizational decision makers gather information about their industry, the environment and general business practices. Ideally, as organizations survive, they develop routines that allow and encourage organizational learning (Kim, 1993; Nonaka, 1994).

Once knowledge is gained by organizational members it is transferred and implemented within the organization. If this process does not occur, then knowledge does not assist the organization in adaptation and survival. Theoretically, as organizations become older and develop stable routines, the transfer and implementation of knowledge becomes routinized. Younger organizations attempt to develop this process while older organizations have it in place.

A survey of the small business literature supports the idea that gaining and implementing knowledge is critical for the survival of businesses. Based on a review of the

literature, d'Amboise and Muldowney (1988) suggested that lack of knowledge is a major cause of failure. Kao's (1982) work found that the major case of organizational failure was the inability to learn how to manage cash flow. After examining various causes of failure, Boyle and Desai (1991) determined that the major cause of failure in small firms was a lack of control over operations.

As firms survive and age, growth patterns become more stable. This stability has the effect of decreasing organizational mortality rates. Evans (1987) found that increased age lead to decreases in variations of firm growth rates. This increased stability lead to a decrease in firm failures. Levinthal (1991) found that "(s)urviving organizations will tend to be organizations that were, in prior periods, successful, and this prior success in turn, will buffer them from selection pressures."

Size

Organizational size is typically measured by the number of employees (Daft, 1992). While the vast majority of researchers have used the number of organizational members as measure of size, other measures have been used and there is some debate as to the accuracy of number of employees as a measure of size (Abdel-khalik, 1988).

Bluedorn (1993) reviewed research literature on organizational size and environment published from 1980 to 1992. He found that Blau's work on organizational size

provided a theoretical framework for much of the preceding

research in the area (Blau, 1970; Blau and Schoenherr, 1971;

Blau, 1973). Bluedorn summarizes Blau's work in this area

as follows:

> (1). as organizational size increases, structural
> differentiation increases at a decreasing rate;
> (2.) as size increases, the administrative portion
> decreases at a decreasing rate; (3.) as structural
> differentiation increases, the administrative
> proportion increases; (4.) the direct effect of
> size on the administrative proportion is greater
> than the direct effect of structural
> differentiation; (5.) Size is negatively related
> to centralization; (6.) size is positively related
> to formalization. (p. 174)

The general theme that runs through the literature of

organizational size is that increased size is related to

increased performance and decreased mortality. Blair and

Placone (1988) found that size and performance were

positively related. Boyle and Desai (1991) observed that

large organizations had better internal control of

operations. Other studies have found that size was

positively related with both technological and

administrative innovation (Kimberly and Evanisko, 1981;

Damanpour, 1992). In a study of hospitals, Ginn and Young

(1992) found that size and system membership enhanced an

institution's ability to implement a proactive strategy.

Researchers uniformly found that size was a good

predictor of organizational survival. For very small

businesses, especially micro-businesses, the issues of age

and size are closely interrelated and it may be very
difficult to separate the two variables at this level. It
has been estimated that 50% of small businesses have only
one member (Star, 1979; Katz, 1984).

Bates and Nucci (1989) found that the smallest
businesses had the highest rates of discontinuance. The
impression that small businesses have high failure rates is
skewed by the extremely high failure rate of businesses with
$5000 a year or less annual income. Dunn and Bradstreet
found that small and well-established businesses were the
hardest hit from Hurricane Andrew (Retailers see light,
1992).

In a study of small business discontinuance, Bates and
Nucci (1989) found that the smallest firms accounted for the
vast majority of business failures. Among agricultural
producers, the smallest operations had the poorest return on
labor and highest potential mortality (Smith, 1989).

Queen and Roll (1987) found that size was a good
predictor of organizational mortality for publicly listed
companies. Dunne and Hughes (1994) found that while the
smallest organizations did have the highest mortality rates,
both the very smallest and very largest were the most likely
to be takeover targets.

When larger firms experience difficulty, they are more
likely to benefit from government bailouts (Adams and Brock,
1987). This increased size leads to the perception of

increased societal value (Meyer and Rowan, 1977). In addition, larger organizations may have more developed interorganizational networks which increase sources of possible intervention. This process allows large organizations to privatize profit while externalizing losses.

The change in the organization's environment caused by natural disaster has implications for organizational growth. From his extensive review of the literature, Bluedorn (1993) found that the environment was the most important variable in determining organizational growth and organizational size (Filley and Aldag, 1980; McPherson 1983; and Keats and Hill 1988) and in predicting organizational performance (Cooper, 1993).

An additional factor in the positive relationship between size and performance is the ability of large organizations to accumulate resources. Bourgeois, III (1981) suggested that larger organizations have accumulated organizational slack which buffers them from environmental shocks.

While size and performance generally have a positive relationship, there is evidence that increased size can be problematic. Gooding and Wagner (1985) determined that size and performance were positively related but size and efficiency were not related. Blair and Placone (1988) found that size increases costs. Baker and Cullen (1993)

suggested that complexity associated with large size slowed organizations' ability to change.

Pre-Disaster Gross Sales

As previously discussed, disasters tend to accelerate existing trends within society and strengthen economic divisions among individuals in an impacted social group. Individuals that had the greatest amount of resources and options available before the disaster had more options and resources after the disaster (Feld, 1973). While Feld's study focuses on community recovery, it appears to be applicable to businesses as well. Feld points out that those that lost their homes had land to place mobile homes on. Those that were renters and could afford higher rent could select among scarce rentals available.

Smart, Thompson and Verentsky (1979) developed a profile used to determine the succeptability of corporations to crises. They suggest that high-growth and risk taking organizations typically have less reserves or organizational slack available. Organizational slack can have a buffering effect after a disaster.

Pre-disaster gross sales are a rough measure of the amount of resources the organization was generating before the disaster and should indicate the ability of the organization to accumulate organizational slack.

Organizational Competition and Cooperation

Survival of the organizations that share a common domain can be threatened by what Bucklin et al. (1989) calls "games of ruin". An organization can choose competitive actions that are very injurious to itself with the expectations that the actions will be even more damaging to other organizations in the domain (Schaffer, 1989; Evans, 1988; Bucklin et. al.; 1989). Schaffer (1989) posits that this behavior can occur when one firm in the market has sufficient market power and is willing to forgo profit maximization and risk its own survival to injure other firms. Instances of this type of behavior have been observed among metropolitan newspapers (Bucklin et al., 1989) and bus service companies (Evans, 1988).

While some organizations may choose to engage in games of ruin, others form linkages with firms sharing their environment. Baum and Oliver (1991) found that institutions that developed institutional linkages had higher survival rates that those without such linkages. Their research also showed that interorganizational linkages have an even greater impact on organizational survival when the environment becomes more competitive. In a study of hospitals under pressure because of declining funding for health care, Walsh et al., (1992-1993) uncovered a strong relationship between survival rates and forming linkages with other health care providers in the environment.

Formation of linkages can increase economic growth (Levin, 1993) and increase the survival rates of all organizations within an environment (Robinson and Lifton, 1993).

Interorganizational linkages appear to be especially important for small businesses. Flynn (1993) examined the effort of sponsors for newly formed small businesses. Sponsorship was critical in the organization's survival. Cooper et al., (1988) suggested that chances of small business survival can be increased by finding outside board members. Cooper et al. found that new business owners lack the ability to objectively evaluate levels of risk. Dadzie and Cho (1989) found that access to government and foreign markets was particularly important to the survival of minority owned businesses. By developing interorganizational linkages, these smaller firms can reduce the amount of resources and time needed to access these markets.

The Chamber of Commerce aids its members in developing interorganizational linkages. Some of the activities the chamber facilitates are increasing international trade among members (Castillo, 1993; Barnhart 1992; Van Fleet; 1991), helping with members insurance needs, especially health insurance (Greene, 1993; Resnick, 1992) controlling workers compensation expenses (Cox, 1992) establishing quality programs (Barrier, 1993; Brown, 1992) area labor analysis (Lackey and Conrad, 1992) and assistance after natural disaster (Szabo, 1992)

Chamber membership is viewed as a potential support network for members. Milo and Yoder (1991) found that travel agencies that developed strong relationships with other organizations, including the Chamber of Commerce, recovered faster. Based on an extensive literature review, Bluedorn (1993) found that interorganizational relationships are important for organizational growth. This would lend support for the hypothesis that Chamber of Commerce membership would increase the organization's ability to recover from natural disaster.

Ownership of Business Location

Studies of group level recovery found that ownership of residence was a critical factor in family recovery from natural disaster. Home owners had more resources than renters and had more sheltering options during recovery. There are some initial findings that indicate that ownership of business location may also be a factor in organizational recovery.

Businesses that are located on a site that is owned by the organization may be older and more established since they have been able to accumulate enough assets to purchase the site. Other researchers have found that property owners fared better than renters after natural disaster (Feld, 1973). Thomas and Evanson (1987) suggest that for some businesses, initial selection of location was the most important determinant of organizational survival.

Conversely, businesses that own their site of operations have greater exposure in case of a disaster. Not only do they have the potential for losing any inventory, they may sustain the additional loss of their building. In addition, the business may have greater difficulty in relocating if a high percentage of assets are tied up in an unusable structure.

Property Insurance

The final variable under consideration is property insurance. The practitioner literature suggests that obtaining sufficient insurance coverage is especially problematic for smaller organizations. Small business owners have trouble getting sufficient coverage because they may not have the minimum level of coverage insurance brokers require (Protect your wealth, 1993). In addition, small firms pay higher premiums than large organizations (Miceli, 1993). Miceli (1993) states that the higher costs are not related to higher claims but to the purchasing disadvantage of the smaller firms.

Other types of policies that would assist small businesses with recovery after natural disaster would be business interruption insurance (Harrel and Demott, 1993) and key-man policies (Hart, 1991). Yet both authors believe that small business owners are not purchasing adequate amounts of either type of policy. McDonough (1992) finds this especially disturbing considering that small and medium

sized business have experienced an increased level of risk
exposure.

Research Model

The determinants of organizational recovery,
organizational characteristics, are analyzed to develop both
description of the disaster recovery process and to move
toward a predictive model of disaster recovery. The
research model for this study will use the multiple paradigm
research (MPR) strategy to investigate the organizational
characteristics that are hypothesized to be determinants of
organizational survival. The organizational ecology model
will provide the theoretical framework for the first phase
of the study. The second phase utilizes the contingency
approach in examining the variables of age, size, and other
organizational characteristics in determining the
organization's disaster experience and level of recovery.
This study will use the configuration model to guide the
analysis during the third phase

In the next section of this study, each of the
paradigms used will be examined. The paradigms will be
compared in their explanation for organizational change and
variation.

Paradigms in Organizational Studies

Of the works that have attempted to define the paradigm
spaces in organizational theory, Burrell and Morgan's (1979)

work has been the most widely accepted (Hassard, 1993).

Morgan (1990) described paradigms as identifying "a basic

structure of social thought, based on a cohesive set of

underlying reality assumptions." Hassard (1993)defined

paradigms as "metatheoretical assumptions which underpin

theoretical statements." Rival paradigms are valuable for

gaining insight to organizational processes because they

suggest "new modes of theoretical conceptualization, the use

of different research tools and techniques, and an appeal to

new criteria for determining the legitimacy and quality of

the knowledge they generate (Morgan, 1990, pg. 13)."

Burrell and Morgan (1979) identify four alternative

frameworks for the study of organizations; functionalist,

interpretive, radical humanist, and radical structuralist.

Hassard (1993) suggests that postmodernism is a fifth

paradigm but it has yet to be fully developed. This work

will take the functionalist perspective while recognizing

the potential contributions of the interpretive and radical

structural paradigms.

According to Morgan (1990), the functionalist paradigm

provides the foundation for most theory and research on the

field of organizational studies. Functionalism provides the

basis for management theory and is especially evident in

studies of organizational effectiveness and efficiency. The

organization is viewed as a part of a larger social system

that serves the needs of its members. Functionalism creates

a language that assists and allows for the management and control of complex organizations. The knowledge generated is generalizable to other organizations and can be regarded as valid and reliable (Morgan, 1990).

The goal of this work is to explore the determinants of organizational recovery from natural disaster. In order to provide a context for exploring the causes of differential recovery, a discussion of the causes of organizational change and variation will be presented.

Organizational Change and Variation

Hannan and Freeman (1977; 1989) suggest that there are three broad groups of theories that explain organizational change and variation. These groups are selection, adaptation, and random transformation theories. McKelvey (1982) proposes a similar categorization scheme that divides theories of variation into two groups, allogenic and autogenic. Allogenic theories posit that the forces that cause variation come from outside the organization while autogenic theories focus on self-regulation and adaptation.

Organizational ecology emphasizes selection as the driving force behind organizational change. Organizational change is caused by the selecting out of organizations that do not fit their environment. Organizations do not make major changes because they tend to have strong inertial forces that make change difficult. Adaptive change is

possible but it is severely constrained. Hannan and Freeman (1989) offer the following description of this perspective:

> The population ecology perspective concentrates on the sources of variability and homogeneity of organizational forms. ... it pays considerable attention to population dynamics, especially the processes of competition among diverse organizations for limited resources such as membership, capital. and legitimacy. (p. 13)

The organizational ecology perspective originated in the writings of bioecologists who were interested in understanding the relationship between a population of biological organisms and the carrying capacity of their environment (Hawley, 1986). Hawley's (1968) concentrated on the relationship between the environment and human systems. Hawley (1968) proposed one of the central assumptions of organizational ecology, the "principle of isomorphism". The work of Hannan and Freeman (1977) provided the framework for field of organizational ecology.

Another view of selection is presented by Kaufman (1991). His work places chance and luck in the forefront of the selection pressures. In the short-term, leadership and management skills can increase efficiency and flexibility which in turn increase the chance of organizational survival. However, Kaufman argues that it is largely a matter of chance that an organization acquires organizational members with the leadership skills needed at a particular time. When studied over longer periods of time, chance is the chief determinant of survival.

Within the group of theories that emphasize adaptation, contingency theory has been the most developed (Hassard, 1993). Contingency theory contends that successful organizations have a match between their strategy, structure, environment, and technology. Lawrence and Lorsch's (1967) work is often cited as the foundation of the contingency perspective. Other theories within this perspective are resource dependence, institutional theory, Parson's functional analysis, and Marxist theories of organization (Hannan and Freeman, 1989).

The socio-technical perspective which emerged from the Tavistock studies (Trist et. al; 1963; Emery and Trist, 1965) was a forerunner of the contingency theories. Both the socio-technical perspective and contingency theory trace their origins to systems theory (Hassard, 1993). Wren (1987) suggested that all management theory could be considered to be some variant of contingency theory.

Hannan and Freeman call the third group random transformation theories. This group of theories hold that organizations change their processes as a result of forces within the organization but that organizational decision makers have little control over these forces. Change tends to occur randomly rather than as an attempt to adapt to the demands of the environment or in meeting organizational goals.

The research goal of this study is to describe and offer explanations of the disaster experience of business organizations. The research question is framed in terms of organizational adjustment to environmental change. Both the management and the sociology literature were examined to determine which perspective, selection, adaptation, or random transformation, best fit the organizational adjustment process.

There is a dearth of literature in the field of management concerning adjustment to natural disaster. The literature in sociology largely ignores complex organizations, other than relief organizations, when examining the adjustment process. The primary level of analysis is the individual and the family. Within these levels, two perspectives concerning adjustment are implied but never clearly articulated. The first could be termed contingency although this term is not used. This perspective is most evident in the technocentric school (Alexander, 1991). The threats from the environment can be minimized through technological and complex systems approaches. Once these threats are identified, the appropriate actions are taken to mitigate risk. This approach is analogous to the contingency approach and suggests that adaptation drives the adjustment process.

The development school focuses on the social context in which the adjustment is attempted. This perspective argues

that the interventions implemented by the technocentric school are not appropriate for developing areas and understate the importance of the social factors of the impacted human system. Because the group implementing the adjustment activities cannot typically change the social system that the human system is embedded in, selection becomes the driving force behind adjustment.

Based on a review of the relevant literature, no definite evidence for either selection or adaptation can be found. Because of the undeveloped nature of the area under investigation, a research method was selected that allows the researcher to examine the efficacy of multiple perspectives. The approach advocated is called the multiple paradigm approach. A discussion of this approach is undertaken in the following section.

Multiple Paradigm Research

The term paradigm is used in so many ways as to make it meaningless and obscure Kuhn's original concept. Paradigm is used synonymously with perspective, theory, discipline, school, and method (Hassard, 1993). Kuhn himself admitted that his early writings were unclear and used multiple definitions. Masterman (1970) clarified the subject by placing all meanings for paradigm into three categories; metaphysical, sociological, and construct. The highest level is metaparadigm. Disciplinary matrix is the paradigm of a particular area of scholarship and is paradigm at the

sociological level. Exemplar or construct paradigms are used to solve specific puzzles or problems within a discipline. The three levels of paradigm are embedded in each other.

The construct paradigm is the meaning that is most central to Kuhn's work (Eckberg and Hill, 1979). Kuhn stated that it is not so much what an exemplar is but what it does. It is a tool to solve puzzles with. For the purposes of this study, the tool or exemplar level of paradigm will be used.

There have been many calls for MPR (multiple paradigm research) (Hirsch, et al., 1987; Eisenhart, 1989; Morgan, 1986; Hassard, 1993; Hassard and Pym, 1990; Pondy and Boje, 1981). Hassard (1991) applied the approach using Morgan and Burrell's framework of paradigms. Hirsch et al. (1987) and Eisenhart (1989) call for the use of complimentary paradigms to develop research that captures the complexity of organizational realities.

There are difficulties in applying the MPR framework. Hassard's work is criticized for using four different paradigms to examine four different organizational problems (Parker and McHugh, 1991). Rather than a unified approach to understanding the subject, divisions between paradigm spaces are accentuated. Hassard's response to this criticism is that each paradigm only recognizes certain

problems and if one area was selected, some paradigms would remain silent.

> The aim is to produce a methodology that is compatible with the view that organization theory comprises a plurality of competing perspectives. We argue that multiple paradigm research (MPR) offers great potential for understanding organizational problems because unlike simple 'monomethod ' approaches (see Martin 1990), it has several lens for it:s analytical camera (p. 88).

There are additional concerns with MPR. Organizational entre may be jeopardized because of organizational gatekeeper's discomfort with the marxist radical structuralist and radical humanist views. It may be difficult to find a problem that is considered legitimate by several paradigms. MPR is more time consuming and paradigm selection may be problematic. While recognizing these concerns, MPR will be used in this study because the ability of MPR to capture a more complete and complex picture of the organization is critical to establishing a foundation for an area of inquiry.

Each of the three perspectives selected for this study; selection, adaptation, and configuration, will be discussed in the following sections. Of the three perspectives, selection is discussed in the greatest depth. This is done so that the process of taxonomy and classification, crucial elements of this perspective, can be discussed.

Selection

Organizational ecology is the most developed stream of research using the selection perspective. Organizational ecology operates at two levels of analysis; populations of organizations and communities of populations. At the level of the population, research focuses on the demography organizations; variations in vital rates for organizational populations, founding rates, merger rates, and disbanding rates. At the community level, relationships between populations and the survival of the entire community and its constituent populations is the focus of inquiry.

The use of the organizational ecology perspective allows researchers to address the problem of generalizability. McKelvey and Aldrich (1983) find that the assumption that all organizations were alike or all organizations are unique underlie most organization research. The population approach makes the assumption that organizations can be placed into categories, forms, species or configurations. By placing organizations into these groups, generalizations can be made about the characteristics of the groups, differences between the various groups, and their interaction with the environment they exist in.

Once these populations or species of organizations have been established, selection severely constrains endogenous forces from affecting organizational change. The process of

change occurs by one population of organizations failing to
adapt and being replaced by an organizational type that can
survive in the environment. Hannan and Freeman (1977, 1989)
postulate that internal and external structural inertia
prevent adaptation from becoming a significant force for
organizational change. Internal sources of inertia are sunk
costs, limited information, political constraints, and
organizational history. External sources of structural
inertia are barriers to industry entrance and exit,
informational constraints, legitimacy and problems with
collective rationality.

Organizations that have the characteristics that allow
them to acquire scarce resources are selected for and
survive while those organizations without these
characteristics are selected against and cease to exist.
The organizational ecology perspective concentrates on
survival.

Each population of organizations occupies a unique
niche. Hannan and Freeman (1977) define niche as

> . . .that area in constant space (the space whose
> dimensions are levels of resources, etc.) in which
> the population outcompetes all other local
> populations. The niche, then, consists of all
> those combinations of resource levels at which the
> population can survive and reproduce itself. (p.
> 946)

Within a niche, organizations can either adopt a
specialist or generalist strategy. Specialists maximize
their ability to extract resources from their niche while

accepting the risk that the niche may change. Generalists are less efficient in extracting resources but are less vulnerable to shifts within the niche.

The organizational ecology perspective is not without its critics. Hannan and Freeman (1989) placed the scholarly controversies into five categories: Social Darwinism, hyper-efficiency, gradualism, size and determinism.

Social Darwinism implies that those organizations that have survived are superior organizations and are the most fit. This idea of the survival of the fittest traces its ideological roots to the writings of Spencer. Social Darwinism gained its unpleasant connotations because it was used to justify social inequality and disparage social reform. Hannan and Freeman (1989) clearly distance their work from the work of Spencer.

> In no sense does the use of a selection logic imply that this is the best of all possible worlds or that organizations that have thrived in some period are somehow deserving of their success. Selection models insist on the importance of randomness in success. . . . we are not convinced that change in populations of organizations reflects a unilinear evolutionary process of the sort described by sociocultural evolutionists following Spencer or by historical materialists following Marx. (p. 36)

A second criticism of the organizational ecology perspective is its deemphasis of market forces. Theorists such as Friedman (1953) argue that those firms that fail to

optimize levels of efficiency will fail and disappear.
Nelson and Winter (1982) suggest that selection forces are
multi-dimensional and efficiency, while important, are just
one of many dimensions.

Van de Ven and Poole (1995) classify organizational
ecology as an evolutionary theory because it stresses the
gradual change of organizations in response to environmental
changes. The roots of gradualism can be traced to the
writings of Darwin. He theorized that evolution occurred
gradually over long periods. Current fossil evidence
suggests that there are long periods of stability followed
by brief periods of extreme instability. During these
periods of brief instability, there were rapid changes in
existing organisms. This punctuated equilibrium view,
rather than gradualism, is the approach taken by population
ecologists.

Organizational ecology has been criticized for being a
perspective that is better suited to explaining the survival
of small organizations while having less utility in
understanding the life cycle of large organizations.
Critics of this theory suggest that very large organizations
can alter their environment by creating linkages within
their environment. Larger organizations also have higher
levels of organizational capital which buffer them from
environmental turbulence and other selection pressures
(Levinthal, 1991). Population ecologists argue that large

organizations can only lessen the pressures of selection temporarily.

The last criticism of the organizational ecology perspective is probably the most relevant to management theorists. They find organizational ecology to be too deterministic and that it ignores the contribution of individual organizational members to organizational change and survival (Morgan, 1986). Hannan and Freeman (1989) argue that rather than deterministic, the organizational ecology perspective is probabalistic. They admit that this perspective has "antiheroic implications". While individuals may strive to change organizations, the forces of inertia limit the results of their actions.

Because of the de-emphasis of individual actors, critics question the value of this perspective to managers within organizations. Hannan and Freeman (1989) answer;

> What could be more germane to business strategy than to identify the circumstance under which business firms dissolve or are acquired? What better warning signal could a manager have than knowledge that new firms employing a particular strategy or organizational device are failing at unusually high rates? Patterns of life events in the population provide a context for gauging the success of managerial actions. Knowledge of population processes can serve as an alternative to conventional profit-and-loss accounting exercise with all their measurement problems. (p. 44).

Classification and Taxonomy

Based on an extensive review of the literature, Ulrich and Barney (1984) found that the topics of selection and classification were closely related. McKelvey (1982) combined the idea of classification with the organizational ecology perspective to develop the basis for his work on organizational systematics. Because the concept of population is fundamental to the organizational ecology perspective, classification and taxonomy become important tools in theory building. Just as biologists use taxonomy to understand the evolutionary history and characteristics of organisms, population ecologists use classification procedures to identify populations of organizations.

The development of taxonomies and classification systems is a critical part of scientific inquiry. Blumer (1931) observed that theory development is impossible without classification. Carper and Snizek (1980) state that "Perhaps the most important and basic step in conducting any form of scientific inquiry involves the ordering, classification, or other grouping of the objects or phenomena under investigation" (p. 65). While focusing on classification as it applies to organizational studies, Rich (1992) states that "Organizational classification provides that basis for strong research by breaking the continuous world of organizations into discrete and collective categories well suited for detailed analysis" (p.758).

Defining taxonomic procedures. Before proceeding further into a discussion of taxonomy, it is necessary to clarify the terms used. The broadest type of inquiry into classification is termed systematics. Simpson (1961) defined systematics as "the scientific study of all the kinds and diversity of organisms and of any kind and all relationships among them" (p. 2). McKelvey (1982) called systematics the "science given over to the study of the diversity of form" (p. 462). Two related procedures are used to develop a systematic categorization of the forms being studied, taxonomy and classification. Taxonomy is the development of theories, rules, and procedures for classifying forms into related groups (Sneath and Sokal, 1973, McKelvey, 1982; Simpson, 1961). Classification is the actual partitioning of the items being classified into groups. In general, taxonomy is concerned with theory development and classification is the applied procedure. Numerical taxonomy is "the grouping by numerical methods of taxonomic units into taxa on the basis of their character states." The goal is to "develop methods that are objective, explicit, and repeatable (Sneath and Sokal, 1973, p. xii)." The benefit of numerical taxonomy over other types of classification theories and procedures is that the reliance on quantitative methods of group should produce objectively derived classification schemes.

Sneath and Sokal (1973) set forth the fundamental principles

of numerical taxonomy (p.5)

> 1. The greater the content of information in the
> taxa of a classification and the more characters
> on which it is based, the better a given
> classification will be.
>
> 2. A priori, every character is of equal weight in
> creating natural taxa.
>
> 3. Overall similarity between any two entities is
> a function of their individual similarities in
> each of the many characters in which they are
> being compared.
>
> 4. Distinct taxa can be recognized because
> correlations of characters differ in the groups of
> organisms under study.
>
> 5. Phylogenetic inferences can be made from the
> taxonomic structures of a group and from character
> correlations, given certain assumptions about
> evolutionary pathways and mechanisms.
>
> 6. Taxonomy is viewed and practiced as an
> empirical science.
>
> 7. Classifications are based on phenetic
> similarity.

Operations of numerical taxonomy. The operations of

numerical taxonomy are carried out in the following

sequence:

> organisms and characteristics are chosen and
> recorded, the resemblances between organisms are
> calculated, taxa are based upon these
> resemblances, and generalizations are made about
> the taxa (such as inference about their phylogeny,
> choice of discriminary characters, etc.). (Sneath
> and Sokal, 1973, p. 5).

The initial step in this process is to determine what

subjects and what characteristics of these subjects will be

examined. Determination of the characteristics of interest

can either be made from reviewing the relevant literature or can be derived during the classification process. Sneath and Sokel (1973) suggest that in most cases, a combination of the two approaches will be used. Cases and characteristics are recorded and an estimation of resemblance is developed. Cluster analysis is typically used. The construction of the taxa is based on the data obtained from the calculation of the resemblance values. The resulting groupings or clusters are typically displayed using a dendrogram.

The final step when using numerical taxonomy is the development of theory concerning the relationships between the cases or items clustered. These items are referred to as operational taxonomic units (OTUs). Relationships between OTUs can be of a phyletic or phenetic nature. Phyletic relationships are based on common ancestry of OTUs. Phenetic classification is based on observable characteristics of OTUs. These characteristics can be a result of common ancestry but are not required to be so. This study will use phenetic characteristics.

OTUs are classified based on the characteristics selected for analysis. The selection of the characteristics or variables is based on the theoretical perspective and the goals of the classification system. Sneath and Sokal (1973) place possible characteristics of OTUs into four categories; morphological, physiological, behavioral, and ecological.

McKelvey (1982) presents numerous lists of characteristics
that have been suggested for classifying organizations.
There is no empirically supported heuristic for determining
the appropriate number of characteristics to use. McKelvey
(1982) noted that studies of organizations tended to use
fewer characteristics that those of biological organisms.
Sokal and Sneath (1973) strenuously object to weighting of
variables. They state that weighting has been a serious
impediment to further development of taxonomy.

Once the characteristics have been selected, it is
critical that they be homologous. McKelvey (1982) offers an
illustration that clarifies this concept. If a biologist
were classifying lizards, he or she would not want to
compare the front legs of one animal with the rear legs of
another and conclude that the animals are of different
species. In an organizational context, social workers in a
social service agency would be compared to workers in other
organizations that had direct contact with clients. A
comparison between social workers and long-haul truck
drivers would lack homology.

Groups of OTUs can be based on a single characteristic
or groups of characteristics. If only characteristic is
used, the group is called monothetic. Single characteristic
grouping is discouraged. Polythetic groups are based on
multiple characteristics. Developing classifications

systems using polythetic groups is more complex but is a better reflection of natural relationships.

Taxonomic structure. It is important to understand the structure of the groups once they are identified and their relationships within the classification system. The first step in identifying taxonomic structure is to identify any patterns. Sneath and Sokal (1973) define pattern as "any describable properties of the distribution of OTU's and groups of OTUs in an attribute space" (p. 193). Profiles of OTUs are developed by placing the data in a matrix. This placement of the various characteristics of the OUT can be in any order as long as homology is maintained. An OTU configuration has been developed if the characteristics are ranked or placed in a theoretically based order.

OTUs are grouped together to form clusters. Sneath and Sokal (1973) define clusters as "sets of OTU's in phenetic hyperspace that exhibit neither random nor regular distribution patterns and that meet one or more of various criteria imposed by a particular cluster definition" (p. 195). Clusters can be identified using a variety of clustering techniques, several of the most commonly used ones being single linkage, average linkage, complete linkage, and centriod.

Once identified, clusters can be described in a multitude of ways. One of the primary descriptions of clusters is the locations of the centers. The center of the

cluster can either be an actual OTU or a hypothetical median organism. Other relevant characteristics of clusters are density, variance, dimension, gaps and moats, number of members of cluster, connectivity and straggliness.

Clusters can be graphically displayed using both multi-dimensional graphs and dendrograms. Dendrograms illustrate the clustering of the OTUs and are useful for determining the level of clustering to be used in developing the taxonomy. Dendrograms can be divided into two groups, phenograms and cladograms, based on the goals of the taxonomy.

Species. The concept of species merits special attention because of its importance to both taxonomy and the organizational ecology perspective. Unfortunately, a definitive statement of the concept of species has not been developed, either in biology or organizational theory. McKelvey (1982) refers to the definition of species as a "conceptual snake pit." Sneath and Sokal (1973) found that the concept was in practice, nonoperational.

Much variety exists within the large population of definitions of species (Slobodchikoff, 1976; Sokal, 1973). In keeping with the organizational ecology perspective, this study will adapt a view of the concept of species similar to that of Doyen and Slobodchikoff (1974) and Slobodchikoff (1976). Slobodchikoff (1976) stated that ". . .a species is a system of genetically similar individuals maintained as a

cohesive unit by a set of selection pressures that balance the disruptive forces imposed by environmental factors, mutation, or genetic recombination" (p. 4). The statement that populations are maintained through competing selection pressures is consistent with Hannan and Freeman's (1977) conceptualization of the constricting effect of structural inertia on organizational adaptation.

Population ecologists have not clearly defined populations or species. Typically, industry is used as a monothetic classification characteristic. In his proposed organizational taxonomy, Rich (1992) relies solely on industry to develop a monothetic classification system. McKelvey (1982) developed a species concept that depends on dominant competencies of an organizations. In practice, use of this characteristic would likely lead to the same classification as industry. McKelvey suggests that one possible solution to the difficulty of operationalizing the concept of species is to develop the taxonomy without using this concept. Considering the central nature of this concept to classification, taxonomy, systematics and the organizational ecology perspective, this does not seem to be a satisfactory alternative.

Because of the nature of the taxonomy being proposed for this study, the operationalization of species may be less problematic. The goal of this study is to develop a classification of organizations that identifies the patterns

of characteristics within different organizational

populations or species that explains differential recovery

rates and impact experiences after natural disaster.

Special classifications have high predictive validity,

but only within a very narrow range of organizational

experience. While general classifications a better

predictors of the entire range of organizational experience,

they have less predictive value in any specific area.

Because the goal of this study is to develop a special

purpose classification, the definition of species can be

tailored for this specific work.

Selection Model

Based on the previous discussion and a review of the

literature, the following model has been developed to depict

the proposed selection model. The model shown in Table 5

Table 5

Selection Model of Disaster Response

	Environmental Isomorphism ⇓	Levels of Physical damage	Length of Time to Reopen
Disaster ⇒ Agent	Org. Species ⇒ ⇑ Inertia	↗Little or No Damage→ ⇒Major Loss ↘Total Loss	Days/Weeks → Weeks/Months → Months/Not Reopening
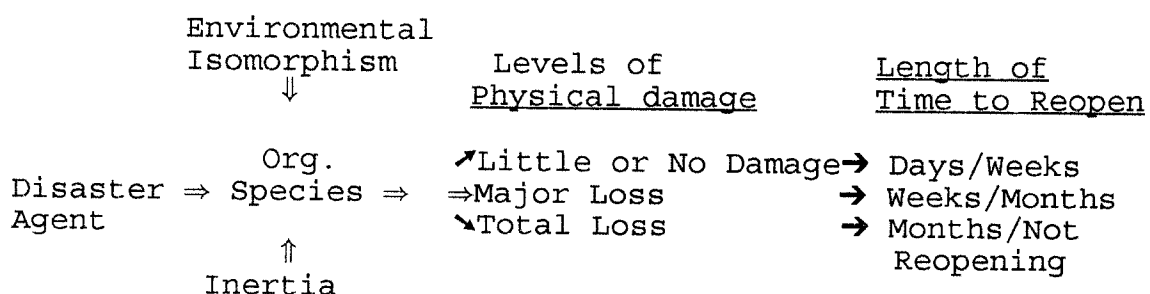
incorporates the disaster agent, the organizational species affected and the outcomes of the interaction between the species and the disaster agent.

Adaptation

The assumption that adaptation drives organizational change underlies most of management theory. Of these adaption orientated theories, contingency theory has become the dominant approach in management thought (Wren, 1987). Contingency theory developed in response to attempts by administrative theorists to develop an organizational structure that was universally effective (Scott, 1992). Proponents of contingency theory recognize that effectiveness is a result of achieving fit with between the organization and its environment. Accepting that there is no one best way of organizing in all environments, decision makers search for the best method of organizing for a particular environment (Galbraith, 1973).

Galbraith (1973, 1977) suggested that the characteristic of the environment that is most relevant to organizational survival is the level of complexity. Organizational fit is achieved by structuring the organization in such a way to facilitate the level of information processing needed to gather information about and adapt to the environment. The issue of fit and survival are the driving variables in the contingency model of organizational survival.

Lawrence and Lorsch (1967) further refined the contingency approach by extending it to large organizations that consist of subunits that operate in different environments. They found that to be effective, each subunit needed to achieve fit with its operating environment. The appropriate degree of coordination and method of integration with the other operating units is determined by the subunits' type of organization. In addition to subunits, Thompson (1967) recognized that the technical, managerial and institutional levels of the organization experience different environmental pressures. Organizational change is viewed as incremental, progress occurs at a steady process and constraints on organizational change are relatively weak (Meyer, Tsui, and Hinings, 1993).

Based on the previous discussion and a review of the literature the following models have been developed to depict the relationship between the contingency variables and the outcome variables. Table 1 presents the relationship between the variables. The first column lists the variables identified from the review of the literature presented in chapter two. The second two columns describe the relationship between the contextual variables and organizational activities that in turn affect the organization's ability to recover from disaster.

Table 1

Contingency Model of the Relationship Between Organizational
Characteristics and Disaster Recovery

Contingency Variable	Characteristics of the organization when the contingency variable is increased	Relationship to the Disaster process	Outcome variables
Age	a. Organizational knowledge b. Implementation of knowledge and development of routines c. Stability in growth patterns and Inertia	Managerial skills learned and implemented by the organization's members are applied to the mitigation and recovery process	a. Level of Physical Damage b. Length of Time to Reopen
Size	a. Developed control systems b. Niche munificence c. Institutionalization d. Slack resources e. Inertia and inefficiency	Large organizations tend to be in munificent environments, have slack resources, access to capital and have organizational members to assist with recovery.	a. Level of Physical Damage b. Length of Time to Reopen
Pre-Disaster Gross Sales	a. Resources available for immediate use b. Greater access to credit c. Location of business in a higher quality structure	Organizations greater access resources and credit and be able to rebuild and restock quicker. Higher quality structures will experience less damage.	a. Level of Physical Damage b. Length of Time to Reopen
Interorganizational Linkages	a. Information about business practices b. Information about environmental changes c. Information about government programs and policies	Chamber of Commerce members will have access to information that helps them cope with the changes caused by the disaster.	a. Level of Physical Damage b. Length of Time to Reopen
Business Location	a. More options for post-disaster business location b. Owners maintain control of the location of the business	Owners will have more control over their location and will not have to compete for scarce rental property.	a. Level of Physical Damage b. Length of Time to Reopen
Property Insurance	a. Lower the risk of the business by externalizing losses	Businesses with property insurance will be more likely to engage in mitigation activity and will be able to reopen quicker because they will have the insurance proceeds available.	a. Level of Physical Damage b. Length of Time to Reopen

Configuration

The term configuration is used in two different ways.

As previously mentioned, taxonomists use the term configuration to

denote a matrix of OTU characteristics that have been arranged in

order of importance or ranked in some way. Organizational

theorists have adopted a different meaning:

> We use the term "organizational configuration" to
> denote any multidimensional constellation of
> conceptually distinct characteristics that
> commonly occur together. Numerous dimensions of
> environments, industries, technologies,
> strategies, structures, cultures, idealogies,
> groups, members, processes, practices, beliefs,
> and outcomes have been said to cluster into
> configurations, archetypes, or gestalts.
> Configurations may be represented in typologies
> developed conceptually or captured in taxonomies
> derived empirically. They can be situated at
> multiple levels of analysis, depicting patterns
> common across individuals, groups, departments,
> organizations, or networks of organizations.
> (Meyer, Tsui and Hinings, 1993, p. 1175)

These two differing approaches to configuration have

commonalities. They both are multi-dimensional in nature.

The characteristics occur as a system and taxonomies can be

used to derive the configuration (Miller, 1987; Miller and

Friesen, 1984). However, the approach to configuration

adopted by the organizational theorists does not involve

ranking. In fact, ranking may distort the configuration as

organizational theorists intend its usage. Meyer, Tsui and

Hinings (1993) liken the configurational approach to chaos

theory in that it acknowledges the disorder and nonlinear character of relationships that exist in nature. This is the antithesis of the ranking approach used by taxonomists. When described using standard taxonomical terms, what Meyer, Tsui and Hinings are proposing is a polythetic taxonomy based on phenetic characteristics.

Within the field of organizational theory, two other terms are used to denote the same concept as configuration; archetype and gestalt. These terms will not be used in this study because, like configuration, they have differing meanings in their fields of origin. For the sake of clarity, configuration will be used in the sense that it is proposed by Meyers, Tsui and Hinings.

Configuration theory has developed in response to earlier research efforts that disassembles organizations into discrete variables. Each variable or characteristic was examined in a search for linear relationships under the assumption that all organizational settings are similar. In addition to organizational uniformity, the assumptions of gradualism and equilibrium underlie non-configurational inquiry.

While configuration theory does offer increased precision and power, it has not been fully or consistently developed. Meyers, Tsui and Hining (1993) state that configurations actively resist change. This is similar to

Hannan and Freeman's (1977) concept of structural inertia. Yet the statement about configurational inertia is followed by the assertion that small inputs can cause massive changes as suggested by chaos theory.

It appears that the configuration approach is seeking to borrow the population or species concept from organizational ecology without accepting its assumptions about selection processes. This may be partially a result of the "anti-heroic implications" of the organizational ecology perspective (Hannan and Freeman, 1989). If configurations occur in coherent patterns that resist change, then these assumptions should be clearly articulated when using the configurational approach. While discussing the organizational ecology perspective, McKelvey and Aldrich's (1983) statement of the causes of organizational variation is closer to that of researchers using the configuration approach. "Our contention is that people cause variations in individual organizations, but that the process of natural selection leads to the form of those organizations that survive and characterize successful populations" (p. 101).

This study will seek to integrate these three perspectives; configurational and contingency theory as developed in the field of organizational theory and the organizational ecology perspective. The term configuration

will be utilized in a manner that is consistent with the earlier definition offered by Meyers, Tsui and Hinings. In addition, the concepts of structural inertia and selection will be integrated into the configurational approach.

Configurations will be viewed as multi-dimensional characteristics that occur together. Once this constellation of characteristics congeals, the forces of structural inertia limit intentional or endogenous change. The combination of inertia and selection make adaptation problematic. While adaptation can occur, it is severely constrained by the forces of selection. Organizations that have large amounts of organizational capital may be able to counter selection forces through interorganizational linkages (Levinthal, 1991). Configurations will be identified and described by using taxonomic techniques. Characteristics used to describe the organizations under study will be strictly phenetic and groupings will be polythetic.

Integrating Organizational ecology, Contingency and Configuration Theory with Disaster Recovery

The differing perspectives within the field of organizational theory are uniform in their recognition that organizations are multidimensional. However, these perspectives vary in their approach in examining different organizational forms. The two competing views are "all

organizations are the same" and "all organizational are

different" (McKelvey and Aldrich, 1983). These differing

assumptions lead researchers to adopt different research

strategies and results in findings that may not adequately

reflect the complex and multi-dimensional nature of

organizations (Burrell and Morgan, 1979).

Litchfield (1956) articulated the position of the "all

organizations are the same school", administration and the

administrative process occur in substantially the same

general form in industrial, commercial, civil, educational,

military and hospital organizations." Two prominent studies

that took this approach are Oldham and Hackman (1981) and

Blau (1974).

The position that "all organizations are different"

in not usually stated explicitly. Some examples of

approaches that emphasize the unique nature of each

organization are the grounded theory approach of Glaser and

Strauss (1967), ethnomethodology (Garfinkel, 1967) and many

case studies (Miles, 1979).

Both the organizational ecology perspective and

configuration theory offer a middle ground. Organizational

ecology's emphasis on the population level of analysis

allows researchers to develop and test theory that has

greater precision for the specific population under

investigation. This perspective recognizes the exogenous

forces of selection and the forces of structural inertia.
In addition, organizational ecology's association with
taxonomy introduces tools that allow organizational
theorists to develop population specific theories.

Configurational theory allows researchers to recognize
non-linear relationships and develops the concept of
organizational form along multi-dimensional characteristics.
Configuration theory offers an alterative to Hannan and
Freeman's (1977) statement on structural inertia. By
attempting to integrate chaos theory, Meyer, Tsui and
Hinings (1993) offer an explanation for organizations that
seem to be able to escape selection pressures.

These multi-dimensional perspectives have the potential
for offering better explanations of complex organizational
processes. For this reason, these approaches will be used
to develop a better understanding of the organizational
recovery process and determinants of organizational recovery
after natural disaster. The idea of organizational forms as
used in organizational ecology and in configuration theory
offers greater predictive value and generalizability.

Organizational ecology is closer to the "all
organizations are the same" position. Once organizations
have been placed into categories by industry, population
ecologists seldom differentiate between organizational types
within an industry. Configuration theory is closer to the

"all organizations are different" perspective because of the polyphentic characteristics of the organization forms it seeks to identify and analyze. This work will utilize these perspectives to develop findings that have greater generalizability to the organizational forms examined.

The following research hypotheses have been developed:

AGE

H1. Older organizations will experience less physical damage than younger organizations.

H2. Older organizations will recover faster than younger organizations.

SIZE

H3. Larger organizations will have less physical damage.

H4. Larger organizations will have shorter recovery times.

INCOME

H5. Organizations with higher pre-disaster gross sales will have less physical damage.

H6. Organizations with higher pre-disaster gross sales will have shorter recover times.

CHAMBER MEMBERSHIP

H7. Organizations that are members of the Chamber of Commerce will have less physical damage.

H8. Organizations that are members of the Chamber of Commerce will have shorter recovery times.

OWNERSHIP OF BUSINESS LOCATION

H9. Organizations that own their business location will have less physical damage.

H10. Organizations that own their business location will have shorter recovery times.

PROPERTY INSURANCE

H11. Organizations that have property insurance in force before the disaster will have less physical damage.

H12. Organizations that have property insurance in force before the disaster will have shorter recovery times.

ORGANIZATIONAL CONFIGURATIONS

H13. The configurations of organizational characteristics defined by the clustering process will have significantly different levels of physical damage from the natural disaster.

H14. The configurations of organizational characteristics defined by the clustering process will have significantly different recovery times from damage caused by the natural disaster.

CHAPTER III

RESEARCH PROCEDURE AND METHODOLOGY

The proposed research procedure and methodology of this study will be described in this chapter. The issues of the research population and sample, data collection, variables, reliability and validity issues, and data analysis will be addressed.

Research Population and Sample

On Monday, August 24, 1992, Hurricane Andrew made landfall in southern Florida. The Class 4 hurricane cut a 20 mile wide path of destruction with winds up to 200 mph (Dymon, 1993). While the location of the hurricane's landfall was expected, the level of its severity was not anticipated. The eye of the hurricane passed directly over Homestead, Florida. An area of 500 square miles was severely impacted. There were 30 deaths and 100,000 homes were damaged or destroyed. There was no communication in the area and infrastructure ceased to function. The devastation was so severe that emergency responders could not use maps to determine their location. Critical shortages of food, water, and health supplies occurred.

shortages of food, water, and health supplies occurred.

Damage was estimated to be $20 billion at the time of the

disaster but may eventually reach $30 billion (Dymon, 1993).

The population for this study is businesses located in

Homestead and Florida City, Florida. This area is bounded

by SW 216 street on the north and the Monroe county line on

the south.

The Homestead Chamber of Commerce surveyed both Chamber

of Commerce members and non-members located in the disaster

area. They collected both data about the disaster and the

opinions of business owners about the services offered by

the Chamber of Commerce. For the purposes of this study,

only data relating to the disaster experience of impacted

businesses will be analyzed.

The area under study is approximately 1,100 square

miles of which 270 square miles is developed land (Hurricane

Andrew impact, 1992). Dunn and Bradstreet estimate that

1935 firms were doing business in this area before the

hurricane.

The 1990 census determined the population of the

Homestead and Florida City area to be 32,672 (Population

projections adjusted, 1993). The median income for Dade

county was $26,909 while the median income for Homestead was

$20,594 and $15,917 for Florida City. The economy of the

area is dominated by agriculture and tourism.

The Chamber had 929 members and all members whose address was known before the hurricane were mailed surveys. Of these, 231 were returned. Non-chamber members were surveyed by teams of survey takers. Respondents were asked if they were members of the Chamber to eliminate duplication. Members of the survey team were instructed to interview the chief decision maker for the business. Surveys were collected from 207 non-chamber members. Of these 438 surveys, 367 are used for this study. The 71 that were not used were eliminated due to their incomplete nature.

Data Collection

The survey instrument was developed by the Homestead/Florida City Chamber of Commerce. The survey collected information about the damage caused by the hurricane, characteristics of the firm, and information about the firms' perceptions of the Chamber of Commerce.

Fifteen business participated in pretesting the instrument. The purpose of pretesting was to determine the accuracy and validity of question content. Business owners participating in the pre-testing process took approximately 10 minutes to complete the instrument. The final survey was mailed with a cover letter from the Chamber of Commerce along with a self-addressed, stamped envelope.

The surveys were mailed on June 16, 1993. Returned surveys were received between June 17 and July 6. Of the 929 surveys mailed, 32 were undeliverable and 231 were returned for a response rate of 25%. According to Dunn and Bradstreet, 19% of the total businesses in the area were surveyed.

A trained group of eighteen interviewers collected additional surveys. The same instrument that was mailed out to the Chamber members was completed in an interview format by the team members. If a business owner did not choose to participate, interviewers asked for a business card. Business cards were useful because which the owner did not agree to be interviewed, it allowed the Chamber of Commerce to determine the number and types of business that had reopened.

Data were gathered about businesses that were still closed from a visual inspection. The type of business and signs of rebuilding activity were recorded. While this provided useful information for the Homestead/Florida City Chamber of Commerce, neither the data from the business cards or visual inspection were used in this study. Only surveys actually completed by the chief decision maker in the business were included.

Operational Definitions

In this section, a description and explanation of each variable under consideration will be provided. All the variables used are based on factual data as opposed to perception or opinion data.

Length of time the business has been operating in the Homestead/Florida City area is being used as a proxy for age. Size was based on the number of employees. Organizational size is typically measured by the number of employees (Daft, 1992). The amount of pre-disaster gross sales was gathered by asking for the firms' gross sales in 1992. Gross sales is useful for comparing level of income across different organizations. Net income would be distorted by level of debt and other expenses that would mask the amount of revenue or resources that the firm is able to acquire from its environment. While this measure is not without its shortcomings, it is useful for cross-organizational comparisons.

The next group of variables under consideration are organizational adaptation strategies adopted by the firm. The first variable is membership in the Chamber of Commerce. Decision makers were asked if they belonged to the Chamber and they could answer, yes, no or don't know. This variable was converted to a binary form by grouping no and non-responses. This procedure can be justified due to the goals

of this study. Chamber membership is hypothesized to be an activity that allows decision makers to develop support networks and interorganizational linkages. If a decision maker is not sure whether or not the firm is a member of the Chamber of Commerce, then this decision maker has not been an active participant in the Chamber and has not engaged in networking through its activities.

The next variable under consideration is the existence of a property insurance policy before the disaster impact. Decision makers were asked if they had insurance and which insurance company they were insured with. As previously discussed in Chapter Two, ownership of shelter was a critical variable in individual recovery from natural disaster. Organizational decision makers were asked if the firm owned their location.

Industry was self-reported by the organizational decision maker. Organizations were grouped together by industry and then an additional grouping by related industry was developed.

Decision makers were asked to indicate the level of physical damage caused by Hurricane Andrew. Their choices were total loss, major damage, minor damage, and no damage. Business owners and managers were asked how long it took for the business to reopen after the disaster. The use of the reopening date as a start of the recovery period is

consistent with the use of this term by Robbins and Pearce (1992). Businesses that have been able to reopen have stopped organizational decline and are in the process of restoring the organization to its pre-disaster state.

Reliability and Validity

Reliability

Cook and Campbell (1979) caution against the introduction of monomethod bias. While this study relies on a single method of data collection, the highly stable nature of the data collected should compensate for this factor.

As previously mentioned, the research instrument was pretested. It was administered to 15 members of the Homestead/Florida City Chamber of Commerce. The stated purpose of the pretest was to determine the clarity, accuracy and validity of question content. The pre-test procedure used fulfills the requirements for pretests suggested by Babbie (1990).

Because of the nature of the questions, the problems associated with interrater reliability and different interviewers are minimal. Surveys completed by Chamber of Commerce members were received and returned via the postal service. The surveys that were completed through interviews were conducted by trained members of the research team. The type of data collected did not involve the perceptions or

opinions of the subjects; therefore, their responses should
not have been affected by the particular member of the
research team that administered the survey instrument.

Cook and Campbell (1979) suggest that the reliability
of measures can be improved through using multiple measures
with high intercorrelations and using aggregated units.
Because of the nature of the data collected, there should be
a high degree of reliability. Measures of such data as age
of the organization or size should be stable.

Data was double keyed to check for data entry errors.
In addition, the first 25 surveys and 25 randomly selected
surveys were examined for keying errors by the author. All
written comments on the surveys were read to insure that all
responses were included. Based on this examination of the
surveys, there is no evidence of any systematic measurement
error.

Validity

Campbell and Stanley (1963) and Cook and Campbell
(1979) develop an extensive catalogue of the differing types
of threats to validity. Validity is divided into two
categories, internal and external.

Threats to internal validity include history,
maturation, testing, instrumentation, statistical
regression, selection, mortality, and resentment of
respondents receiving less desirable treatment.

Cook and Campbell (1979) state that it is nearly impossible for the field researcher to isolate their subjects so that they are assured that there are not effects of history on the subjects. Testing, maturation and instrumentation are not issues because there were not multiple tests of the respondents. The threat of statistical regression is minimized due to the nature of the data collected. The threat of selection errors was minimized by using two waves of data collection. In the first wave, members of the Chamber of Commerce were surveyed. In the second wave, members of the research team canvassed business in the area that were not members of the Chamber so that their responses could be included in the data base. This multi-wave approach helps to minimize the potential for selection threats to validity due to inclusion of Chamber of Commerce members only.

Mortality does not present a serious threat to understanding the impact of natural disaster on business organizations. This study does, however, potentially underestimate the number of businesses that did not survive the disaster. If businesses did not survive the initial impact and no attempt was being made to rebuild at the location of the business, data about the business could not be collected. If rebuilding was in progress, businesses were placed into the category of organizations that needed

more than one year to recover and the chief decision makers
was asked to complete the survey. This problem is common to
disaster studies. While survivors can be interviewed to
determine their characteristics and actions to recovery from
the disaster, for obvious reasons, it is difficult to
interview the individuals or organizations that did not
survive. This factor should be considered when attempting
to generalize the results of this study.

The final threat to internal validity is resentment of
respondents receiving less desirable treatments. While
participating in the study may not seem to be an event that
is particularly desirable or undesirable, members of the
research team did note a phenomenon of interest. Their
general opinion was that Hispanic decision makers were more
likely to refuse to participate in the study. In a few
cases, limited proficiency of Spanish by members of the
interviewing team prevented participation by subjects. In
other cases, Hispanic business owners stated "strong
opinions about the Chamber of Commerce" (Fentzke, 1993).
This strong reaction to the Chamber of Commerce may have led
to an under-representation of Hispanic owned businesses.
This is important to note since research that examined the
ethnic characteristics of disaster victims found that non-
white victims tended to experience higher levels of physical
damage and slower recovery (Drabek, 1986).

There are a variety of potential threats to construct validity. Many of these concerns are not applicable to this study because the majority of the data reported is not based on respondent's perceptions or opinions. Evaluation apprehension occurs when respondents alter their responses to match what they believe the evaluators desire. In this case, the nature of the data gathered precludes this from being a serious consideration. Even if respondents felt that their organization should be portrayed as larger or older than it really was, there would be some hesitation to falsify information that could be easily verified from other sources. Experimenter expectancies should not be relevant because the members of the interview team were not involved in delivering any type of treatment to the respondents.

External validity can be compromised through interaction with selection and treatment and sampling problems. In this case, the organizations studied, with the exception of eleven, survived the hurricane. There is a possibility that non-survivors are not adequately represented here. This problem has been acknowledged in the field of disaster research because it is impossible to interview individuals that do not survive disaster. This study should be an important step in developing a database of businesses and disaster so that it can be compared with

studies of other businesses that experience different types of disaster to determine if there are common patterns of recovery across different types of disaster.

Data Analysis

Descriptive statistics are computed for each variable. A table is presented with the relevant data. The first phase in data analysis uses discriminant analysis. The method used is step-wise Wilks with an adjustment for variable group membership. The classification hierarchy is based on SIC codes. This phase of analysis examines the variable of industry as a means of exploring the relationship between population membership and disaster experience. Both population and community wide patterns of level of physical damage and length of time to reopen will be examined.

The second phase of this study uses contingency theory to provide a framework for data analysis. Each variable is examined and relationships between individual variables and disaster experience are explored.

The final step in data analysis uses cluster analysis to identify clusters of organizations that share a common organizational configuration. The complete method is used to determine the number of potential clusters. Validation techniques are utilized (Aldenderfer and Blashfield, 1984).

Romesburg (1984) suggests that agreement with other methods of analysis is a useful validation technique and in this study, the results of the two previous phases of data analysis are used for additional validation.

Chapter Summary

This chapter describes the procedure and methodology used in this study. The businesses examined here are a sample of the businesses affected by Hurricane Andrew. This study examines the relationship between the organizational characteristics and the organization's disaster experience.

CHAPTER IV

RESULTS

The results of the analysis of the data is

presented in this chapter. Descriptive statistics are

presented in the first section. The following sections

contain the analysis based on the organizational ecology,

contingency and configuration models.

Descriptive Statistics

Descriptive statistics for the variables under study

are presented in this section. Age was measured through

length of time the business had been in the south Florida

area. The average age of businesses in this sample was high

with 59.7% (216) having been in the area over ten years.

Businesses that were one to three years old made up 17.4%

(63) of the sample. Businesses that were four to six years

old accounted for 11.9% (43) and organizations that were

seven to ten years old were 11% (40) of the sample.

While most businesses were older, an examination of

size finds that small business form the bulk of the

organizations surveyed. Fifty percent (177) of the
organizations had one to five employees. Businesses with 6
to 15 employees made up the next largest group with 22.9%
(81) of the total. Fourteen percent of the businesses had
16 to 50 (50) employees and nine percent (32) had 51 or more
employees. Four percent (14) of the organizations had no
members other than the owner.

Unlike the two previous variables, the amount of gross
sales in the year before the disaster was widely distri-
buted. The largest group of businesses, 22.4% (60), had
gross sales between $1,000,000 and $4,999,999. The next
largest group, 16.4% (44), had gross sales between $100,000
and $299,999. Both businesses with sales less than $50,000
and those with sales between $500,000 to $999,999 made up
14.2% (38) of the sample. The remaining categories
accounted for the following percentages: $300,000 to
$499,999, 11.9% (32); $50,000 to $99,999, 10.1% (27);
$10,000,000 and over, 6.7% (18); and $5,000,000 to
$9,999,999, 4.1% (11).

The majority of the businesses surveyed had property
insurance in force before the disaster. Eighty percent
(282) reported having insurance. The majority of
businesses, 65.5% (234), were members of the Chamber of
Commerce. The percentages of businesses owning their
business location was evenly divided between owners and

nonowners with 49.9% (177) reporting they owned their location.

The level of physical damage reported ranged from total loss to no damage. The majority of the businesses, 53.7% (196), reported major damage. Minor damage was reported by 23.3% (85) of the business surveyed. Slightly more than 20% (74) of the business sustained a total loss. Only 2.7% (10) reported no damage.

After the disaster, 20.1% (74) of the businesses reopened within one week and 20.1% (74) opened in less than a month. Slightly less than half, 49% (175), took more than a month and less than a year to reopen. Nine point eight percent (35) were not open after one year or were not planning to reopen.

Organizational Ecology

The results of the analysis based on the organizational ecology model will be presented in this section. The literature review in chapter two presented the basic precepts of the organizational ecology model. Because of the importance of the species concept, a system of classification is critical to utilizing the organizational ecology approach. In this section, the classification system will be developed and the results of the data analysis will be presented.

Classification Process

Following the methods detailed by Sneath and Sokal (1973) the OTU were selected and recorded. As discussed in Chapter Three, the units examined are business in Homestead and Florida City that were in operation at the time of Hurricane Andrew. The characteristics of these OTU were selected based on a review of the literature and were recorded. Because the goal of the procedure is to develop a special purpose taxonomy, the analysis could proceed using either a classification system developed specifically for this study or use a pre-existing classification system. A decision was made to use a pre-existing system in order to increase comparability with other research.

A variety of pre-existing classification systems were examined. These included Standard Industrial Classification Codes, United Nation's International Standard Industrial classification, Customs Cooperation Council's Harmonized System and the Standard International Trade Classification. The last two systems were not selected because they deemphisize retail and service operations. The UNSIC was not used because it overemphasizes manufacturing and underemphasizes retail trade. While this system was not used for this study, it may have utility in conducting comparative studies of natural disaster in different nations.

The classification system used for this study is based on the U. S. Standard Industrial Classification (SIC) of Establishments. This system was selected to increase comparability and based on the literature (Howe and Cochrane, 1993). Table 2 illustrates the classification system as it is used in this study. The SIC code terminology appears on the left and the taxonomic labels appear on the right. Dallas Children's Hospital is classified as an example. Each level of classification used in the example is underlined. Complex organizations are divided into four sectors; private/economic, government, voluntary, and informal. The concept of organizational sectors is best described by Van Til (1988).

This hierarchical classification system is very similar to the standard industrial classification. SIC codes provide the foundation for both classification systems. All organizations are classified in a manner that is consistent with the SIC codes with four exceptions.

Businesses that sell mobile homes are placed in the same group as home lumber supplies in the SIC system. In this study, they will be included in real estate. In the SIC manual, veterinarians are grouped with agriculture. In this study, they will be moved to personal services. This change is made because there are no animal related agricultural producers. Because of the absence of livestock

Table 2

A Hierarchical Classification System of Businesses Adapting
SIC to Taxonomic Labels for Children's Hospital of Dallas

SIC Label   Taxonomic Labels

Sector-------Kingdom
            Private/economic
            Government
            Voluntary sector--charities, NGO's
            Informal sector--families, emergent, SM

Division------Division
            Agriculture
            Mining
            Construction
            Manufacturing
            Transportation
            Wholesale
            Retail Trade
            Finance, Insurance and Real Estate
            Services

Major Groups--Class
            Hotels, rooming houses, etc.
            Personal services
            Business services
            Automotive repair
            Miscellaneous repair
            Motion pictures
            Amusement repair
            Health Services
            Legal Services
            Educational Services
            Social Services
            Museums, Art Galleries, etc.
            Membership Organizations
            Engineering, Accounting, Research, etc.
            Private Households
            Miscellaneous services

TABLE 2, A Hierarchical Classification System, cont.

SIC Label   Taxonomic Labels

Industry Group--Order
        Offices and Clinics of Doctors of Medicine
        Offices and Clinics of Dentists
        Offices and Clinics of Doctors of Osteopathy
        Offices and clinics of Other Health Practitioners
        Nursing and Personal Care Facilities
        Hospitals
        Medical and Dental Laboratories
        Home Health Care Services
        Miscellaneous Health and Allied Services

Industry Code--Family
        General Medical and Surgical Hospitals
        Psychiatric Hospitals
        Specialty hospitals, except psychiatric

Specialty Hospitals, Except Psychiatric--Genus
        Alcoholism rehabilitation hospitals
        Cancer Hospitals
        Children's Hospitals
        Chronic Disease Hospitals
        Drug Addiction rehabilitation Hospitals
        Eye, Ear, Nose, and Throat hospitals: inpatient
            Hospitals, specialty: except psychiatric
        Maternity Hospitals
        Orthopedic Hospitals
        Rehabilitation Hospitals: Drug Addition and
        Alcoholism
        Tuberculosis and other raspatory illness
        hospitals

Children's Hospitals--Species

Subindustry--Subspecies
        Subgroups within children's hospitals

Business--Variety
        Children's Hospital of Dallas

Notes for Table 2

1. Titles on the left hand side are the particular type of organization being classified. The titles on the right hand side are from the botanical labels presented by McKelvey (1982).

2. Division level and below is consistent with the SIC typology.

3. The Sector level is consistent with a typology presented by Van Til (1988).

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producers, these veterinarians are servicing pets and small animals and do not have large animal practices. Therefore, they will be placed into the service division.

Travel agencies are included in the services division, rather than the transportation/public utilities division. The reason for this is because travel agencies are atypical of organizations in this sector. The transportation/public utilities sector is composed of very large, heavily regulated, capital intensive organizations. Travel agencies are small organizations that provided services based on knowledge of the transportation sector but do not share the characteristics of organizations in the transportation and public utilities division.

Pawn shops are included in the finance sector rather than the retail sector. The primary business of these organizations is making personal loans. Retail activities are a method of recouping loan losses. Based on

conversations with managers of pawnshops in the local area, 70% of the income for these business comes from loans and 30% from retail. The classification system presented will be used to form groups that have sufficient homogeneity to allow generalizations to the entire group. The disaster experiences of the different divisions and classes will be explored.

Analysis of Disaster Experiences at the Division Level

The initial level of analysis is at the division level. This level corresponds to the 11 division levels in the SIC manual of 1987. Division J, public administration, is not analyzed because it is outside the scope of this study. Divisions K and B, nonclassifiable establishments and mining, are not analyzed because there were no establishments in the study that were members of these divisions.

Table 3 shows the group membership of companies included in the analysis. Service organizations, the largest group in the sample, account for 39% (138) of the total. The next largest group are retail organizations which make up 33% (117) of the sample. The predominance of these types of businesses is expected as tourism and healthcare are major components of the local economy. Discriminant analysis using Wilk's method is utilized because it has the ability to arrive at a reduced set of

Table 3

Division Membership of Businesses Surveyed

Division	Number of Organizations	Mean Level of Physical Damage	Mean Level of Length of Time to reopen
Agriculture, Forestry and Fishing	29	3.14	2.66
Construction	16	2.56	2.13
Manufacturing	2	2.50	1.50
Wholesale	2	3.50	3.50
Transportation, Communication, Electric, Gas, and Sanitary Services	3	2.67	2.33
Retail	117	2.88	2.44
Finance, Insurance and Real Estate	43	3.02	2.40
Service	138	2.89	2.54
Total	350	2.91	2.47

Rankings for Level of Physical Damage
        1=No Damage
        2=Minor Damage
        3=Major Damage
        4=Total loss

Rankings for Length of time to Reopen
        1=less than a week
        2=less than a month
        3=less than a year
        4=over one year/not reopening

variables that are potentially better predictors that the

full set of variables. Because of the small number of

wholesale, transportation and manufacturing organizations, caution should be used in interpreting their disaster experience relative to the other categories.

Table 4 presents the mean values for level of physical damage. The F for level of physical damage is 1.439, df(7,342) (p<.1888). The divisions are ranked by the mean level of physical damage.

TABLE 4

Divisions Ranked by Level of Physical Damage

Division	Level of Physical Damage
Manufacturing	2.50
Construction	2.56
Transportation, Communication, Electric, Gas, and Sanitary Services	2.67
Retail	2.88
Service	2.89
Mean	2.91
Finance, Insurance and Real Estate	3.02
Agriculture, Forestry and Fishing	3.14
Wholesale	3.50

Rankings   1=No Damage
2=Minor Damage
3=Major Damage
4=Total loss

Table 5 presents the mean values for length of time to reopen for the eight divisions analyzed. The F value for length of time to reopen is .9894 (p<.4387). The mean level of physical damage and length of time to reopen is not significantly different at the division level.

Table 5

Divisions Ranked by Length of Time to Reopen

Division	Mean Length of Time to Reopen
Manufacturing	1.50
Construction	2.13
Transportation, Communication, Electric, gas, and Sanitary Services	2.33
Finance, Insurance and Real Estate	2.40
Retail	2.44
Mean for Sample	2.47
Wholesale	2.50
Service	2.54
Agriculture, Forestry and Fishing	2.66

Rankings 1=less than a week
          2=less than a month
          3=less than a year
          4=over one year/not reopening

Analysis of the Disaster Experience at the Class Level

The next level analyzed is the class level in the classification system that corresponds to the major group in the SIC system. Not all the divisions can be analyzed at this level. There were no organizations involved in mining activities in the sample. Construction, manufacturing and wholesale were not divided into classes because of insufficient information or respondents. Information on the transportation, communication and public utilities division is not presented in order to insure confidentiality and because of insufficient numbers. Analysis of the retail, service, finance and related activities, and agriculture at the class level will be presented. It should be noted that these four divisions constitute over 98% of the total organizations surveyed.

The first division that has sufficient members and information about its members to allow class identification and analysis is agriculture. There are four classes in the agriculture division and they are presented in Table 6. Citrus, vegetables, and landscaping plants are the primary products in this area. Organizations in the related agriculture group are primarily in the business of providing farm labor and shipping agricultural products. The F value for level of physical damage is .2874, df(3,25) (p<.8341). The F value for length of time to reopen is .6666 (p<.5805).

Table 6

Mean Values for Level of Physical Damage and Length of Time
to Reopen for Agriculture Establishments

Class	Number	Level of Physical Damage	Length of Time to Reopen
Nursery & Landscaping	10	1.80	2.50
Farm/Produce Citrus	10	1.90	2.90
Related Agriculture	6	1.83	2.33
Unclassified Agriculture	3	2.00	3.00
Group Means	29	1.86	2.66

Rankings for Level of Physical Damage
        1=No Damage
        2=Minor Damage
        3=Major Damage
        4=Total loss

Rankings for Length of time to Reopen
        1=less than a week
        2=less than a month
        3=less than a year
        4=over one year/not reopening

The second taxa of organizations analyzed is retail.
The F value for level of physical damage was 1.330,
df(7,109)(p<.2430). The F value for length of time to
reopen is 2.886 (p<.0083). As evidenced from Table 7, there
is a great deal of variety in this division.

Table 7

Mean Level of Physical Damage and Length of Time
to Reopen for Retail Organizations

Class	Number	Level of Physical Damage	Length of Time to Reopen
Building Materials	4	3.25	1.50
General Merchandise	3	3.67	1.33
Food	19	2.89	2.00
Automotive Dealers and Related Retail	25	3.00	2.32
Apparel & Accessories	3	2.33	1.67
Home Furnishings	10	3.10	2.80
Eating and Drinking	23	2.65	2.57
Misc. Retail	30	2.80	2.70
Mean for Division	117	2.88	2.44

Rankings for Level of Physical Damage
    1=No Damage
    2=Minor Damage
    3=Major Damage
    4=Total loss

Rankings for Length of time to Reopen
    1=less than a week
    2=less than a month
    3=less than a year
    4=over one year/not reopening

The third division of organizations analyzed is the finance and real estate. There were 43 members of this group. As shown in Table 8, the F value for level of physical damage was .3964, df(4,38)(p<.8099). The F value for length of time to reopen was 1.445 (p<.2382).

TABLE 8

Mean Level of Physical Damage and Length of Time to Reopen for Financial and Real Estate Establishments

Class	Number	Level of Physical Damage	Length of Time to Reopen
Depository Institution	7	3.00	1.86
Nondepository Financial Institution	2	3.50	2.50
Insurance Agents	12	3.17	2.42
Real Estate	21	2.90	2.62
Miscellaneous Real Estate and Finance	1	3.00	1.00
Mean for Division	43	3.02	2.40

Rankings for Level of Physical Damage
      1=No Damage
      2=Minor Damage
      3=Major Damage
      4=Total loss

Rankings for Length of time to Reopen
      1=less than a week
      2=less than a month
      3=less than a year
      4=over one year/not reopening

The final division of organizations analyzed is service. Table 9 shows the classes included in the service division. There are 131 members of this taxa. The F value for level of physical damage was 2.22, df(13,117) (p<.0124). The F value for length of time to reopen was 1.05 (p<.4129).

Analysis of the Disaster Experience at the

Sub-division and Class Level

The next level in the classification hierarchy is the class level. Only one group, health care providers, has sufficient members to allow analysis at this level. In addition, concerns about respondent confidentiality make analysis at lower levels problematic. Table 10 presents the mean values for level of physical damage and length of time to reopen for each of the organizational types in this class. The F value for level of significance for physical damage is .7450, df(8,23) (p<.6522). The F for length of time to reopen is 2.6491, (p<.0321).

While Rich (1992) suggests hierarchical classification, subdivisions may be more useful. Because of the number of subjects required, it is difficult to analyze organizations at the class level. The exception in this study is health care which was analyzable at the class level.

The goal of the analysis is to develop monothetic groups that have as little variation as possible within groups. From the previous analysis, only agriculture and

Table 9

Mean Level of Physical Damage and Length of Time to Reopen
for Service Organizations

Class	Number	Level of Physical Damage	Length of Time to Reopen
Hotels and Other Lodging	11	2.64	2.73
Personal Ser.	15	2.73	2.93
Business Ser.	6	3.83	2.50
Auto Repair, Service and Parking	9	3.33	2.56
Misc. Repair Services	2	2.00	2.00
Motion Pictures	1	2.00	3.00
Amusement and Recreational Services	7	3.29	2.86
Health Ser.	32	2.88	2.56
Legal Ser.	4	3.00	2.25
Educational Services	7	2.71	2.00
Social Ser.	3	2.67	2.00
Museums, Art Galleries, and Gardens	2	2.00	2.50
Membership Organizations	13	2.77	2.62
Engineering, Accounting, Research, & Other Related	19	2.84	2.16
Division Mean	131	2.88	2.52

Table 9, Cont.

Notes for Table 9

Rankings for Level of Physical Damage
        1=No Damage
        2=Minor Damage
        3=Major Damage
        4=Total loss

Rankings for Length of time to Reopen
        1=less than a week
        2=less than a month
        3=less than a year
        4=over one year/not reopening

finance form groups that have little variation within the group. Both retail and service had considerable variation within their group and do not seem to reflect the theoretical assumptions of taxonomy.

The variation within the service and retail division would indicate the need to analyze groups at a lower level. However, with the exception of health care, this is impractical. The sample size needed to collect sufficient numbers of business organizations below the class level would be enormous. Instead of moving to a lower level of analysis, another alternative will be utilized. Groupings of classes within the division can be formed that are sufficiently homogenous to allow generalizations about their disaster experiences. The retail division was divided into two sub-divisions, durable and non-durable goods. The definition for durable goods is those goods that are expected to last three years or more.

Table 10

<u>Mean Values for Level of Physical Damage and Length of Time
to Reopen for Health Care Establishments</u>

Families	Number	Level of Physical Damage	Length of Time to Reopen
Home Health	1	3.00	2.00
Medical Doctors	6	3.17	3.00
Hospitals	4	2.50	2.00
Dentists	5	2.80	2.80
Nursing Homes	3	3.00	3.33
Residential Treatment Centers	1	3.00	3.00
Ancillary Medical	9	3.00	2.67
Medical Labs	1	2.00	1.00
Miscellaneous Health and Allied Services	2	2.50	1.00
Mean Values	32	2.88	2.56

Rankings for Level of Physical Damage
       1=No Damage
       2=Minor Damage
       3=Major Damage
       4=Total loss

Rankings for Length of time to Reopen
       1=less than a week
       2=less than a month
       3=less than a year
       4=over one year/not reopening

The retail class is divided into two subclasses, durable and non-durable goods. General merchandise stores were excluded at this level because it was not possible to determine if their sales were primarily durable or nondurable goods. Table 11 presented the mean values for durable goods. The F ratio for level of physical damage is .2523, df(2,36) (p<.7783). The F for length of time to reopen is 2.61 (p<.0875).

Table 11

Mean Values for Level of Physical Damage and Length of Time to Reopen for Retailers Selling Durable Goods

Members of Subclass	Number	Level of Physical Damage	Length of Time to Reopen
Building Materials	4	3.25	1.50
Home Furnishings	10	3.00	2.80
Automotive Dealers	25	3.10	2.32
Mean for group	39	3.05	2.36

Rankings for Level of Physical Damage
        1=No Damage
        2=Minor Damage
        3=Major Damage
        4=Total loss

Rankings for Length of Time to Reopen
        1=less than a week
        2=less than a month
        3=less than a year
        4=over one year/not reopening

Table 12 presents mean values for retailers of non-durable goods. The F ratio for level of physical damage is .6144, df(3,71) (p<.6079). The F ratio for length of time to reopen is 3.8267, (p<.0134). General merchandise was excluded from this level of analysis because its mean values

TABLE 12

Mean Values for Level of physical Damage and Length of Time to Reopen for Retailers of Non-durable Goods

Member of Subclass	Number	Level of Physical Damage	Length of Time to Reopen
Eating and Drinking	23	2.65	2.57
Apparel & Accessories	3	2.33	1.67
Food Store	19	2.89	2.00
Miscellaneous Retail	30	2.80	2.70
Mean for Group	75	2.76	2.27

Rankings for Level of Physical Damage
       1=No Damage
       2=Minor Damage
       3=Major Damage
       4=Total loss

Rankings for Length of Time to Reopen
       1=less than a week
       2=less than a month
       3=less than a year
       4=over one year/not reopening

were outside the norms for either groups and it was
uncertain what proportion of their sales were non-durable
versus durable goods. The subdivisions developed from the
service class are social services and education, legal and
professional, and entertainment. While the subdivisions
developed appear to be homogeneous, there were four types of
business that were not included in this level of analysis;
personal services, business services, auto repair and
miscellaneous repair.

The other four types of business not used in the
subclass groups had few members and did not seem to fit well
with any of the obvious grouping. Personal services
primarily consists of beauticians. Further data will be
needed before conclusions can be reached about these five
groups not included at this level.

The first subclass under consideration is social
services and education. The F ratio for level of physical
damage is .0170, df(2,21) (p<.9832). The F ratio for length
of time to reopen is 1.3654 (p<.2770). Table 13 presents
the mean values for the level of physical damage and length
of time to reopen. The disaster experience of these
organizations is of particular interest as these
organizations are an important part of community recovery.

Table 13

Mean Values for Level of Physical Damage and Length of Time
to Reopen for Social Service and Educational
Establishments

Member of Subclass	Number	Level of Physical Damage	Length of Time to Reopen
Educational Services	7	2.71	2.00
Social Services	4	2.75	2.25
Membership Organizations	13	2.77	2.62
Mean Values	24	2.75	2.38

Rankings for Level of Physical Damage
        1=No Damage
        2=Minor Damage
        3=Major Damage
        4=Total loss

Rankings for Length of Time to Reopen
        1=less than a week
        2=less than a month
        3=less than a year
        4=over one year/not reopening

The mean values for legal and professional services are presented in Table 14. The F ratio for level of physical damage is .1643, df(1,21) (p<.6893). The F ratio for length of time to reopen is .0305, (p<.8629). In the second subgroup consisted primarily of CPAs and other accounting related businesses.

Table 14

Mean Values for Level of Physical Damage and Length of Time
to Reopen for Legal and Professional Services Establishments

Members of Subgroup	Number	Level of Physical Damage	Length of Time to Reopen
Legal	4	2.00	2.25
Engineering, CPAs, Research, Management and Related	19	2.16	2.16
Mean for group	23	2.13	2.17

Rankings for Level of Physical Damage
        1=No Damage
        2=Minor Damage
        3=Major Damage
        4=Total loss

Rankings for Length of Time to Reopen
        1=less than a week
        2=less than a month
        3=less than a year
        4=over one year/not reopening

The mean values for the next subclass, entertainment
and tourism related businesses, are presented in Table 15.
The F ratio for level of physical damage is .4978,
df(2,10)(p< .6209). The F ratio for length of time to reopen
is .1443, (p<.8672). These recovery of these organizations
is a factor in the recovery of other organizations as the
hotel and lodging businesses are a critical part of the
tourism industry of the area.

Table 15

Mean Values for Level of Physical Damage and Length of Time to Reopen for Entertainment and Travel Establishments

Members of Subclass	Number	Level of Physical Damage	Length of Time to Reopen
Hotels & Lodging	11	2.36	2.73
Motion Pictures	1	2.00	3.00
Museums & other Related	2	2.00	2.50
Mean for Group	14	2.50	2.71

Rankings for Level of Physical Damage
       1=No Damage
       2=Minor Damage
       3=Major Damage
       4=Total loss

Rankings for Length of Time to Reopen
       1=less than a week
       2=less than a month
       3=less than a year
       4=over one year/not reopening

The final subdivision under consideration is outdoor amusement and recreation facilities. Because of the small number and unique nature of the members of this group, a table describing the members of this group will not be presented so that confidentiality can be maintained. The seven members of this group have an F ratio of 1.857, $df(3,3)$, $(p<.3119)$. The F ratio for length of time to reopen is .4286, $(p<.7477)$.

Analysis at lower levels is not possible because of two factors. First, analysis at levels below class could compromise confidentiality of the respondents. Second, there are not sufficient members of the categories below class for further analysis.

Generalizations Based on the Taxa

One of the primary goals of taxonomy is to develop a system that allows the researcher to make generalizations about the taxa (Sneath and Sokal, 1973). Analysis of each grouping will be presented in this section.

A generalization that can be made about all the taxa is that they are not useful for predicting length of time to reopen. The division or subdivision that an organization belongs to does not appear to have a relationship to an organization's length of time to reopen. It is possible that a relationship exists when the taxa are divided into levels below the ones under consideration for this study. Because of this lack of apparent relationship, only the relationship between grouping and level of physical damage will be discussed in detail. Based on the findings of this study, selection does not seem to explain recovery differentials.

Agricultural establishments formed a homogenous group at the division level. There are two possible explains for tight groupings at the division level, environmental

isomorphism and linkages. Isomorphism causes organizations in the same niche to become similar. The environmental forces surrounding these establishments may have caused a degree of isomorphism that lead to a consistent level of physical damage. The organizations in this division are sensitive to many of the same environmental factors. Their ability to extract resources from their niche is influenced by weather, land prices, credit available in the farm credit system, and commodity prices. All of these factors are beyond the influence of any of the organizations in this study. These factors would be relevant to any agricultural establishments in the U.S.

An additional factor that is important to the organizations in this study is the availability of inexpensive farm labor. Because the laborers are not physically part of the organization, any damage they experience as a result of the hurricane can be externalized by the organization. This is contrasted to agricultural operations that are primarily mechanized and would have machinery that could be damaged by the disaster agent.

The second explanation for the uniformity is tight linkage within the division. Tightly linked organizations have a high degree of interaction with other organizations and changes in one organization have significant effects on those organizations they are linked with. It could be

argued that the degree of linkage is a characteristic of the organization's environment and should therefore be considered a factor that increases isomorphism. The position taken in this study is that while the two are probably related, each can occur without the other. Organizations can be tightly linked without becoming similar. Organizations can be strongly shaped by the force of environmental isomorphism without establishing any linkages. There is little evidence of linkages in this division so this is probably not a major factor in creating a uniform level of physical damage.

Based on the information gathered from the classification process, it would be expected that agricultural establishments would have more physical damage than the mean level of damage for the community they are members of. These organizations would be likely to experience major damage to total loss.

Establishments in the finance and real estate division had a mean level of physical damage that was slightly less than the mean for all organizations in the study. Environmental isomorphism was likely a factor in the homogenous level of damage among members of this group. The members of this division are the subject of significant levels of regulation by government bodies and the tasks they perform require similar physical assets. In addition, these

organizations probably have a significant level of linkage.
Based on the results of the classification process, these
organizations would be likely to experience a mean level of
physical damage that is slightly greater than the mean level
for all businesses in the community.

Retail organizations form a large and diverse group in
the community under study. Because of this diversity, it
was not possible to analyze the level of damage at the
division level. When the division was subdivided into
retailers of durable and nondurable goods, a sufficient
level of uniformity was achieved to allow analysis.

Retailers of nondurable goods had a lower mean level of
physical damage than all organizations and a much lower mean
level than retailers of durable goods. This a probably
related to the nature of the inventory these establishments
own. These goods cycle through the business at a fairly
high rate. In addition, they form a lower proportion of the
total assets of the business than the inventory of retailers
of durable goods. In addition to the higher value of the
inventory, some of the goods the durable retailers were
selling were likely outdoors, thereby exposing them to
greater weather losses. Auto dealers and lumber yards in
particular would face greater exposure. Retailers of home
furnishings would be likely to have inventory displayed and
stored in large warehouse type structures. These structures

would be particularly vulnerable to the high winds and torrential rains associated with Andrew.

The division with the largest number of members was service. Like the members of the retail division, these organizations were too diverse to make meaningful observations and generalizations about. As observed in the agriculture and retail division, those organizations that have assets that are normally exposed to the elements experience higher level of physical damage. The outdoor amusement and recreation subdivision experienced very high levels of physical damage.

Organizations providing health care experienced slightly less damage than the mean level of damage for all groups. While these organizations were likely to posses equipment that would be damaged or destroyed by the elements, environmental forces may have reduced the level of damage. Nursing homes and hospitals are required by law to have disaster plans. Hospitals, because of their importance to the community at times of crisis, are typically located in disaster resistant buildings.

Organizations providing legal and professional services had a mean level of damage that was slightly less than the mean for all organizations. These organizations would have roughly the same production related assets. Convergence in this subdivision was probably due primarily to environmental

isomorphism. Organizations providing social and educational services experienced less mean damage than the legal and professional services subdivision. This decline is probably related to a reduction in the value and amount of assets used in the production of services.

Of all the service organizations, those providing entertainment and lodging experienced the lowest levels of physical damage. In fact, this group and manufacturing businesses experienced the lowest level of physical damage of all groups in the study. There is no evidence of linkages among the members of this group. It is also unclear what environmental forces would cause these organizations to experience lower levels of damage. This area has building codes that require construction to be able to withstand high winds and storms. Based on these factors, lodging and entertainment organizations would expect to experience a significantly lower mean level of physical damage than other organizations in the business community.

Table 16 presents the rankings of the divisions and subdivisions based on the level of physical damage. When the subdivisions replace the divisions of retail and service the F ratio for level of physical damage is 2.04 df(8,274), (p<.0423). The F ratio for length of time to reopen is .9045,(p<.5131). The retail and service division are shown on the table for comparison purposes.

Table 16

Mean Level of Physical Damage at the division and the
Subdivision Level

Entertainment/Lodging (S)	2.50
Social Service and Educational (S)	2.75
Retailers of nondurable Goods (R)	2.76
Legal and Professional (S)	2.87
Retail	2.88
Health Care (S)	2.88
Service	2.89
MEAN	2.91
Finance	3.02
Retailers of Durable goods (R)	3.05
Agriculture	3.14
Outdoor Amusement and recreation (S)	3.29

1=Little/No damage
2=Minor Damage
3=Major Damage
4=Total Loss

Selection Model

Based on the previous analysis, the proposed model of disaster recovery has been revised as shown in Figure 6. The initial model included the length of time the business needed to resume operations. This variable has been removed and the revised model is presented. Selection appears to have an influence on the level of physical damage experienced by groups of organizations but not on the length of time to reopen.

Figure 6. The Revised Selection Model.

```
                    Isomorphism
                         ⇓
                       Org.
        Disaster ⇒ Species ⇒ Level of Physical Damage
        Agent           ⇑
                     Inertia
```
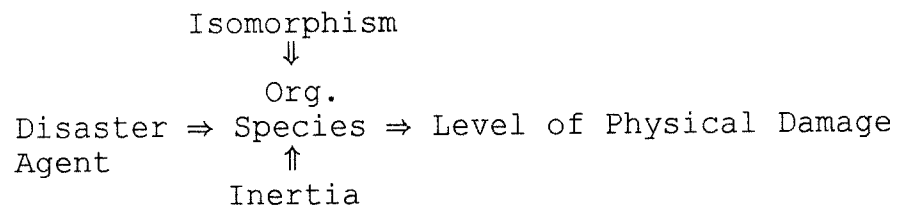
Contingency Theory

The results of the analysis based on the contingency perspective will be presented here. The first stage of the analysis will examine the relationship between level of physical damage and the contextual variables of age, size, income, Chamber of Commerce membership, ownership of business location, and property insurance. The second stage will look at the relationship between the length of time to reopen to each contextual variable and level of physical damage.

Level of Physical Damage

This section contains the results of the analysis of the relationships between level of physical damage and the contextual variables of age, size, income, membership in the Chamber of Commerce, ownership of business location and property insurance. A table is presented at the end of this section contains the chi square, level of significance, and gamma for each variable.

Age

  The variable under consideration is age of the business. Table 17 shows the relationships in a contingency table that illustrates the relationship between age of the business and level of physical damage. Younger businesses tended to either have little or no damage or total loss. The oldest group of businesses, those that had been in operation more than ten years, consistently experienced major damage. Chi Square is 24.34390, df(9), (p.<.004), and gamma is -.035. While the level of significance is higher, the value for gamma indicates that there is negligible negative relationship.

Table 17

Contingency Table Showing the Relationship Between Age of
the Business and Level of Physical Damage

		AGE				
LEVEL OF PHYSICAL DAMAGE		3 Years or less	4 to 6 Years	7 to 10 Years	10 Years or more	Total
No Damage	Count Exp value Row % Column % Total	4 1.7 40.0 6.6 1.1	4 1.2 40.0 9.3 1.1	0 1.1 0.0 0.0 0.0	2 6.0 20.0 .9 .6	10 10 100.0 2.8 2.8
Little Damage	Count Exp value Row % Column % Total	10 14.1 12.0 16.4 2.8	10 9.9 12.0 23.3 2.8	14 9.2 16.9 35.0 3.9	49 49.8 59.0 22.7 13.6	83 83.0 100.0 23.1 23.1
Major Damage	Count Exp value Row % Column % Total	29 32.7 15.0 47.5 8.1	19 23.1 9.8 44.2 5.3	17 21.4 9.8 44.2 5.3	128 115.8 66.3 59.3 35.6	193 193.0 100.0 53.6 53.6
Total Loss	Count Exp value Row % Column % Total	18 12.5 24.3 29.5 5.0	10 8.8 13.5 23.3 2.8	9 8.2 12.2 22.5 2.5	37 44.4 50.0 17.1 10.3	74 74.0 100.0 20.6 20.6
Total	Count Exp value Row % Column % Total	61 61.0 16.9 100.0 16.9	43 43.0 11.9 100.0 11.9	40 40.0 11.1 100.0 11.1	216 216.0 60.0 100.0 60.0	360 360.0 100.0 100.0 100.0

Size

The level of physical damage is presented in a condensed form, three categories rather than four, because the 4X4 had 25% of cells having less than 5 expected count. The categories of little and no damage were combined because these are the cells that have the low expected values. Chi square was 17.945, df(6), (p<.0003). Gamma is -.100. This is a low negative relationship. As shown in table 18, there is little difference between the observed and the expected values in the majority of cells.

Table 18

Contingency Table Showing the Relationship Between Size of
the Business and the level of Physical Damage

		SIZE*				
LEVEL OF PHYSICAL DAMAGE		0 to 5	6 to 15	16 to 50	51 or more	Total
No/Minor Damage	Count Exp Val Row Column Total	49 48.4 54.4 25.8 13.9	25 20.7 27.8 30.9 7.1	12 12.7 13.3 24.0 3.4	4 8.2 4.4 12.5 1.1	90 90.0 100.0 25.5 25.5
Major Damage	Count Exp Val Row Column Total	91 103.3 47.4 47.9 25.8	45 44.1 23.4 55.6 12.7	30 27.2 15.6 60.0 8.5	26 17.4 13.5 81.3 7.4	192 192.0 100.0 54.4 54.4
Total Loss.	Count Exp Val Row Column Total	50 38.2 70.4 26.3 14.2	11 16.3 15.5 13.6 3.1	8 10.1 11.3 16.0 2.3	2 6.4 2.8 6.3 .6	71 71.0 100.0 20.1 20.1
Total	Count Exp Val Row Column Total	190 190 53.8 100.0 53.8	81 81 22.9 100.0 22.9	50 50 14.2 100.0 14.2	32 32 9.1 100.0 9.1	353 353 100.0 100.0 100.0

*Measured by number of employees, not counting the owner if
owner operated.

Pre-disaster Gross Sales

The next variable under consideration is pre-disaster Gross Sales. The data presented in Table 19 show little variation between the observed and expected values. Chi square is 23.70644, df(9), (p<.00479). Gamma is −.082. This is a negligible negative relationship. The largest organizations concentrated in the category of major damage while there is a great deal of variability in the level of damage for organizations with less revenue.

TABLE 19

Contingency Table Showing the Relationship Between Income
and Level of Physical Damage

		1992 INCOME (,000)				
LEVEL OF PHYSICAL DAMAGE		$99 or less	$100 to $499	$500 to $4,999	$5,000 or more	Total
Minor/ No Damage	Count Exp Val Row Column Total	18 17.7 24.7 27.7 6.7	22 20.7 30.1 28.9 8.2	26 26.7 35.6 26.5 9.7	7 7.9 9.6 24.1 2.6	73 73.0 100.0 27.2 27.2
Major Damage	Count Exp Val Row Column Total	27 34.9 18.8 41.5 10.1	43 40.8 29.9 56.6 16.0	54 52.7 37.5 55.1 20.1	20 15.6 13.9 69.0 7.5	144 144.0 100.0 53.7 53.7
Total Loss	Count Exp Val Row Column Total	20 12.4 39.2 30.8 7.5	11 14.5 21.6 14.5 4.1	18 18.6 35.3 18.4 6.7	2 5.5 3.9 6.9 .7	51 51.0 100.0 19.0 19.0
Total	Count Exp Val Row Column Total	65 65.0 24.3 100.0 24.3	76 76.0 28.4 100.0 28.4	98 98.0 36.6 100.0 36.6	29 29.0 10.8 100.0 10.8	268 268.0 100.0 100.0 100.0

Chamber of Commerce Membership

Table 20 shows the relationship between membership in the Chamber of Commerce and level of physical damage. The table is a 2X2 because Chamber membership is a dichotomous variable. Chi square is .04349, df(1),(p<.835). Gamma is .027. This is a negligible positive relationship.

Table 20

Contingency Table Showing the Relationship Between Membership in the Chamber of Commerce and Level of Physical Damage

	MEMBERSHIP IN THE CHAMBER OF COMMERCE			
LEVEL OF PHYSICAL DAMAGE		No/Not Sure	Yes	Total
Little or no Damage	Count Exp value Row Column Total	32 31.2 35.2 26.2 9.0	59 59.8 64.8 25.2 16.6	91 91.0 100.0 25.6 25.6
Major Damage or Total Loss	Count Exp value Row Column Total	90 90.8 34.0 73.8 25.3	175 174.2 66.0 74.8 49.2	265 265.0 100.0 74.4 74.4
Total	Count Exp value Row Column Total	122 122.0 34.3 100.0 34.3	234 234.0 65.7 100.0 65.7	356 356 100.0 100.0 100.0

Ownership of Location

Table 21 shows the relationship between ownership of business location and level of physical damage. The level of significance is .12416. Chi square is 2.36403, df(1), (p<.124). Gamma is .184. This relationship is not significant.

Table 21

Contingency Table Showing the Relationship Between Ownership of Business Location and the Level of Physical Damage

		OWNERSHIP OF BUSINESS LOCATION		
LEVEL OF PHYSICAL DAMAGE		Do Not Own	Own	Total
Little or No Damage	Count Exp Value Row Column Total	53 46.6 57.0 29.8 14.9	40 46.4 43.0 22.6 11.3	93 93.0 100.0 26.2 26.2
Major Damage or Total Loss	Count Exp Value Row Column Total	125 131.4 47.7 70.2 35.2	137 130.6 52.3 77.4 38.6	262 262.0 100.0 73.8 73.8
Total	Count Exp Value Row Column Total	178 178.0 50.1 100.0 50.1	177 177.0 49.9 100.0 49.9	355 355.0 100.0 100.0 100.0

Property Insurance

Table 22 shows the relationship between property insurance and level of physical damage. The level of significance is .64425. Chi square is .21322, df(1), (p<.644). Gamma is -.073. This relationship is not significant.

Table 22

Contingency Table Showing the Relationship Between Property Insurance and the Level of Physical Damage

		PROPERTY INSURANCE		
LEVEL OF PHYSICAL DAMAGE		No Insurance	Insurance	Total
Little or No Damage	Count Exp Value Row Column Total	16 17.5 18.0 23.2 4.6	73 71.5 82.0 25.9 20.8	89 89.0 100.0 25.4 25.4
Major Damage or No Damage	Count Exp Value Row Column Total	53 51.5 20.2 76.8 15.1	209 210.5 79.8 74.1 59.5	262 262.0 100.0 74.6 74.6
Total	Count Exp Value Row Column Total	69 69.0 19.7 100.0 19.7	282 282.0 80.3 100.0 80.3	351 351.0 100.0 100.0 100.0

Hypotheses Concerning Physical Damage

The hypotheses concerning the relationship between physical damage and the contextual variables will be considered in this section.

H_1. Older organizations will experience less physical damage than younger organizations.

Table 23 summarizes the relationship between the level of physical damage and the contextual variables. The relationship between age and level of physical damage is significant and H_1 is accepted. Based on the gamma, the relationship is very weak. While increased age is associated with lower levels of physical damage, the association is so weak that age is not a useful predictor of the level of physical damage.

H_3. Larger organizations will have less physical damage than smaller organizations.

H_3 has a significant negative relationship with the level of physical damage. While the gamma for this relationship is stronger than that for age, it is still considered weak. Therefore, while H_3 is accepted as significant, the relationship is too weak to be useful in prediction the level of physical damage.

H_5. Organizations with higher pre-disaster income will have less physical damage.

The relationship between the level of physical damage and pre-disaster income is significant; therefore, H_5 is accepted. Like the two previous variables, the gamma indicated a negligible negative association. Because of this, this relationship is not useful in predicting the level of physical damage.

H_7. Organizations that are members of the Chamber of Commerce will have less physical damage.

H_9. Organizations that own their business location will have less physical damage.

H_{11}. Organizations that have property insurance in force before the disaster will have shorter recovery times.

Membership in the Chamber of Commerce, ownership of business location, and property insurance have no significant relationship to the level of physical damage. H_7, H_9 and H_{11} are rejected. Based on the analysis, the contingency model using the contextual variables selected in this study do not appear to be useful in explaining the level of physical damage.

Table 23

A Summary of the Relationship between the Level of Physical Damage and the Contextual Variables

Variable	Chi Square	Level of Significance	Gamma	Relationship
Age	24.34	.004	-.035	Significant but negligible association
Size	17.95	.001	-.100	Significant but weak association
Pre-Disaster Gross Sales	23.71	.005	-.082	Significant but negligible association
Membership in the Chamber of Commerce	.04	.838	.027	NS
Ownership of location	2.36	.124	.184	NS
Property Insurance	.21	.644	-.073	NS

Length of Time to Reopen

The results of the analysis of the relationship between length of time to reopen and level of physical damage and the contextual variables are presented in this section. As in the previous section, a table is presented that assists in exploring the relationship between the length of time to reopen and the contextual variables.

Level of Physical Damage

The variable measuring the level of physical damage was compressed to three categories from four to avoid an excessive number of cells with an expected value of less than 5. When presented in a 4X4 table, 25% of the cells had an expected value of less than 5. The 3X4 table had no cells with an expected value of less than five. Chi square is 90.476, df(6), (p<.001). Gamma is .610. This relationship is significant and gamma indicates a substantial positive relationship.

Table 24

Contingency Table showing the Relationship between the Level
of Physical Damage and Length of Time to Reopen

		LEVEL OF PHYSICAL DAMAGE			
LENGTH OF TIME TO REOPEN		Little/ No Damage	Major Damage	Total Loss	Total
Less than a week	Count Exp Val Row Column Total	32 19.5 43.2 34.0 9.0	38 39.4 51.4 20.0 10.6	4 15.1 5.4 5.5 1.1	74 74 100.0 20.7 20.7
Less than a month	Count Exp Val Row Column Total	37 19.5 50.0 39.4 10.4	34 39.4 45.9 17.9 9.5	3 15.1 4.1 4.1 .8	74 74 100.0 20.7 20.7
Less than one year	Count Exp Val Row Column Total	24 46.1 13.7 25.5 6.7	105 93.1 60. 55.3 29.4	46 35.8 26.3 63.0 12.9	175 175 100.0 49.0 49.0
Over a year/ Not reopen- ing	Count Exp Val Row Column Total	1 9.0 2.9 1.1 .3	13 18.1 38.2 6.8 3.6	20 7.0 58.8 27.4 5.6	34 34.0 100.0 9.5 9.5
Total	Count Exp Val Row Column Total	94 94 26.3 100 26.3	190 190 53.2 100.0 53.2	73 73 20.4 100.0 20.4	357 357 100.0 100.0 100.0

Age

The relationship between age and length of time to reopen mirrors the previous relationship, older business reopen faster than younger businesses. Chi square is 22.49, df(9), (p<.007). Gamma is -.292. The gamma indicates a moderate negative association. Older businesses appear to be able to reopen quicker than younger businesses.

Table 25

Contingency Table Showing the Relationship Between Age of
Business and Level of Physical Damage

		AGE				
LENGTH OF TIME TO REOPEN		3 yrs or less	4 to 6 years	7 to 10 years	10 years or more	Total
Less than a week	Count Exp. Row Column Total	5 12.8 6.8 8.2 1.4	6 9.0 8.1 14.0 1.7	4 8.2 5.4 10.3 1.1	59 44.0 79.7 28.1 16.7	74 74 100 21.0 21.0
Less than a month	Count Exp. Row Column Total	11 12.8 14.9 18.0 3.1	8 9.0 10.8 18.6 2.3	7 8.2 9.5 17.9 2.0	48 44.0 64.9 22.9 13.6	74 74 100.0 21.0 21.0
less than a year	Count Exp. Row Column Total	39 29.4 22.9 63.9 11.0	25 20.7 14.7 58.1 7.1	23 18.8 13.5 59.0 6.5	83 101.1 48.8 39.5 23.5	170 170 100.0 48.2 48.2
Over a year/ not reope n-ing	Count Exp. Row Column Total	6 6.0 17.1 9.8 1.7	4 4.3 11.4 9.3 1.1	5 3.9 14.3 12.8 1.4	20 20.8 57.1 9.5 5.7	35 35 100.0 9.9 9.9
Total	Count Exp. Row Column Total	61 61 17.3 100.0 17.3	43 43 12.2 100.0 12.2	39 39 11.0 100.0 11.0	210 210.0 59.5 100.0 59.5	353 353.0 100.0 100.0 100.0

Size

The next relationship explored is that between size and
length of time to reopen. Chi square is 30.691,
df(9),(p<.0003). Gamma is -.266. Gamma indicates a low
negative association. Among those organizations with 5
members or less, a smaller number than expected were able to
reopen in less than a week. Conversely, larger
organizations were able to reopen in less than a week at
higher rates than expected.

Table 26

Contingency Table Showing the Relationship Between Size of Business and Length of Time to Reopen

		SIZE*				
LENGTH OF TIME TO REOPEN		0-5	6-15	16-50	51 +	Total
Less than a week	Count Exp Val Row Column Total	23 38.8 31.9 12.4 6.7	22 16.7 30.6 27.5 6.4	15 10.0 20.8 31.3 4.3	12 6.5 16.7 38.7 3.5	72 72 100.0 20.9 20.9
Less than a month	Count Exp Val Row Column Total	37 39.4 50.7 19.9 10.7	16 16.9 21.9 20.0 4.6	13 10.2 17.8 27.1 3.8	7 6.6 9.6 22.6 2.0	73 73 100.0 21.2 21.2
Less than a year	Count Exp Val Row Column Total	111 91.1 65.7 59.7 32.2	36 39.2 21.3 45.0 10.4	15 23.5 8.9 31.3 4.3	7 15.2 4.1 22.6 2.0	169 169 100.0 49.0 49.0
A year or more/ Not reopen- ing	Count Exp Val Row Column Total	15 16.7 48.4 8.1 4.3	6 7.2 19.4 7.5 1.7	5 4.3 16.1 10.4 1.4	5 2.8 16.1 16.1 1.4	31 31 100.0 9.0 9.0
Total	Count Exp Val Row Column Total	186 186 53.9 100.0 53.9	80 80 23.2 100.0 23.2	48 48 13.9 100.0 13.9	31 31 9.0 100.0 9.0	345 345 100.0 100.0 100.0

*Measured by number of employees

Pre-Disaster Gross Sales

The next variable under consideration is pre-disaster gross sales. Table 27 presents a contingency table that illustrates the relationship between revenue and length of time to reopen. Chi square is 41.267, df(9), (p< .00001). Gamma is -.371. This is a moderate negative association.

The expected number of businesses with gross sales of $99,999 or less that were able to reopen in less than a week was 14. The actual number was five. This pattern reverses itself at the highest level of sales, those business with $5,000,000 or more in sales. Fourteen businesses reopened in less than a week while the expected number is 6.3.

Table 27

Contingency Table Showing the Relationship Between Pre-
disaster Gross Sales of Businesses and Length of Time to
Reopen

LENGTH OF TIME TO REOPEN		INCOME (,000)				
		$99 or less	$100 to $499	$500 to $4,999	$5,000 or More	Total
Less than a week	Count Exp value Row Column Total	5 14.0 8.8 7.7 1.9	6 16.0 10.5 8.1 2.3	32 20.7 56.1 33.3 12.1	14 6.3 24.6 48.3 5.3	57 57 100.0 21.6 21.6
Less than a month	Count Exp value Row Column Total	12 14.3 20.7 18.5 4.5	18 16.3 31.0 24.3 6.8	24 21.1 41.4 25.0 9.1	4 6.4 6.9 13.8 1.5	58 58 100.0 22.0 22.0
Less than one year	Count Exp value Row Column Total	40 29.8 33.1 61.5 15.2	42 33.9 34.7 56.8 15.9	31 44.0 25.6 32.3 11.7	8 13.3 6.6 27.6 3.0	121 121 100.0 45.8 45.8
Over one year/ Not Reopening	Count Exp value Row Column Total	8 6.9 28.6 12.3 3.0	8 7.8 28.6 10.8 3.0	9 10.2 32.1 9.4 3.4	3 3.1 10.7 10.3 1.1	28 28 100.0 10.6 10.6
Total	Count Exp value Row Column Total	65 65 24.6 100.0 24.6	74 74 28.0 100.0 28.0	96 96 36.4 100.0 36.4	29 29.0 11.0 100.0 11.0	264 264 100.0 100.0 100.0

Membership in the Chamber of Commerce

The relationship between membership in the Chamber of Commerce and length of time to reopen is significant. Chi square is 14.049, df(1), (p<.00018). Gamma is -.212. This is a low negative relationship. Among Chamber members, there is a shift toward a shorter length of time to reopen.

Table 28

Contingency table showing the relationship between membership in the Chamber of Commerce and length of time to reopen

LENGTH OF TIME TO REOPEN		MEMBERSHIP IN THE CHAMBER OF COMMERCE		
		No	Yes	Total
Less than a month	Count	34	111	145
	Exp Value	50.4	94.6	145
	Row	23.4	76.6	100.0
	Column	28.1	48.9	41.7
	Total	9.8	31.9	41.7
More than a month and not reopen-ing	Count	87	116	203
	Exp Value	70.6	132.4	203.0
	Row	42.9	57.1	100.0
	Column	71.9	51.1	58.3
	Total	25.0	33.3	58.3
Total	Count	121	227	348
	Exp Value	121.0	227.0	348.0
	Row	34.8	65.2	100.0
	Column	100.0	100.0	100.0
	Total	34.8	65.2	100.0

Ownership of Business Location

The relationship between ownership of the business location and length of time to reopen showing a strong positive relationship between ownership and decreased length of time to reopen. Chi square is 10.41945, df(1), (p<.00125). Gamma is -.214. This is a low negative relationship and is statistically significant.

Table 29

Contingency Table Showing the Relationship Between Ownership of Business Location and Length of Time to Reopen

		OWNERSHIP OF BUSINESS LOCATION		
LENGTH OF TIME TO REOPEN		Not Owned	Owned	Total
Less than a Month	Count Exp Value Row Column Total	58 72.8 40.3 33.0 16.7	86 71.2 59.7 50.0 24.7	144 144 100.0 41.4 41.4
More than a Month/ Not Reopening	Count Exp Value Row Column Total	118 103.2 57.8 67.0 33.9	86 100.8 42.2 50.0 24.7	204 204 100.0 58.6 58.6
Total	Count Exp Value Row Column Total	176 176.0 50.6 100.0 50.6	172 172 49.4 100.0 49.4	348 348 100.0 100.0 100.0

Insurance

The relationship between property insurance and length of time is also counter intuitive. The level of significance is .37686. Chi square is .78091, df(1), (p<.37686). Gamma is -.124. The relationship is not significant. These findings are contrary to findings in the sociology literature that associated insurance with increased levels of recovery for individuals.

Table 30

Contingency Table Showing the Relationship Between Property Insurance and Length of Time to Reopen

LENGTH OF TIME TO REOPEN		No Insurance	Insurance	Total
		PROPERTY INSURANCE		
Less than a month	Count Exp Value Row Column Total	24 27.2 17.1 35.8 7.0	116 112.8 82.9 41.7 33.6	140 140.0 100.0 40.6 40.6
More than a month/ Not reopening	Count Exp Value Row Column Total	43 39.8 21.0 54.2 12.5	162 165.2 79.0 58.3 47.0	205 205.0 100.0 59.4 59.4
Total	Count Exp Value Row Column Total	67 67.0 19.4 100.0 19.4	278 278.0 80.6 100.0 80.6	345 345.0 100.0 100.0 100.0

Hypotheses Concerning the Length of Time to Reopen

H_2. Older organizations will reopen faster than younger organizations.

Table 31 summarizes the relationship between the length of time to reopen and the contextual variables. The relationship between the level of physical damage and age is significant and H2 is accepted. Based on the gamma of -.292, the association appears to be too weak to explain the length of time to reopen. While the gamma is below the threshold for a moderate relationship, .30, it is very close and merits consideration in future research.

H_4. Larger organizations will have shorter recovery times.

The relationship between size and length of time to reopen is significant and H4 is accepted. The association between size and length of time to reopen is a low negative association. As with age, the gamma for size is close to the threshold for a moderate association.

H_6. Organizations with higher pre-disaster gross sales will have shorter recovery times.

The relationship between length of time to reopen and pre-disaster income is significant and H6 is accepted. The gamma for income indicates a moderate level of association.

H_8. Organizations that are members of the Chamber of Commerce will have shorter recovery times.

The relationship between length of time to recover and membership in the Chamber of Commerce is significant and H_8 is accepted. Based on the gamma, the association is low. Because of the low level of association, information about membership in the Chamber of Commerce is not useful in predicting the length of time to reopen.

H_{10}. Organizations that own their business location will have shorter recovery times.

The relationship between length of time to reopen is significant and H_{10} is accepted. Based on the value for gamma, the association is low and is not useful in predicting the length of time to reopen.

H_{12}. Organizations that have property insurance in force before the disaster will have shorter recovery times.

The relationship between length of time to reopen and having property insurance is not significant therefore H_{12} is rejected.

Table 31

A Summary Table of the Chi Square, Level of Significance and Gamma for each Variable

Variable	Chi Square	Level of Significance*	Gamma	Significance
Level of Physical Damage	92.476	.001	.610	significant with a substantial positive association
Age	22.49	.007	-.292	Significant with a low negative association
Size	30.69	.001	-.266	Significant with a low negative association
Pre-disaster Gross Sales	41.27	.001	-.371	Significant with a moderate negative association
Membership in the Chamber of Commerce	14.05	.001	-.212	Significant with a low negative association
Ownership of Business location	10.42	.001	-.214	Significant with a low negative association
Property Insurance	.78	.377	-.124	NS

*Rounded to three places.

Discussion

Based on the results of the preceding analysis, the contingency perspective does not seem to be useful in explaining the level of physical damage. While the relationships between age, size and gross sales and level of physical damage are significant, the strength of association is very weak. Knowing the mean level of these variables would not be useful in predicting the level of physical damage.

The contextual variables do appear to help explain the length of time to reopen. The level of physical damage, income and age appear to be useful in predicting the length of time to reopen. It is logical that damage would have a substantial association with the length of time to reopen. While the relationship is substantial, there is still a large part of the variance that is not explained by the level of damage alone. Higher income appears to shorten the length of time to reopen, possibly through increased access to immediate resources and credit. Older organizations have had an opportunity to develop established organizational routines and increased managerial knowledge. This indicates that the pattern of recovery may be that those organizations that have quick access to resources and have the skills to use the resources are the organizations that recover the quickest.

Configuration Theory

The following section presents the results of the analysis of the data using configuration theory as a framework. Cluster analysis is used to describe the organizational configurations. These configurations will form the basis of an organizational typology.

Taxonomic Procedures

A brief review of the taxonomic process will be presented. The process starts with selection of the organisms to be classified. As discussed in Chapter three, the OTU's in this study are businesses in Homestead, Florida at the time Hurricane Andrew struck.

The second step is the selection of the characteristics of the OTUs. Characteristics of the businesses in this study were selected by examining existing studies of disaster victims to determine what characteristics were relevant. As previously noted, the characteristics selected are age, size, gross sales, membership in the Chamber of Commerce, property insurance, and ownership of business location.

In the next phase of analysis, the characteristics are recorded and resemblances are calculated. The data used in this study have been recorded in a SPSS data file and the resemblances are calculated using cluster analysis. The final two steps in the taxonomic process is the development

of taxa and generalizations about the taxa. Each cluster will be described and a typology will be developed based on the taxa.

Analysis of Clusters

The first step in conducting the analysis is to determine the number of clusters. K-means was selected as the clustering method. This method was selected because it was consistent with theoretical goal of determining the existing configurations. Iterative partitioning methods, like K-means, begin with the objects to be clustered in a single group and attempt to divide the subjects into groups that are as internally homogenous as possible (Bailey, 1994).

As suggested by Norusis (1994), hierarchical cluster analysis, specifically the complete method, was used to determine the number of clusters. The variables used to define the clusters are age, size, gross sales, Chamber of Commerce membership, ownership of business location and property insurance. A seven cluster solution was accepted based on a visual inspection of the dendrogram and the distance coefficient.

An advantage of iterative methods is that more than one pass is made through the data. Passes through the data continue as cases are reassigned to clusters until an optimal solution is reached. This process compensates for

poor initial partition of the data if it occurs (Aldenderfer and Blashfield, 1984). Four iterations were required to develop the optimal solution with maximum distance between the clusters.

The next step in the analysis was to determine if the clusters had significantly different disaster experiences. Their experiences were examined along two variables, level of physical damage and length of time to reopen. Discriminant analysis was used to determine if significant differences in means exist. Table 32 shows the mean values for length of time to reopen and level of physical damage.

Table 32

Multiple Discriminant Analysis of the Seven Cluster Solution
With Mean Values for Level of Physical Damage and Length of
Time to Reopen

Cluster	Number	Level of Physical Damage	Length of Time to Reopen
C1	38	2.95	2.79
C2	52	2.88	2.17
C3	47	2.85	2.04
C4	25	2.72	2.52
C5	18	2.72	2.50
C6	4	3.50	2.50
C7	67	3.00	2.73
Total	251	2.90	2.45

The F value for level of physical damage is 1.1499, df(6,244), (p<.3340). The F ratio for length of time to reopen is 4.4780, (p<.0013). The analysis will focus on length of time to reopen because of the lack of significant differences between the cluster's mean level of physical damage.

Table 33 presents the clusters ranked by length of time to reopen with the mean value for each of the variables used to find the cluster. The clusters fall into three groups. Clusters three and two have the shortest lengths of time to reopen and are positioned well above the mean. Clusters five, six, and four group together just below the mean. The two lowest performing clusters, seven and one, form the third group.

A Discriminant analysis of clusters three and two is undertaken to determine how these two clusters differ. The F ratio for length of time to reopen is .4045, df(1, 97), (p<.5273). The F ratio is not significant so these two groups do not have significantly different lengths of time to reopen, however, they do differ significantly along organizational characteristics. The members of cluster three have a lower mean level of pre-disaster gross sales and a much smaller mean size than the members of cluster two. The F ratio for pre-disaster income is 30.748

Table 33

Mean Values for Clusters Along the Variables Clustered with Clusters Ordered by Length of
Time to Reopen

CLUSTERING VARIABLES

Cluster	Number	Length of Time to Reopen	Age	Size	Gross Sales	Chamber of Commerce Membership	Property Insurance	Ownership of Business Location
C3	47	2.04	3.89	1.66	3.02	1.85	1.89	1.66
C2	53	2.17	3.96	3.43	3.43	1.91	1.94	1.81
MEAN	254	2.45	3.21	1.83	2.35	1.72	1.80	1.50
C5	19	2.50	3.89	2.21	1.95	1.74	1.84	1.68
C6	4	2.50	1.25	3.50	3.00	1.75	2.00	1.50
C4	26	2.52	1.62	1.65	2.77	1.69	1.50	1.15
C7	67	2.73	3.76	1.00	1.55	1.63	1.76	1.37
C1	38	2.79	1.29	1.00	1.26	1.48	1.74	1.24

(p<.0001) and the F ratio for size is 320.369, (p<.0001).
Both clusters of organizations were typically older, members
of the Chamber of Commerce, had property insurance in force,
and owned their business location. The Discriminant analysis
found that none of these variables were significantly
different.

The second group of clusters had a length of recovery
time that was slightly less than the mean for the entire
group of organizations studied. Like the two previous
clusters, the results of Discriminant analysis show that
these three clusters have very different characteristics.
The only characteristics these three clusters had in common
were length of time to reopen and membership in the Chamber
of Commerce. The F ratio for length of time to reopen was
.0026, df(2,44), (p<.9974). The F ratio for Chamber of
Commerce membership is .0644, (p<.9377).

Clusters five and six have the same mean length of time
to reopen, 2.500. The members of cluster five were the
oldest of the three middle clusters and the second oldest
group in the study. Cluster five has the lowest mean size
of the middle three clusters in the study. The cluster is
near the mean for all groups study and between the two other
clusters in its group for level of pre-disaster income. The
members of cluster five typically had property insurance and
were slightly more likely to own their business location.

The members of cluster six have the lowest mean age and the highest mean size. This cluster also had a mean level of gross sales, 3.000, that was above the mean for all clusters, 2.350. The members of this group were typically members of the Chamber of Commerce and all had property insurance. The group was evenly divided between owning and leasing their business location.

The members of cluster four were on the average, younger and had lower gross sales than the other organizations in the study. The members of this group had the largest mean size of the three moderately performing groups. and were the third oldest group of the entire study. They were less likely to be Chamber members, have property insurance, and own their business location than the other moderately performing clusters.

The final two clusters examined, clusters seven and one, had the longest length of time to reopen. These clusters do not have significantly different lengths of time to reopen. The F ratio is .1521, (df 1, 103), (p<.6973). The clusters differ significantly only along two variables, age and sales. Cluster seven is considerable older than cluster one. Conversely, cluster seven has lower gross sales than cluster one. While the two clusters have

significantly different levels of gross sales when compared to each other, they have the lowest mean gross sales of all the clusters analyzed. The F ratio for age is 763.108 df(1, 103), (p<.0001) and the F ratio for sales is 8.7197, (p<.0001). The organizations in both clusters had the smallest mean size of all the organizations studied. These two clusters were the least likely to be members of the Chamber of Commerce of all the organizations in the study. The cluster means were below the mean level of insurance for the entire study. The members of cluster one were more likely to be renters while the members of cluster seven were evenly divided between renters and owners.

Developing a Typology of the Organizational Types

The organizational characteristics can be grouped along two dimensions, resources and structure. Variables included in the resources group are income, ownership of business location and property insurance. Structural variables are size, age, and Chamber of Commerce membership. Two new variables, resources and structure, are created and the values for each variable, rounded to whole numbers, are presented in Table 34. The resources and structure variables are measured on an eight point scale. The resources variable combine gross sales, 1-4, property insurance 1-2, and ownership of business location, 1-2. The resource score for cluster one is obtained by taking the

Table 34

Mean Values for each Structure and Resources and the Scaled Values for Structure

Variable	Mean Value for C1	Scaled Value for C1	Mean Value for C2	Scaled Value for C2	Mean Value for C3	Scaled Value for C3	Mean Value for C4	Scaled Value for C4	Mean Value for C5	Scaled Value for C5	Mean Value for C6	Scaled Value for C6	Mean Value for C7	Scaled Value for C7
Age	1.29	.97	3.96	2.97	3.89	2.92	1.62	1.22	3.89	2.92	1.25	.94	3.76	2.82
Size	1	.75	3.43	2.57	1.66	1.25	1.65	1.24	2.21	1.66	3.50	2.62	1.00	.75
Chamber Membership	1.48	1.48	1.91	1.91	1.85	1.85	1.69	1.69	1.74	1.74	1.75	1.75	1.63	1.63
Structure Score		3.2		7.45		6.02		4.15		6.32		5.31		6.5
Gross Sales	1.26		3.43		3.02		2.77		1.95		3.00		1.55	
Ownership if Business Location	1.24		1.81		1.66		1.15		1.68		1.50		1.37	
Property Insurance	1.74		1.94		1.89		1.50		1.84		2.00		1.76	
Resource Score	4.24		7.18		6.57		5.42		5.47		6.5		4.68	
Typology Location		(3.2, 4.24)		(7.45, 7.18)		(6.02, 6.57)		(4.15, 5.42)		(6.32, 5.47)		(5.31, 6.5)		(6.5, 4.68)

mean scores for gross sales (1.26), property insurance (1.74), and ownership of location (1.24) and adding them together (4.24). This gives greater weight to income and is justified by the earlier findings using the contingency perspective that showed gross sales as the strongest predictor of length of time to reopen. The structure score was obtained by adding the mean value of the rate of membership in the Chamber of Commerce for the cluster and adding the rescaled values of age and size. In order to maintain equal scale size along both of the dimensions, age and size were reduced from a four point scale to a three point scale. This was done by multiplying their mean values by .75. As with the previous variable, the three values are added together to obtain a structure score. Both the scores are combine as coordinates and the values are placed in a grid as shown in Table 34. Because of the coding scheme used, the grid starts at coordinate (3,3). While the lowest possible score for an organization is (2.5,3), this would be highly unlikely since every organization in a cluster would have to have the minimum values in each of the three components of structure. The lowest score observed in this group was the score of cluster one, (3.2,4.24).

The next step in this analysis is moving the classification procedure from taxa to types (Bailey, 1994). Based on the previous analysis, a typology will be

developed. Doty and Glick (1994) contrast typologies and theories. They describe a theory as "a series of logical arguments that specifies a set of relationships among concepts, constructs, or variables". In order for a typology to be useful for theory construction and testing, certain conditions have to be met. Typologies must define the complete set of ideal types and provide complete descriptions of each ideal type using the same set of dimensions (Doty & Glick, 1994).

The typology developed for this study is presented in Figure 7. When the table is divided into four cells, the extreme values in each cell are viewed as ideal types. Cell one contains organizations that have high levels of structure but are low along the resource dimension. Cell two contains organizations that are high on both the resource and structure dimension. Cell three contains organizations that rank low along both dimensions and cell four contains organizations that rank high on the resource dimension while having a low score along the structure dimension.

The majority of the organizations in the study are in cells two and three and those that are outside these cells border cells two and three. This would be consistent with studies that explored the organizational life cycle. Young

Figure 7. The Position of Each Cluster in the Structure/Resources Matrix.

organizations would initially be in cell three with low levels of resources and structure. As environmental munificence is the major determinant in organizational growth, those organizations in munificent environments would survive and grow and use their resources to acquire linkages (Bluedorn, 1993). Those organizations that are not in munificent environments remain in cell three. Organizations may also remain in cell three because of ineffective management or the desire of managers or owners to keep the organization small. Organizations in cell three were the slowest to reopen. This can be explained in terms of relative depravation. These organizations had few resources or linkages before the disaster so the losses caused the organizations to decline to a level below that needed to operate. Larger organizations with more resources had sufficient assets to repair damage and reopen quicker.

The ideal type in this cell, those organizations with mean scores of (3,3), would be very young and small, lease their business location, have low gross sales, and be unlikely to have property insurance or belong to the Chamber of Commerce. These organizations, best be described as micro-businesses, would be very vulnerable to disaster.

The organizations in cell two had the shortest mean length of time to reopen. These organizations ranked the highest along the resource and structure dimensions. In

prior periods these organizations were likely to have been in cell three. These organizations have enough slack resources to develop linkages and externalize risk through property insurance. The ideal type in this cell would be best exemplified by a Fortune 500 company that is active in the local business community.

Cell one, the location of organizations that have low levels of resources and high levels of structure, contains clusters 7 and 5. Both of these clusters border cell 3. This is not unexpected, as businesses that are able to survive with minimal growth in the number of organizational members, would be likely to move into cell 3. The organizations in both clusters five and seven are older businesses that are small and have low levels of gross sales when compared to the other clusters. These businesses could probably be described as established life-style ventures. The business do not have sufficient resources to support growth or expansion but do provide acceptable return for an owner/operator. These businesses are most likely to remain in cell four or decline to cell three.

The ideal type that this cell describes would have a score of (8,3). Not unexpectedly, there are no clusters that appear to be similar to this type. Organizations of this type would likely be social movement organizations (SMOs) or minimalist organizations (Halliday, Powell &

Granfors, 1987). SMOs would be likely to originate in cell three and if they survived, move to cell four. Minimalist organizations are those organizations that have little investment in labor or capital, can subsist on few resources, have extensive linkages to other organizations and are relatively adaptive. These organizations tend to be similar to SMOs in that their primary goal is not profit generating. They are typically involved in promoting the interests of specific professional, trade or political groups. Because these groups were outside the scope of this research, there were none in the sample to allow the research to determine what their recovery patterns were. Based on the earlier findings using the organizational ecology perspective, productive assets are the best predictor of level of physical damage. Because these organizations typically have few assets, their predicted recovery times would be relatively short.

Businesses in cell four have high level of sales but are less likely to be linked to the rest of the business community through the Chamber of Commerce. While falling into this cell, cluster six, is closer to cells three and two than the ideal type represented in this cell. A business could achieve values close to the extreme if it was created by an entrepreneur after one or more successful business ventures. Resources from previous business could

allow the organization start operations with high levels of resources while being young and small with few linkages. Such a business would likely grow into cell two or decline to cell three.

There would likely be three categories of organizations that would be similar to the ideal type described in this cell. These are business that lack community legitimacy, business that are quasi-legal and business that are illegal. Examples of businesses that might lack legitimacy in a particular community are pawn shops and liquor stores. While the primary activities of these businesses are not illegal, the community attitudes toward such establishments might preclude the establishment of linkages to the larger business community and organizational growth. An additional barrier to legitimacy might be the ethnicity or social status of the business owner, the customers of the business or both. Sexually orientated businesses would be quasi-legal in the sense that these organizations may have core business activities that are very similar to those that are illegal but are altered in such a way as to meet minimum legal requirements. The community may enact laws that make operation of such business difficult or impossible, thereby decreasing the ability of the business to increase in size, age, or own a permanent location.

Business that are illegal can be divided into two

groups, those that have core activities that are illegal and those that are illegal because of the way the business operates. Examples of those with core activities that are illegal would be sales of illegal drugs, prostitution, and intercepting and using credit card numbers from Internet transactions. Business that operate without licences or permits, do not comply with relevant regulation and do not pay taxes would be examples of business that are illegal because of their manner of operation. Based on the analysis of each cell, it appears that most business organizations will exist along a path between cells two and three.

Hypotheses

H13. The configurations of organizational characteristics defined by the clustering process will have significantly different levels of physical damage from the natural disaster.

H14. The configurations of organizational characteristics defined by the clustering process will have significantly different recovery times from damage caused by the natural disaster.

The F ratio for level for physical damage is 1.1499, df(6,244), (p<.3340). The F is not significant and H13 is rejected. The F ratio for length of time to reopen is 4.4780, (p<.0003). The F is significant and H14 is accepted.

CHAPTER V

DISCUSSION

A discussion of the findings of this study are

presented in this chapter. The research questions are

addressed in the first section. Next, the utility of the

multiple paradigm approach is explored. Finally, the

limitations of the study are presented as well as directions

for future research.

Research Questions

Two research questions were posed in chapter one. The

first area of inquiry was to determine which of the selected

contextual variables were relevant in understanding the

disaster experience. The second question examined the

forces of selection and adaptation. The goal was to

determine if the disaster experience can best be described

in terms of selection or adaptation. The findings

concerning each of the organizational characteristics will

be presented first. It is followed by a discussion of the

adaption and selection perspectives that is organized around

each of the three paradigms used in the study.

Determinants of Organizational Recovery

The first research question addressed is determining

which, if any, of the contextual variables are relevant in

understanding the disaster experience. The relationship

between each organizational characteristic and the level of

physical damage and length of time to reopen is shown in

Table 35.

The first variable examined was industry. While the

industry groupings showed consistent levels of physical

damage, there did not seem to be a relationship between

industry and the length of time to reopen. It seems likely

that organizations engaged in similar activities have a

common core of assets. This physical similarity is likely

to be the cause of the uniform levels of damage. The

variation in the length of time to reopen is probably linked

to other contextual variables.

Age explained very little of the change in level of

physical damage. In light of the relationship between

industry and the level of physical damage, this is not

surprising. If the type of assets an organization has that

are exposed to the disaster agent is the chief determinant

of the level of physical damage, then the age of the

business would be of minor importance. All the members of a

Table 35

Summary of the Relationship between the Outcome variables and the Contextual Variables

Contextual Variables	Outcome Variables	
	Level of Physical Damage	Length of Time to Reopen
Industry	Strong Relationship	Not Significant
Age	Negligible Negative Relationship	Low Negative Relationship
Size	Weak Negative Relationship	Low Negative Relationship
Pre-Disaster Gross Sales	Negligible Relationship	Moderate Negative Relationship
Chamber of Commerce	Not Significant	Low Negative Relationship
Ownership of Location	Not Significant	Low Negative Relationship
Property Insurance	Not Significant	Not Significant

particular organizational form, regardless of age, would have similar processes and assets that were used in the transformation process.

Age does appear to play a role in the length of time needed to reopen the business. This is consistent with earlier studies. With age, organizational members gain

knowledge and managerial skills that can be used during the recovery process.

Like age, size does not appear to explain variation in the level of physical damage. It does however, explain a degree of variation in the length of time needed to reopen. Increased size allows greater access to capital and slack resources. In addition, larger organizations tend to be in more munificent environments (Bluedorn, 1993). These factors accelerate recovery while being unrelated to the level of physical damage.

Like the previous two variables, pre-disaster gross sales do not explain any significant amount of variation in the level of physical damage. Of all the contextual variables, pre-disaster gross sales appears to have the greatest influence on the length of time needed to reopen. The higher degree of liquidity allows organizations to quickly lease scarce rental locations and contract for reconstruction services. Because there is typically a limited pool of undamaged rental locations and competent reconstruction contractors, these first movers can effectively block recovery efforts by organizations that must seek financing and government assistance to finance their recovery.

As with the previous variables, membership in the Chamber of Commerce does not have appear to influence the

level of physical damage. This variable has a low negative association with the length of time to reopen. Previous research has found that linkages to helping networks play an important part in the survival of businesses (Flynn, 1993; Levin, 1993). The significant findings in this study should be interpreted cautiously. Chamber membership may in fact be indirectly measuring age, size and pre-disaster gross sales. It is intuitively satisfying to assume that the linkages provided by Chamber membership were helpful in providing information about recovery resources but further research is needed to determine what type of helping network, if any, is utilized by business decision makers.

The relationship between ownership of the business location and the level of physical damage is not significant. This finding is somewhat surprising because studies of family recovery had found that owners typically experience less physical damage. Lower levels of damage occur because owned homes are normally located in less hazardous areas and are of higher quality construction (Rossi et al., 1983, Quarantelli, 1982).

A possible explanation for this finding could be the economic compression of businesses in relation to families. The range of income observed in families is much greater than that of businesses because families can exist for extended periods of time with little or no earned income.

While these families can exist with little or no earned income, their quality of housing is likely to be substandard. In addition, housing units that are affordable to low income families are more likely to be located in hazardous areas. Mobile homes are notoriously unable to withstand the effects of natural disaster.

Businesses can withstand periods of little income but cannot continue to operate when organizational resources have been exhausted. Because the lower end of the economic range is largely absent, business owners and managers can locate their establishments outside of hazardous areas and in higher quality buildings. If transactions with customers occur at the business site, a substandard building can negatively impact the customer's perception of the organization. Other possible factors that cause business decision makers to avoid poorer quality buildings and hazardous locations are: fear of potential injury to clients and employees, potential loss of inventory and other assets, government inspections and regulations that set standards for safety, and requirements of insurers. When considered together, these factors deter the selection of lower quality locations and lead to less variation in the quality of rental and owned properties. Because there is less variation among the structures, the type of ownership is not a significant factor in the level of physical damage.

Ownership of the business location had a low negative association with the length of time to reopen. This finding is consistent with earlier studies of family recovery. This outcome should be interpreted as an initial finding that requires additional examination. The association is fairly low and may be influenced by other variables.

Property insurance had no significant relationship to the level of physical damage. A surprising finding was that it also had no significant relationship to the length of time needed to reopen. A possible explanation for this finding is that the level of insurance coverage and payout is as important as having a policy in place. Those businesses that had policies but found that they were inadequate to cover the losses sustained may not have been significantly better off than those establishments without insurance. Additional research that examines property insurance in greater detail is required before any generalizations can be made.

When considering the contextual variables in relationship to the level of physical damage, a pattern emerges. With the exception of industry, none of the contextual variables appear to be relevant in predicting the level of physical damage. This supports the contention that damage is primarily determined by the type of assets that are exposed to the disaster agent.

The length of time needed to reopen the business does appear to be influenced by the contextual variables. After the level of physical damage, pre-disaster gross sales have the strongest mitigating effect. Age and size explain a small amount of variation. When considered simultaneously, the contextual variables combine in configurations that explain significant variation in the length of time to reopen. This finding suggests that future research should be conducted in a manner that identifies naturally occurring configurations. In the next section, the concepts of configuration and organizational forms are explored in greater depth.

Selection, Adaptation, and the Disaster Experience

This section focuses on the second question, the influence of selection and adaptation on the disaster experience. The results from each paradigm will be presented. A model is developed that integrates the selection and adaptation perspectives.

Organizational Ecology

The organizational ecology paradigm proved useful in understanding the level of physical damage that related groups of businesses experienced. However, there did not appear to be a relationship between the organizational form and the length of time to reopen. Based on these results, it appears that the level of physical damage a particular

form or species of organization will experience is determined by the selection forces in the environment.

The process of isomorphism, whether mimetic, coercive normative, or technological, leads organizations to have similar input, transformation and output process requiring the same physical assets. In addition to having similar assets, organizations of a particular species can be dependent on another species which dominates the niche or provides resources for organizations sharing the niche. The health of the other forms or species in the niche is tied to the dominant form which further serves to create a uniform disaster experience. An example of this kind of relationship is that of the firms providing agricultural related services. They are dependent on the recovery of the produce and citrus growers for their recovery.

While these organizations achieve a high degree of similarity due to the forces of isomorphism and the stabilizing effects of inertia, there is still variation within the species. These groupings are polythetic in that members are not identical and no one member contains all the genetic material of the species but the entire group in total. This variation within the species may be one explanation for differing recovery rates within a species.

When the results of the analysis based on the contingency and configuration paradigms are considered, it

appears that individual characteristics such as age, size, and sales are important variables in predicting the speed of recovery. The reason for this may be the competition for scarce resources. After a disaster, quick access to credit, temporary business locations, and reconstruction services are critical to prompt business recovery. Those organizations with high pre-disaster sales are more likely to have the ability to acquire the needed recovery services faster than those organizations that must access external resources. Once the organizations with higher levels of pre-disaster sales acquire these resources, the other organizations may find access to the rental, credit, and repair services problematic.

While the organizational ecology paradigm proved useful, its difficulties in application pointed to an underdeveloped area in organizational ecology, that of classification. One of the key assumptions of this perspective is the existence of identifiable species or forms of organizations. To varying degrees, this issue has been avoided by selecting organizational types that are unusual and clearly distinct from other groups. Yet the majority of organizational types encountered are not so easily distinguished from one another. This is especially true of organizations in the service and retail sectors.

Classification is a prerequisite for using the scientific method (McKelvey, 1982). Identifying the subjects of inquiry are critical to hypothesis formulation, measurement, and replication. By having a clearly defined population, the researcher is able to separate measurement error and artifact from effects. In addition, classification aids in the process of information retrieval.

McKelvey (1982) proposed that species be identified by their dominant competencies. The pool of organizational competencies could be identified and the organization classified by its set of competencies. This would allow researchers to compare like organizations. This process would allow meaningful comparisons based in similarities of identified forms. The difficulty in using this approach is in obtaining sufficient information about the organizations to develop this system. The constraints of time and resources would preclude an individual researcher from undertaking such a project. This approach may prove useful as part of an ongoing effort to collect such information and develop a large database for classification.

Hannan and Freeman (1989) have proposed a list of four organizational features that could be used to identify species or organizational forms; (1) the mission, (2) the form of authority, (3) the basic technology, and (4) the general marketing strategy. Classifying organizations using

the last two items would be very similar to using SIC codes to classify organizations. Information about the organization's mission would be unlikely add additional discriminant ability in distinguishing organizations as the technology and market strategy selected would either drive or be driven by the organization's mission. It is not clear how the organization's form of authority would be useful in identifying organizational forms. While it is important to partition organizations into related forms or species, it is detrimental to the classification process if extraneous factors are used to create artificial divisions. Unless very large samples are gathered and a reliable method is developed to scale different types of authority, this feature would likely prove difficult to use in a classification process.

For the purposes of this study, the classification system used was based on SIC codes with a few modifications. It quickly became apparent that following a strictly hierarchical process of dividing the sample into increasingly smaller groups made analysis difficult at lower levels. The only group of organizations that was present in sufficient numbers to analyze at the class level was health care establishments. Instead of moving down to lower levels of the hierarchical classification system, it was more useful to make groupings at the sub-division level.

Based on the use of the organizational ecology perspective to develop a classification system, the following observations were made. First, this method requires a large sample size. When studying disasters in smaller communities, there may simply not be enough affected organizations to make this approach practical. This difficulty could be partially remedied by developing a large data base of information about businesses after natural disaster from many different communities.

The second observation is that this method has the potential to make cross-community comparison much easier. When initially developing the classification system, it was observed that certain organizational types dominated the sample and others were completely absent. If this sample is an accurate representation of the community, as secondary sources indicate it to be, this provided a type of community snapshot that can be used to compare the disaster experiences of like communities. The business in Homestead and Florida City are predominately in the agriculture, retail and service sectors. Manufacturing activity is almost absent.

If secondary sources, such as County Business Patterns from the U.S. Census Bureau, information from Dunn and Bradstreet, or telephone directories, indicate that the sample is not representative of the area, the researcher has

the opportunity to seek out the particular type of organization that is under represented. This allows a much more accurate picture of the community to be developed.

Contingency Theory

Unlike the previous paradigm, contingency theory does not appear to be useful in predicting the level of physical damage. Age, size, pre-disaster gross sales have weak associations with the level of physical damage, while the other three variables have no association. Conversely, contingency theory does shed some light on the length of the recovery process. As expected, the level of physical damage is a significant predictor of length of time to reopen. Yet it is interesting to note that the relationship is substantial, but not strong, (gamma of .70 or better).

Of the remaining variables, only pre-disaster gross sales seem to be useful in predicting the recovery time for a business. Based on this analysis and the previous work with organizational ecology, it appears that selection is the process that underlies physical damage. As discussed in the previous section, pre-disaster sales are a resource for organizations that may allow them to out compete other members of their species by getting scarce resources before the other organizations. This importance of resources can be explained from both an organizational ecology and contingency perspective.

While organizational ecology focuses on like groups of businesses, contingency disassembles organizations into their relative components. Selecting the appropriate components to examine is important if any meaningful results are to be obtained from using this perspective. The components selected here were based on findings from the studies of individuals, families and other groups. Because of the small number of published studies, future researchers may want to broaden the variables examined to insure inclusion of all relevant information.
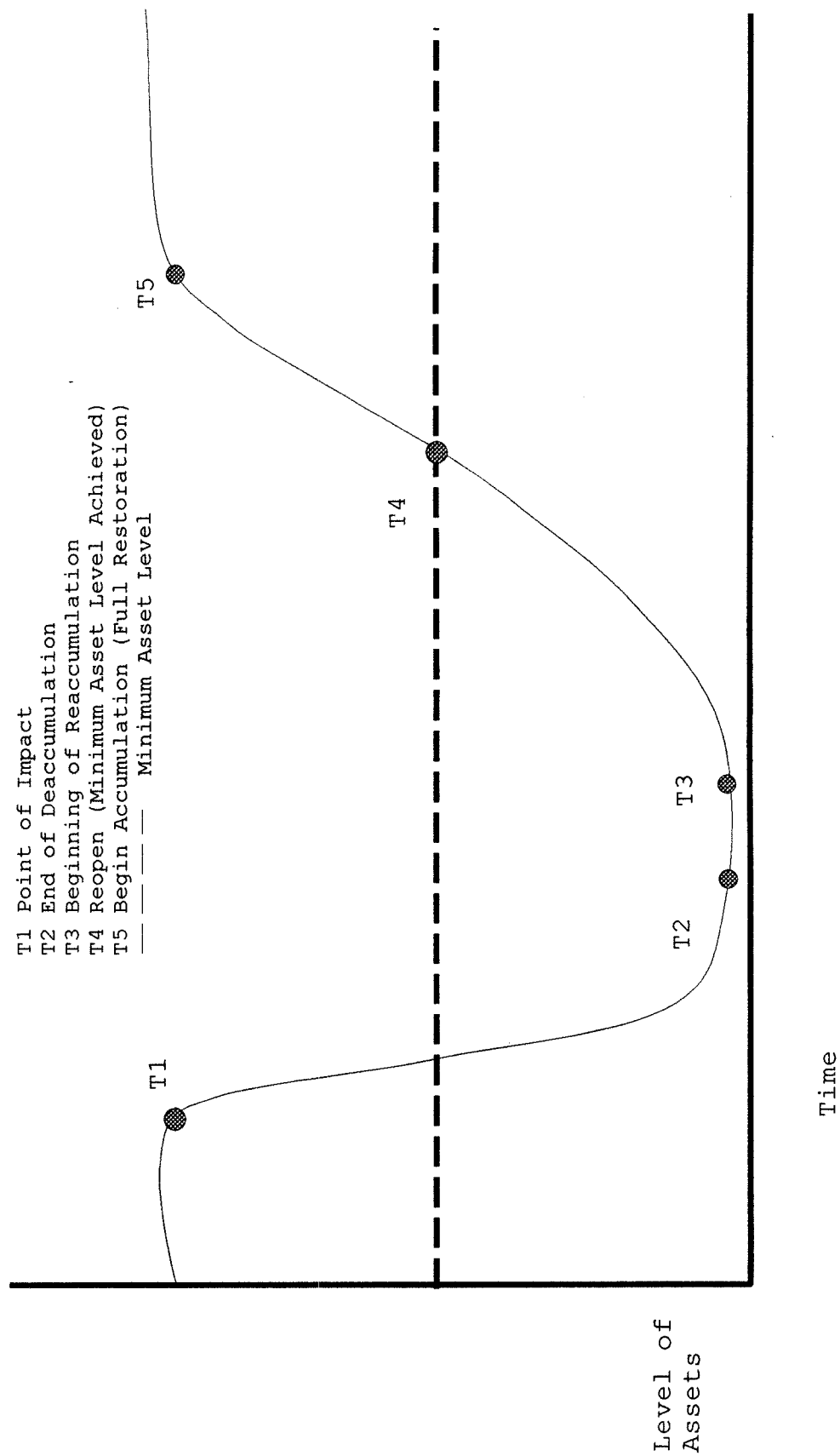
Configuration Theory

After the configurations were identified, it was possible to determine what the disaster experience was for each configuration. Like the contingency theory, this perspective does not seem to predict the level of physical damage.

The organizational configurations have significantly different lengths of time to reopen. As surmised from the literature, businesses that were large, older, had higher pre-disaster gross sales, owned their business location, belonged to the Chamber of Commerce, and had property insurance had the shortest mean length of time needed to reopen. The cluster of businesses having the slowest rate of recovery were those that differed from the preceding group along all the clustering variables. This finding is

consistent with earlier research findings that individuals

with higher socioeconomic status had faster recovery rates

and disaster exacerbates pre-existing economic differences.

This perspective could potentially be useful for

emergency management professionals. Based on the

configurations identified, emergency managers can use the

information to determine what members of the business

community are most vulnerable to disaster. This would allow

planners to allocate resources to those business types and

areas deemed most vulnerable to business discontinuation

after a natural disaster.

When the results are considered together, a pattern of

disaster experience emerges. Figure 9 illustrates this

process. This figure was adapted from Rodeheaver's (1990)

study of household recovery in Guatemala after the 1976

earthquake. The curved line represents the events in the

disaster process graphed in temporal order. The X axis

represents the organization's level of assets. The dashed

line is the minimum level of assets needed to operate the

business. This is a hypothetical example used to illustrate

the process Rodeheaver describes as a cycle of accumulation,

deaccumulation and reaccumulation. Different organizational

forms would have differing levels of assets and lengths of

time between events. T1 is the initial point of impact.

Until this point, the business has been engaged in asset

T1 Point of Impact
T2 End of Deaccumulation
T3 Beginning of Reaccumulation
T4 Reopen (Minimum Asset Level Achieved)
T5 Begin Accumulation (Full Restoration)
— — —   Minimum Asset Level

Level of
Assets

Time

Figure 9.

A Model of the Level of Business Assets After a Natural Disaster

accumulation. After the point of impact, the business experiences asset deaccumulation, a period of rapid and steep decline in the level of assets. This period of decline slows but continues as the business experiences secondary impacts and loss of market share. T3 is the point in time at which losses are stopped and the process of reaccumulation begins. The business is able to reopen at point T4 but is still not fully recovered from the disaster experience. Finally, at point T5, the business has achieved its pre-disaster asset level and resumes the process of asset accumulation. The literature suggests that many individuals and groups have a higher standard of living after the disaster because the housing and property that is replaced is better quality than that lost. Based on anecdotal evidence from Hurricane Andrew, businesses that survive appear to benefit from the replacement of damaged assets. Further research is needed to determine the long-term effects of the disaster and to measure any permanent changes in economic condition of affected organizations.

The focus of this study was the level of decline between T1 and T2 and the length of time between T1 and T4. Based on the findings of this study, the level of asset deaccumulation is dependent upon the organizational species. Selection largely determines the steepness of the drop in assets between impact and the end of the deaccumulation

process. The length of time between T1 (impact) and T4 (reopening) appears to be a combination of the level of physical damage and the amount of pre-disaster resources available to the organization. The amount of time needed to reopen is driven by both selection and adaptation. While this model of disaster experience for business organizations should be tested further before being accepted, based on the findings of this study, it accurately represents the disaster experiences of the businesses studied.

Multiple Paradigm Research

The results of this study illustrate the utility of MPR for studying complex organizational phenomena. Each paradigm offered a different view of the process and the combined results uncover the complex interplay of forces that determine the disaster experience of businesses. The organization ecology perspective substantiates the link between selection and organizational form and confirms that both are powerful determinants of the level of physical damage. The contingency and configuration perspectives failed to uncover a significant relationship between organizational characteristics and the level of physical damage. These multiple methods of inquiry give support to the finding that selection is the driving force behind the

level of physical damage an organization would be likely to experience.

The configuration perspective incorporates the selection and adaptation perspective, by allowing change but understanding that change is often difficult and has unforseen consequences on all areas of the organization. The configuration approach proved to be very useful in understanding the early phases of the recovery process. Based on this finding, it appears that adaptation is more significant in the recovery process than in predicting level of damage but that selection still plays a part.

By incorporating the three paradigms, it was possible discover the relationship between selection and level of physical damage and adaptation and the length of time to reopen in one study. If one paradigm had been selected three separate projects would have been required and each would have proceeded without the feedback provided from the other two. The results of this study illustrate the value of this approach in obtaining an accurate representation of organizational reality.

While this approach was successful in the context of this study, Hassard (1993) reported several difficulties in using MPR. The first was that research using the radical humanist and radical structuralist paradigms could have jeopardized organizational entre. This problem was not an

issue in the present study because it used secondary data. However, Hassard's concern is valid and should be considered when explaining the theoretical aspects of the proposed research.

The second issue faced was the increased amount of time needed to complete a project that involved four separate studies. This was less of an issue for this research because the same data set was used in each paradigm, rather than collecting three separate sets of data for each paradigm as was done by Hassard.

Burrell and Morgan (1979) suggest that investigation across the paradigms occur in the following order; functionalist, interpretive, radical humanist and radical structuralist. Hassard followed this prescription but stated that in future research, he would probably have moved from the micro to the macro level by examining the paradigms in the following order; interpretive, radical humanist, functionalist, and radical structuralist.

When considered the order for this study, organizational ecology was selected as a starting point because of its emphasis on classification and identifying forms. The contingency perspective disassembles the organizations and examines their components. The configuration perspective then takes these disassembled components and reassembles them into broad types. After

examining the results, this order was fortuitous in that the theories represented the temporal order of events. The first stage in the disaster was the physical damage caused the disaster agent, which fit well with the organizational ecology perspective. The configuration perspective offered insight into the restoration process. Configuration theory acknowledges the importance of selection and adaptation while taking the position that organizations do overcome inertia and change.

Burrell and Morgan (1979) considered the paradigms to be incommensurable while Hassard suggested that MPR offers a partial solution to this difficulty. This issue is minimized in this study by selecting tool paradigms that all fall within a single paradigm meta-space, structural functionalism.

It is interesting to consider how the selection-adaptation dichotomy would be viewed in terms of the meta-paradigms. As discussed in Chapter Two, the majority of management theory falls into the functionalist paradigm. The basic assumptions of this paradigm recognize both selection and adaptation as forces that shape organizations. The interpretive paradigm would have had utility in understanding the process that managers underwent in making sense of the events before and after the disaster. The interpretive paradigm would have been useful in exploring

the adaptation process in greater depth than was possible in
the functionalist perspective as this paradigm focuses on
understanding the sense making process of individuals and
small groups and is strongly adaptation oriented. It would
be difficult to investigate selection at a community or
species level using this paradigm.

Conversely, the radical humanist perspective would have
offered interesting extensions of the selection process
while having limited utility in exploring adaptation. The
radical humanist perspective, like the interpretive
perspective, posits that reality is socially constructed.
However, it views this constructed reality as imprisoning
members of the society in a system that creates alienation
associated with industrial societies (Hassard, 1993). While
beyond the scope of this work, this paradigm would offer an
unique framework for extending earlier works that found that
disasters tend to increase pre-existing societal inequality
and widen the gap between the economic groups in a society.
This paradigm offered an alternative explanation for the
findings of the configuration perspective. If further
research were undertaken that studied the differences
between those organizations in cell three (the smallest,
youngest, and lowest pre-disaster gross income) and the cell
two (largest, oldest, and highest pre-disaster gross
income), the radical structuralist paradigm would offer a

unique counter-balance to the structuralist paradigm.

The radical structuralist view shares the objectivist approach of functional structuralism in that external phenomenon are considered to exist separately from the observer. Like structural functionalism, it recognizes both the selection and adaptation process in organizations.

The two paradigms have distinctly different views of social order. The functionalist paradigm views the issue of social order as one of regulation. This is much more suited to examining selection forces. The radical structuralist paradigm's primary concern is change. This emphasis on change makes this paradigm particularly valuable for framing studies of the adaptation process.

Limitations

As previously discussed, Hispanic business owners may have been under-represented in this study. Phillips, Garza, and Neal (1994) found that communication between dominant groups and minority groups after natural disaster becomes more difficult. Hispanics in particular were reported to be apprehensive of organizations that appeared to be military in nature. These pre-existing conditions may have caused the Hispanic respondents to decline participation in the study at a higher rate than the general population. Evidence of this pattern was gained by examining the surveys

from businesses that declined to participate. The survey team members were instructed to obtain business cards from those businesses that declined to keep a record of all contacts. Based on the use of Spanish on the business cards and Hispanic surnames, it appeared that Hispanic owned and operated businesses were less likely to participate. Further research is needed to determine if Hispanic owned businesses have significantly different recovery patterns than business owned by Non-Hispanics.

The typology developed in Chapter Four also suggests that certain types of organizational forms were likely under-represented. Those include businesses that operate in an illegal manner, those with core activities that are illegal and those that, while legal, are outside the social norms for the larger business community.

Further research is needed to determine if the patterns observed in this disaster are generalizable to communities in general or just communities with the same species profile as Homestead and Florida City. In addition, further research is needed to determine if the patterns observed here are specific to hurricanes or are typical of natural disasters in general.

Implications for Future Research

There is little research concerning the disaster experiences of businesses. Most research at the organizational level has focused on disaster relief organizations. Research should be conducted that identifies community profiles so that it can be determined if there is a consistent disaster experience across all communities or experiences that are specific to certain types of communities. Additional research should be undertaken that examines the disaster experience in relation to the type of disaster experienced, the length of warning, and the degree of human culpability in the disaster and the combination of natural and technological disasters.

Studies that examine the long-term recovery patterns would be helpful in developed a more complete picture of the disaster experience. This my be especially helpful in understanding the relationship between recovery and insurance which seems to be counter intuitive in this study. This information would be useful in determining which organizational forms suffer the greatest amount of long-term damage and which seem to benefit from the environmental disruption as some research has suggested.

Greater detail is needed in the outcome variables. The level of physical damage should be divided into physical damage to inventory and WIP, assets used in production or

the transformation process, administrative assets such as records, and the location of the business. While some businesses may experience total loss of inventory, there may be little loss of the other types of assets. Other businesses may lose productive assets and thereby have greater difficulty in recovery. This greater degree of discrimination may help to further differentiate between the different organizational forms.

There is little information about the types of assistance the organizations receive in their recovery process. There is little information about who provides the assistance and what the relationship is between relief organizations and businesses that have sustained severe damage from natural disasters. It is not clear if the majority of rebuilding is done by organizational members, other members of the business community, family members in the case of a family owned business, or from relief agencies. The helping relationships should be explored in greater detail, with a network analysis of these relationship conducted to clearly identify sources of assistance.

Related to the topic of assistance is the topic of role strain and role conflict. There are no published studies that explore coping mechanisms of business owners when they have both business and personal losses. When there is

damage to the home, other family members may not be able to assist in business recovery and may need to expend their efforts toward obtaining shelter and basic necessities for the family. In addition, if members of the family were injured or killed in the disaster, the recovery process for the business becomes even more difficult.

Further development of the concept of organizational form or species is desirable if the study of organizational ecology is to achieve generalizability. The development of recognized organizational groupings also has uses for developing community profiles which allow researchers to determine if like communities are being compared.

Finally, there is need for refinement of MPR and further testing of the accumulation-deaccumulation-reaccumulation model. Shultz and Hatch (1996) describe four distinct types of MPR: sequential, parallel, bridging and interplay. Their work suggests methods that can overcome some of the difficulties in the process described by earlier researchers.

The model presented in this chapter provides a synthesis of the forces of selection and adaptation that influence the disaster experience of organizations. This model suggests that the process is complex and may require methods such as MPR to capture all of its complexity.

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