

AN ABSTRACT OF THE THESIS OF

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Abstract approved:

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Natural Hazards are a potential risk to Benton County small businesses. However, little has been done to help prepare, respond, recover or resume business following a significant disastrous event. 93 small businesses in Benton County responded to a mailed survey, and 10 additional small businesses participated in both mailed surveys and interviews. Information collected from the surveys and interviews were used to assess current disaster preparedness of Benton County small businesses, gauge business owner knowledge about risk reduction tools and techniques, and to better understand small business needs in reducing risk and loss from natural hazards. Overall, businesses were concerned about the potential impacts of natural disasters, but few have taken steps to mitigate these hazards. Trends were identified in interview responses that add valuable information about why businesses have not taken appropriate steps to mitigate hazards. Most small business owners/managers are more concerned about day-to-day activities than they are about planning for natural disasters. Businesses that practiced environmental stewardship and other sustainable

business practices tended to be more interested in protecting their business and in training management and employees to prepare, respond, recover, and resume business. Overall, business owners weren't sure how to protect their business from large-scale hazards. The cost versus benefit of emergency and disaster preparedness was of concern for many business owners. Lastly, businesses that provided non-essential services, such as screen-printing for clothing or a furniture store were less prepared for an emergency or disaster event than those who provided a more essential service.

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**An Analysis of Benton County Small Businesses' Emergency
and Disaster Preparedness**

by
Tiffany L. Chona

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Tiffany L. Chona, Author

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CONTRIBUTION OF AUTHORS

Safaa Amer, in the Department of Statistics assisted with data analysis and interpretation. Peggy Peirson provided mentoring and project design input.

TABLE OF CONTENTS

	<u>Page</u>
I. Introduction.....	1
Statement of Problem.....	5
Research Hypothesis and Research Questions.....	7
Limitations.....	9
Delimitations.....	10
II. Literature Review.....	11
Relevant Research Studies.....	11
Historical Examples of Disaster in Benton County and the Benton County Hazard Analysis.....	17
Two Dimensional Assessment Model.....	20
III. Methods.....	22
Informed Consent and Confidentiality.....	25
Benefits and Information Sharing.....	25
Two-Dimensional Scheme for Meeting the Economic Challenges of Disabling Business Interruptions (Veltri, Rutledge, and Van Pelt, 1997).....	26

TABLE OF CONTENTS (Continued)

IV. Analysis.....	30
Previous Survey Results As Compared To This Study.....	32
V. Conclusions and Recommendations.....	48
Conclusions.....	48
Recommendations.....	51
Bibliography.....	53
Appendices.....	56

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Benton County Hazard Analysis, 2002.....	19

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Survey Response Rate.....	31
2. Business Descriptive.....	32
3. Industry Types.....	32
4. Hazard Events: The Estimated Degree of Impact to Benton County Businesses.....	38
5. Essential Services: The Estimated Impact to Benton County Businesses if Services are Interrupted.....	39
6. Preparedness Activities: What Benton County Businesses Have and Have Not Done.....	40
7. Results: Two Dimensional Assessment Model – Dimension I.....	41
8. Results: Two Dimensional Assessment Model –Dimension II.....	41
9. Potential Mitigation Activities.....	45
10. Potential Ways To Distribute Information To Businesses.....	47

APPENDICES

<u>Appendix</u>	<u>Page</u>
A. Coverletter, Survey and Reminder Card.....	56
B. Informed Consent Document and Interview Questions.....	67
C. Telephone Recruitment Script.....	72
D. Participation Form Given To Manager and Acknowledgment Advertisement	74
E. Two-Dimensional Assessment Model Worksheets.....	77

DEDICATION

I dedicate this thesis to my daughters, Ashley and Christina Chona, I pray you always remember you are beautiful, smart and strong. May all your dreams come true.

Chapter I - Introduction

Creating a disaster-resilient Benton County through emergency and disaster planning for small businesses is vital for the community as a whole. Organizations struck by natural disasters, such as earthquakes and floods, often sustain injuries to employees and/or damage to building structure(s), equipment, and processes. In addition, organizations are greatly impacted by impediments such as power outages, supply chain interruptions, and economic downturn. Businesses in Benton County are more likely to survive an emergency or disastrous event if management recognizes threats to their organization, takes steps to mitigate these threats, and has a plan to adapt to challenges following an emergency.

A significant business interruption often forces customers to seek out alternate sources for products or services. Regaining these customers is a challenge. Business owners often invest business equity to recover from the event, leaving the business in a difficult financial situation. If business activity decreases following the disastrous event, it further compromises the business financially. Recognizing specific threats to each organization is essential to developing an effective plan to address these threats. Organizations that do not take safety measures will likely experience greater interruption to their business operations, lost income to employer and employees, and lost assets in the form of business equity, which may result in business closure (Alesch, Holly, Mittler,

Elliott, & Nagy, 2001). The Institute for Business and Home Safety (1999) estimates that 25% of small businesses will not reopen following a significant business interruption. Inadequate or inappropriate insurance coverage, loss of customer base, reduced sales, damage to infrastructure and merchandise all contribute to a business owner opting not to reopen, particularly if the business was struggling prior to the event. Often, the disaster is simply “the last straw” (Dahlhamer, James, & Teirney, 1996).

What constitutes an emergency or disaster differs for each business (Peirson, 2003). Each has its unique vulnerabilities and each business owner must decide what degree of emergency and disaster preparedness makes economical and practical sense for his or her business. While a “one-size-fits-all” cannot be applied here, almost any business can adopt basic strategies to greatly reduce the impact of otherwise disastrous events. Business preparedness, response, recovery, and resumption are dependent upon how equipped individuals and the greater community are in dealing with a critical event. During a crisis, people are first concerned about their personal and family safety (Alesch, et al., 2001). If plans are in place at the individual level, attention to helping the business, respond, recover and resume routine operation can be applied and effectively focused.

According to the Benton County Hazard Analysis Report (2002), the area’s top three natural disaster risks are severe winter storms, earthquake, and flood. Benton County sustains interruption to public utilities and transportation annually as a result of severe winter storms, which can affect all community members. In

addition, researchers studying trends in seismic activity predict that the Northwest will sustain an earthquake of high magnitude in the near future (Benton County Hazard Analysis, 2002). The reason that earthquakes are listed as the number two hazard for Benton County is not because earthquakes happen very frequently, but because the potential for widespread disaster, injury, and fatalities is expected to be great. Likewise, the impact on businesses and public utilities could be ruinous without solid preparedness efforts.

The Benton County floods of 1996 shut down major highways, flooded homes and businesses, and isolated many residents for several days before waters receded. Severe flooding is not as common or as wide spread in Benton County as are winter storms. When flooding does occur, however, it can affect many people and cause extensive damage to homes and businesses.

In establishing a disaster preparedness plan, it is necessary to evaluate how each type of emergency and disaster will impact an organization. Internal risks to consider include the well-being of employees (first aid training and kits), equipment, processes, data files, and building structure.

Evaluating external risks to organizations requires consideration of local hazards near the businesses (railway, highway, and hazardous waste transportation route), risk to a business's customer demographics, and risks created by neighboring business operations. Knowing the vulnerabilities of critical supply lines is also key. Events such as severe weather at the location of major suppliers can interrupt delivery of essential resources. Choosing suppliers that have taken

steps to prepare, respond, recover and resume business is also important. No matter how well prepared an organization may be, if the supplier is unable to deliver essential resources, the business may be compromised.

At the macroscopic level, national and global events such as terrorism, economic downturn, health scares and war can also affect local business.

Although small businesses in Benton County may not deal directly in these national or global markets directly, such disturbances can have local effects.

Businesses should create redundant systems and have back-up plans in the event that one or more of these events occur and have a negative impact on the business's ability to successfully operate.

Establishing disaster resilience for small businesses in Benton County initially requires that information be collected about the current level of awareness and concern for business continuity and emergency and disaster preparedness. This information gathering is the focus of the analysis herein and has been summarized and shared with the Benton County Sheriff's, Office of Emergency Management so that future mitigation efforts can best meet the needs of local businesses. Business owners will be encouraged to take a resource-based view of their organization when determining how to plan, respond, recover, and resume business by protecting critical resources through business continuity and emergency and disaster planning.

Organizational resources are defined as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc., controlled

by a firm that enables the firm to conceive of and implement strategies that improve its efficiency and effectiveness”(Barney, 1991). “A resource is valuable when the firm’s use of the resource helps it exploit specific opportunities or protect itself from threats (Barney, 1991). By protecting valuable resources, businesses can “build competitive advantage over other organizations, and develop efficient and effective strategies to protect these resources from risk, danger and loss associated with an emergency or disaster event (Barney, 1991).

Typically, small businesses owners are focusing on day-to-day operations and not on long-term sustainability. Encouraging small business owners to spend the time and resources on long-term disaster plans should create greater resiliency (Peirson, 2003). (A loss of one small business in Benton County is not just the loss of a single business; its closure has ripple effects throughout the whole community. In the event of a large scale disaster many businesses could be lost immediately, thereby reducing the viability of the community as a whole. Creating a disaster-resilient community by encouraging small businesses to prepare, respond, recover, and resume business following an emergency or disastrous event can minimize some of these negative impacts.

Statement of Problem

The problem involved in this study was to determine the extent to which businesses have developed their emergency and disaster function in order to prepare, response, recover and resume business following a natural disaster; and to provide research based information to help businesses make decisions regarding

emergency and disaster preparedness in the future. A solution to this problem was contingent upon completion of the following sub-problem tasks:

- (1) assess current disaster preparedness of Benton County small businesses;
- (2) understand small business needs in reducing risk and loss from natural and human-caused hazards;
- (3) gauge business owner knowledge of risk reduction tools and techniques.

Studies indicate that businesses with financial strength, a diversified customer base, more than one business location, and completed pre-mitigation work are more likely to survive an emergency or disastrous event (Alesch, et al., 2001). This study will help characterize the current trend in emergency and disaster planning for Benton County small businesses. It will detail how they are addressing the importance of business continuity in the event of an emergency or disaster. Surveys and interviews have been used to identify trends in current emergency and disaster mitigation efforts, the level of concern about potential emergency and disaster events, and current knowledge about what pre-mitigation tools are available to small business.

This study was conducted at the request of the Benton County Sheriff's Emergency Management Department (Contact: Peggy Peirson, Emergency Services Coordinator). The principal investigator for this study was Dr. Anthony Veltri (OSU-Environmental Health and Safety). Peggy Peirson--Emergency Management Coordinator at the Benton County Sheriff's Department--provided

her expertise throughout the project. Information collected during this study will be shared with the Benton County Emergency Management Department in an effort to help create a more disaster-resilient community by providing research based information to help businesses make decisions regarding emergency and disaster preparedness.

Research Hypotheses and Research Questions

- 1.) H_0 : Based on survey responses: local small business owners are not concerned about emergency and disaster preparedness.
- 2.) H_0 : Local small business owners have not taken steps to prepare, respond, recover, and resume business following an emergency or disaster event.
- 3.) H_0 : Industry groups (manufacturing, retail, service-based organization, consulting, etc.) do not differ in steps they have taken to prepare and protect their business from emergency and disaster events.

The following questions are designed to help answer the main three hypotheses for this study:

Question 1: Based on the survey responses, are Benton County small business owners concerned about the potential impact caused by natural disasters?

Question 2: If a natural disaster interrupted community services, how severely would local small businesses be impacted?

Question 3: On average, how long might the businesses surveyed be closed before suffering major financial loss as a result of a natural disaster?

Question 4: Based on the business preparedness activities covered in the survey, what have business owners done, or plan to do, to protect themselves from a disabling business interruption resulting from a natural disaster?

Preparedness Activities:

- A. Discussion with staff regarding what to do in case of natural disaster?
- B. Developed plan to notify staff?
- C. Purchased business insurance (e.g., flood, earthquake)
- D. Purchased business interruption insurance?
- E. Stored extra fuel, batteries, or other emergency supplies?
- F. Developed business emergency response plan?
- G. Developed business emergency recovery plan?
- H. Conducted disaster drills or exercises?
- I. Made arrangements to move business to other location in case of disaster damage?

Question 4, Part B: Based on in-person interviews, how well-developed are small businesses' emergency and disaster functions?

Question 5: For unprepared businesses, how does the level of concern (serious, moderate, or slight) regarding the impact of natural disasters compare to businesses that have or plan to implement preparedness activities?

Question 6: Is there any relationship between industry type and number of preparedness activities that have been implemented or plan to be implemented?

Question 7: Is there any relationship between industry type and level of concern about the potential impact of natural disasters?

Question 8: Based on the survey feedback, what type of mitigation activities would be most beneficial to Benton County small businesses?

Question 9: Is there a difference between the number of preparedness activities (planned or implemented) for business owners who own their building versus business owners who do not?

Question 10: Based on the survey results, what is the most effective way to deliver disaster preparedness information to Benton County small businesses?

Limitations

This study is limited to a random selection of Benton County small businesses with fifty or fewer employees, as listed in the Oregon Employment Department (OED) database (Internet based)--the most extensive list currently available. The database contains approximately 2000 businesses that meet the operational definition used in this study. All 2000 business names were downloaded to a spreadsheet; randomly assigned a number; and, using SPSS software, 500 businesses were then randomly selected to receive a mailed survey. Businesses not listed in the OED database were not included in this pool.

Survey results are limited to those participants willing to complete and return the questionnaire. The same survey used in this study was used in the city of Beaverton and Jackson County prior to the Benton County study. The response rate for the survey when used by Oregon Natural Hazards Workshop, in the city of Beaverton and Jackson County, was approximately 30%.

Because this study is limited to Benton County, results may not be generalized to other geographic regions throughout Oregon or the United States. Other possible limitation include in the scope of the questions asked by the survey,

testing effects, and the inability to control for answer credibility. In addition, there may be a difference between respondents and non-respondents regarding their level of emergency and disaster preparedness. Businesses least prepared and least concerned about natural disasters may have been less likely to return the survey. The use of open-ended interview questions with a smaller group of businesses provided additional information to determine characteristics of local businesses that may be missed or misrepresented from the mailed survey responses.

Delimitations

The analysis for this study represents a stratified random sample of small businesses selected from the OED database. The OED database was divided into stratas based on industry type. This study uses two types of data collection methods: mailed survey and interviews. The mailed surveys collected broad, general information, while the open-ended questions asked during the interviews provided more in-depth understanding of emergency and disaster preparedness from a business owner's perspective.

Chapter II - Literature Review

This chapter describes literature relevant to the research purposes of this thesis. The literature section is organized into three main sections: (1) research studies examining the emergency and disaster preparedness for small businesses; (2) examples of Benton County emergency and disaster events and Benton County hazard analysis; (3) introduce other counties in Oregon in which the survey used was also administered in our study. Currently the literature on emergency and disaster preparedness for small businesses is limited to only a few research studies and a small body of literature available through organizations like the Small Business Association and the Institute for Business and Home Safety. A plethora of literature has been written on emergency and disaster preparedness for large businesses and residential preparedness. However, small businesses have very unique management styles and particular levels of emergency and disaster preparedness, response, recovery and resumption efforts that make practical and economical sense for the specific business. For that reason this literature review will focus on the main research studies conducted on primarily small businesses.

Relevant Research Studies

The goal of "Organizations at Risk: What happens when small businesses and not-for-profits encounter natural disasters" (Alesch, D., Holly J., Mittler E., Nagy R., 2001) was to determine what differentiates businesses that fail in the wake of a natural disaster from businesses that succeed. The findings from this

study indicate that businesses have few ideas regarding disastrous-event recovery techniques. Businesses that are smaller, weaker, and under significant stress before the event are less likely to reopen following a disastrous event.

“Organizations at Risk” reports that it is difficult to draw direct linear cause and effect relationships between variables that will predict business survival. Instead the variables interact in complex, multidimensional ways. A business owner’s experience and perceived competencies often act as the guiding force in post-disaster recovery.

Alesch, et al. (2001), identifies the term “Management Mitigation,” or the management techniques employed to reduce both exposure and vulnerabilities through smart business practices. These techniques include: diversifying an organizations’ customers; housing inventory in a safe location; protecting electronic and hard copy data; establishing multiple business outlets (e.g., geographic, catalog, e-commerce); obtaining sensible lease provisions; and purchasing business interruption insurance (with adequate coverage).

Key terminology used in the area of emergency and disaster preparedness for businesses is defined by Alesch, et al. (2001), as follows:

Recovery: movement to a viable, new-system state following the major perturbation of the natural disaster.

Survival: a business that continues to meet the objective(s) for which it exists.

Robustness: the capacity or ability of a system to withstand shocks to its environment or environment.

Resilience: a business's ability to recover from or adjust easily to misfortune or change

The disaster sites selected by Alesch, et al. (2001), come from a variety of communities, each community having experienced a different type of disaster with varying degrees of resulting intensity. Each community also had a different history of disaster frequency. The locations chosen were as follows:

- 1) Northridge, California (earthquake of January 1994)
- 2) North Carolina (floods of Tar River, resulting from Hurricane Floyd in 1999)
- 3) The Red River of the North (floods of 1997)
- 4) Florida, South Dade County (Hurricane Andrew, 1992)
- 5) Georgia (floods of Flint River, resulting from Hurricane Floyd)
- 6) Los Alamos, New Mexico (wildfires of 2000)
- 7) Minnesota (tornado of 1998)

Overall, 150 businesses were selected from each area that had suffered the most extensive damage. Face-to-face interviews were conducted with 40 of those business owners. One-hundred businesses participated in a telephone survey. The remaining 10 chose not to participate. In addition to the interviews and telephone surveys, impromptu "drop-ins" occurred with an undisclosed number of businesses in the disaster areas, allowing business owners to recount their experience.

Nine main themes that indicate whether or not a business will fail following an emergency or disaster event were identified:

Theme One: "The Illusion of Security." In general, business owners lack concern about suffering losses from a natural disaster right up to the time it unalterably changes their lives. Business owners do not take precautions because they do not perceive that a risk exists.

Theme Two: "There was nothing I could have done to protect against all this." Following an event that resulted in significant devastation to businesses, some management felt that no matter what efforts could have been made it could not have saved their business from such catastrophic losses.

Theme Three: "Continuing Nightmare: A 360-degree disaster for the individual." For some businesses the devastation caused by the disaster has long term emotional and psychological effects. These may be precipitated by injury or death during the disaster or by an emotional feeling of loss and grief over the devastation of the business itself.

Theme Four: Self-Imposed Limits. Some businesses fail to see alternatives to emergency and disaster preparedness and limit the activities taken to respond to a disaster. Business owners may not be aware of all the possible ways to protect their business and therefore set limits on what they feel is an achievable level of preparedness.

Theme Five: Imprudent Use of Financial Resources. Many small businesses suffer from cash flow issues that make response to a disastrous event difficult.

Theme Six: "Not seeing what is happening to the customer base." Following a disaster, businesses usually experience a change in customer base and find that the community around them has changed as well.

Theme Seven: "Assuming things will get back to normal." Businesses that are able to reopen following a disaster may experience an altered business climate and things are not likely to return to "normal" or even an "altered normal" for a period of time. During this period of recovery, open businesses may continue to suffer from reduced business activities and limited business operation capabilities.

Theme Eight: "The special case of retirement." The age of the people running the business may impact how that business recovers from the disaster. People whose retirement may be effected by the event may take a different approach to post-disaster recovery than a younger business owner.

Theme Nine: "Help from the community, one-in-other and the government." Clean-up following a significant disaster can be "dirty work" and is often made more tolerable and efficient if individuals, communities, and the government work together to expedite the recovery process.

One of the biggest indicators of business recovery as reported in "Organizations at Risk" is the ability to recognize and adapt to the post-disaster environment. Ashby's law states that to survive, a system must have a repertoire of responses at least equal to the array of environmental challenges (Alesch, et al., 2001). "Organizations at Risk" identifies the complexity involved in recovering from a significant disaster. Surviving this process often determines whether a business is able to recover from a disaster. Emergency and disaster preparedness studies that focus primarily on small businesses are limited, which makes this study very valuable and essential as a guide in developing my own study of emergency and disaster events with small businesses.

The following is a description of work by Dahlhamer, James, & Tierney (1996) entitled "Winners and Losers: Predicting business disaster recovery outcomes following the Northridge earthquake." In this study 4000 questionnaires were mailed 18 months after the Northridge Earthquakes to firms in the Los Angeles metropolitan area. Researches received 1,100 responses. The questionnaires were followed up with 50 face-to-face interviews and 100 telephone interviews.

Four main variables studied were: firm characteristics, the direct and indirect impacts of the earthquakes, particular loss containment measure taken, and previous disaster experience. It was found that for most businesses, most losses did not occur right after the event, but rather after a period of months. In general, it appears that business owners have few ideas about how they should go about recovery efforts.

This study illustrates that the variables involved in business survival cannot be isolated but are, instead, complex and interconnected. All things being equal, businesses whose customer base was not adversely affected had a better chance of survival than did those who had suffered significant customer loss. Businesses that had more than one location were more likely to survive as were businesses that relied on customer's discretionary income for their sales as opposed to those providing essential goods and services. Lastly, businesses whose owners were able to adjust to consumers' changing demands were more likely to survive than

owners who continued to do business in the same way they had prior to the earthquake.

Historical Examples of Disasters in Benton County and the Benton County Hazard Analysis

The Benton County Hazard Analysis separates natural hazards into three main groups including weather emergencies (floods, windstorms, snow, ice, drought); geologic emergencies (earthquakes, volcanic eruptions); and epidemiological emergencies (human infections or agricultural product infections). In addition, the Hazard Analysis identifies specific subgroups of human-caused disasters: fire and explosion emergencies, transportation emergencies, hazardous material emergencies, civil disturbance emergencies, utility emergency, and nuclear emergencies. The Hazard Analysis uses five criteria in a ranked (high, moderate, low) and weighted order (event history, vulnerability, maximum threat and probability) to analyze potential risks in Benton County. Figure 1., shows the results of the Benton County Hazard Analysis.

As shown in Figure 1., severe weather emergencies (excludes flooding) and earthquake, are the top two Benton County Hazards. When interviewing participants, the Hazard Analysis was often used to help businesses understand what the risks are in Benton County and how risks are determined. Knowing what Benton County's specific hazards are is an essential first step in developing and implementing a strategy to prepare, respond, recover, and resume business operation following a disastrous event. One of the goals for the project was to see if local businesses' concerns about natural hazards were in-line with what experts

believe are the main hazards in Benton County. For example, Benton County experiences strong windstorms in both the fall and winter months. The Pacific low-pressure systems produce winds up to 60 mph resulting in damage and power outages.

In February of 2002 a windstorm caused 30 million dollars in damages in Western Oregon. Wind gusts over 100 mph were reported near the coast with 40 to 70 mph winds recorded inland. Power was out in some parts of the state for nearly a week. On October 12, 1962 the strongest non-tropical windstorm to ever hit the lower 48 states struck the Pacific Coast. The Columbus Day Storm killed 56 people, injured hundreds more, and left several million people without power. Wind gusts were recorded in Corvallis up to 127 mph. Parts of Corvallis strewn with power lines and debris were impassable for weeks. A major bridge linking downtown Corvallis and Interstate 5 was severely damaged by falling trees and added to the transportation disruption in and out of the city. The storm cost \$235 million dollars in property damage and even more in lost timber (Peirson, 2002).

Benton County also has a history of earthquakes. The largest on record took place in 1872, originating in the North Cascades. It had a magnitude of 7.4, and was followed by many aftershocks. The earthquake caused damage in Clackamas, Marion, and Yamhill Counties. A major fault line runs through the northeast corner of Benton County, a densely populated location. The Cascadia Subduction Zone, a major fault line, is also located in the northwest, running parallel to the coast of Washington and Oregon. Geologic evidence has shown

HAZARD ANALYSIS WORKSHEET

JURISDICTION: BENTON COUNTY

HAZARD	HISTORY (wf=2)	VULNERABILITY (wf=5)	MAX THREAT (wf=10)	PROBABILITY (wf=7)	TOTALS
SEVERE WEATHER/ WINTER STORM	High 20	High 50	High 100	High 70	240
EARTHQUAKE	Moderate 10	High 50	High 100	Moderate 35	195
HAZMAT	High 20	Moderate 25	Moderate 50	High 70	165
FIRE	High 20	Moderate 25	Moderate 50	High 70	165
FLOOD	High 20	Moderate 25	Moderate 50	High 70	165
UTILITY FAILURE	Low 2	Moderate 25	High 100	Moderate 35	162
ENEMY ATTACK	Low 2	Moderate 25	High 100	Low 7	134
CIVIL DISORDER	Moderate 10	Moderate 25	Moderate 50	Moderate 35	120
DROUGHT	Moderate 10	Low 5	Moderate 50	Moderate 35	100
VOLCANIC ASH	Low 2	Low 5	Moderate 50	Moderate 50	92
DAM FAILURE	Low 2	Moderate 25	Moderate 50	Low 7	84
RADIOLOGICAL	Low 2	Low 5	Moderate 50	Low 7	64
High = 10 points		Moderate = 5 points		Low = 1 point	

Residents were reminded that severe flooding is possible in Benton County and can cause serious interruption to the community (Vandever, 1996).

These are just a few examples of natural disasters that can and have occurred in Benton County. They clearly illustrate that it makes sense to develop a strategy to address those hazards most likely to have the greatest impact on local businesses. Businesses that take such measures will likely experience reduced losses and be able to reopen their business more quickly; whereas unprepared businesses may remain closed for a longer period or even indefinitely.

Overall, research is limited regarding what type of emergency and disaster strategies are most effective for small businesses. However, the literature cited in this section highlights some of the most recent examples of research done in this area and develops some common themes to guide businesses in their emergency and disaster strategy formation and implementation. This literature also serves as the foundation for this study, which assesses the current level of emergency and disaster concern and preparedness of Benton County small businesses.

Two Dimensional Assessment Model

In addition to research based work done on small businesses this study uses a Two-Dimensional Assessment Model (Veltri et. al., 1997) to evaluate qualitative information about emergency and disaster functions of small businesses. The model provides very specific examples of business strategies, plans and operations that are known to help reduce risk and losses in the event of a natural disaster. In addition, the model is a tool to evaluate how businesses level of preparedness

compares with the “relative degree of disabling business interruption exposure commonly encountered in the region in which they conduct business” (Veltri, et. al, 1997).

Chapter III - Methods

Subjects for this study included 500 small businesses (50 or fewer employees) in Benton County that were selected from the Oregon Employment Department database. The database contains approximately 2000 businesses that fit the working definition of a small business. The database organizes businesses by industry type and number of employees. A sample size of 500 was required to reach a 95% confidence level and 5% precision assuming maximum variance. The sample size was adjusted to account for non-responses. The estimated response rate for this survey was 30%; therefore the sample size was increased to insure a sufficient number of completed surveys were collected.

The survey used in this study was provided by the Oregon Natural Hazards Workshop. (Appendix A). The reliability and validity of the survey tool was not actually calculated, however the tool was previously administered in Rhode Island where the survey was first developed. Feedback from the stakeholder interviews and from participating businesses provided assurance that the survey was a reliable instrument. The survey was then modified to fit Oregon. Extensive field-testing was used to insure the clarity and appropriateness of the survey for use as a tool to evaluate emergency and disaster preparedness for businesses.

The survey responses were analyzed for trends in the data. Both descriptive statistics and chi-square square analysis were used to evaluate the

survey responses. The chi-square analysis was chosen to analyze the categorical variables and test for independence between the variables.

This information collected from the survey was used to develop questions for a second round of in-person interviews. (Appendix B). Because of the low response rate during the first mailing, the smaller groups of businesses chosen to participate in the interview were also asked to fill out the same survey and mail it back prior to the interview. The second group of businesses was randomly selected from the same database, after removing the names of businesses that participated in the first round mailing. Data from the first and second round of surveys were statistically analyzed to insure that no significant differences were found in survey responses that may create bias in the study.

A stratified random sampling method was used to select the subjects from the Oregon Employment Department database. The database is organized into specific stratas based on industry type (e.g. health services, manufacturing, retail). To ensure a representative sample was randomly selected from each industry type, a stratified random sample method was used.

The first sample of businesses selected included 484 businesses meeting the working definition of a small business. Surveys were mailed to these businesses and a reminder card was mailed approximately three weeks later to businesses that had not returned their surveys. Once data from the first selection of businesses were recorded using the statistical software SPSS, an additional 16 businesses were selected using the same stratified random sampling method from

the original database. The total number of businesses included in the sampled was N= 500. Businesses were contacted via telephone (Appendix C), and following a brief introduction and description of the study, were asked to participate.

Participation for these businesses included filling out and returning by mail the same survey the initial group of businesses received. In addition, these subjects were asked to participate in an in-person interview. To reduce bias between the two samples interviews were not scheduled with businesses until the business had returned the mailed survey. Results from the two mailings were compared and no significant difference in responses between groups was found. Therefore, results from the two samples were blended. The coding system used to manage the data during the first mailing was used during the second survey mailing. The interview was designed to allow open-ended discussion about the questions covered in the survey and to gain additional information about why businesses choose to manage emergency and disaster preparedness the way they do.

Because a coding system was used to determine non-responders and responders, business names and responses could have been linked to survey responses and therefore were not anonymous. The interview lasted approximately 30 minutes wherein subjects were asked to give feedback about the survey format and content. The business owners or managers were then asked to discuss in more detail their thoughts about emergency and disaster preparedness and how it relates

to their business. Handwritten notes recorded subject responses to the open-ended questions.

Informed Consent and Confidentiality

This research has been reviewed and approved by Oregon State University, Institutional Review Board (IRB). Part of the IRB approval process includes explaining to potential subjects about voluntary consent and confidentiality. Each survey was accompanied by a cover letter, explaining the importance of the research and that participation in the study was voluntary. (Appendix A). Subjects that chose to complete the survey were assured that their responses to survey questions would be confidential and only aggregated data results would be published.

A coding system was used to manage data collection and to determine which businesses returned the survey. Reminder cards were sent to businesses that had not completed the survey. Once the data was coded, the link between code number and individual responses were destroyed to insure confidentiality and anonymity of responses.

Benefits and Information Sharing

Following the interview, participants were given the option of participating in a drawing for a free, 72-hour, emergency disaster kit and/or having their business name recognized in an acknowledgement advertisement in the local Chamber of Commerce quarterly mailing (Appendix D). Only participants who

completed the consent form were included in the drawing or the acknowledgement advertisement.

In addition, some business owners requested information in the form of brochures or toolkits that could provide additional information about protecting their businesses. Business owners were given a Northwest Hazards Brochure (created by Tiffany Chona), a guide to assembling a 72-hour emergency kit (Benton County Emergency Management, document), and a copy of the Small Business Association (SBA) – Institute for Business and Home Safety (IBHS) “Open for Business Toolkit.” Permission was given by IBHS to reproduce and distribute this document. All documentation was given to participants at the end of the interview to eliminate any bias the material might have had on subjects’ responses to interview questions. The materials were made available with the hope of further encouraging business owners to take active measures in emergency and disaster preparedness for their business.

Two-Dimensional Assessment Scheme for Meeting the Economic Challenges of Disabling Business Interruptions (Veltri, Rutledge, & Van Pelt, 1997)

The interview notes were organized using the Two-Dimensional Assessment Model (Veltri et. al., 1997) (Appendix E). This two-phase model allows businesses to “assess their relative degree of exposure compared to their level of development and to rethink their management strategy and structure for preparing to withstand these events.” (Veltri et. al., 1997). Dimension one is a

quantitative “assessment of the organization’s relative degree of disabling business interruption exposure commonly encountered in the region in which they conduct business.” Dimension two “assesses the level of development of eight strategic management and technical areas that affect the organizations ability to withstand disabling business interruption events (Veltri et. al., 1997).

The model allows information from open-ended interview questions to be organized into the following categories: strategy formation, organizational structure, financing arrangement, implementation strategy, performance evaluation, preparedness, response, recovery, resumption, and research and development (Dimension II) (Veltri et. al., 1997). The model provides specific examples of business activities that help to characterize businesses into these categories. Questions were asked during the interview that helped to determine if particular activities characteristic of each level existed at the business (Appendix E).

Once the information about the business is organized based on these categories the business is then compared to a “the relative degree of disabling business interruption exposure commonly encountered in the region (Benton County) in which the business is located” (Veltri et. al., 1997). The relative degree of business interruption exposure for a region is estimated using five main focus areas: incident probability, estimated employee and physical impact plan, potential loss and realized revenue impact, and perceived duration of business recovery and resumption (Veltri et. al., 1997). A scale from 1 (low) to 12 (high) is used to rate

each of these specific areas of interest based on the hazards in the area (Dimension I). For this study, information from the Benton County Hazard Assessment (2002) was used to determine the appropriate rating for each of these main focus areas. Each individual business was then compared to this standardized hazard analysis rating (Veltri et. al., 1997).

The level of emergency and disaster preparedness for each business can be determined based on the results from both Dimensions I and Dimensions II of the model. The different levels are as follows: Level One: Reactive; Level Two: Ordinary; Level Three: Extraordinary; Level Four: World Class (Veltri et. al., 1997). Level One (reactive) businesses primarily respond only after-the-fact to emergency or disastrous events, and are given a numerical rating between one and three. Level Two (ordinary) businesses have an emergency and disaster function that is of common quality, undistinguished, and of average performance ability, and are given a numerical rating between four and six. Level Three (extraordinary) businesses have an emergency and disaster function that is notably exceptional in at least one important performance area, and are given a numerical rating between seven and nine. Level four (world-class) businesses have a distinctly competent and capable emergency and disaster function that surpasses all others of like kind in all performance areas, and are given a numerical rating between ten and twelve.

Because subjects offered different responses to questions, and each business manages emergency and disaster preparedness differently, this portion of the data analysis is subjective, and is based on the subject's responses and the

interviewer's interpretation of these responses. Each subject was asked the same questions during the interview to help reduce variability. However, even with a structured-question list, each business and management style was so unique as to make direct comparisons difficult. At the same time, the interviews added a depth of information about the businesses that could not have been collected from the standardized survey. The interviews provided an opportunity to understand how local small businesses perceive and manage emergency and disaster preparedness.

Chapter IV - Analysis

During the first mailing, 484 surveys were mailed out to businesses. Of those, 93 were completed, 3 were no longer in business, 4 were refused, 54 were returned and 3 were ineligible.

An additional sixteen businesses were then selected to participate in the survey and interview. Of the sixteen selected, ten completed both the survey and interview. The smaller group (second group) of businesses chosen to participate in the interview was also asked to fill out the same survey and mail it back prior to the interview. The 10 survey responses were blended with the original larger sample of businesses. Once a business returned the completed survey, the in-person interview was then arranged.

The second group of businesses was randomly selected from the same database, after removing the names of businesses that participated in the first round mailing. Data from the first and second round of surveys were analyzed to insure that no significant differences were found in survey responses that may create bias in the study.

Five businesses said they would participate and after receiving the survey, they chose not to complete the survey or the interview. The main reasons given for not participating were: too busy to participate or they felt that the project did not apply to their business. One business mailed back an unanswered survey and chose not to hold the interview.

Table 1:

Survey Response Rate			
Disposition	First Mailing	Second Mailing/Interview	Total
Frequency			
Complete	93	10	103
Not Returned	327	1	328
No longer in Business	3	0	3
Refused	4	5	9
Undeliverable	54	0	54
Ineligible - Number of employees >50	3	0	3
Total Number of Surveys	484	16	500
* Adjusted Response Rate = 25%			

The adjusted response rate for this survey is 25%. Table 1. Ninety-six percent of the businesses in this study have less than 25 employees. Of the businesses surveyed, 35% operated out of a building that is owned, 49% operated out of a building that is leased. Ten percent of businesses were home offices, whereas 6% of subjects responded "other" or marked a combination of own, lease, or home office. Seventy-five percent of businesses occupy a building that is older than 20 years. An additional 10% occupy a building that is 10 to 20 years old. Fifteen percent of businesses surveyed occupy a building that is 10 years or newer. Businesses are located in a wood building total 50.5 %, while 19.6% of businesses are in buildings made of a combination of materials, and 13.4% of businesses occupy a masonry building. Table 2.

Table 2:

Business Descriptive	
Number of Employees	96% have <25 Employees
Average Number of Years in Business	26.6 (SD 22.7)
Type of Business	69% individual firm, 4% Ind. Firm with Multiple Units, 4% Franchise, 9% Chain, 14% Other
Lease / Own Building in Which Business is Located	49% Lease, 35% Own, 10% Home Office, 6% Other
Age of Building	15% < 10 years, 10% 10 to 20 years, 75% >20 years old
Type of Building Construction	50.5% Wood, 19.6% Combination of Materials, 13.4% Masonry

Outlined in table 3., are the number of businesses from each industry type that participated in this study. There is a fairly even distribution between industry groups, with the exception of Agricultural and fishing industry. This distribution is results from the use of the stratified random sample where all industry types were represented equally in the sample.

Table 3:

Stratified Random Design: # of Businesses in Each Industry Type that Completed the Survey.	
Industry Types	#
Agricultural and Fishing	7
Finance, Insurance, Real Estate, Business Services, Consulting & Apartment Mgmt., Non-Profits	24
Transportation, Communications, Utilities, Construction	10
Health Services	17
Other Services and Eating & Drinking Establishments	22
Other Manufacturing, Retail Trade, Wholesale Trade	23
Non-Response = 2	103

Previous Survey Results As Compared to This Study

The Oregon Natural Hazards Workshop (ONHW) designed the survey used in this study. ONHW has used this study in Jackson County and the city of

Beaverton, both located in Oregon. The study had approximately a 30% response rate when used by ONHW.

Overall, the demographics of Jackson County, the city of Beaverton and Benton County are very similar. Businesses in the city of Beaverton and Jackson County have been in business for an average of 11 to 25 years. An average of 71% of businesses surveyed in the city of Beaverton and Jackson County were individual firms with no other firms or franchises. Approximately, 86% of business employees in the both locations commute less than 29 miles to work each workday. In Beaverton, the average age of the building in which businesses are located is 27 years old. Generally, these older buildings are less likely to have been structurally retrofitted to withstand natural disasters. Newer buildings must conform to more building codes that better withstand earthquakes and other potential natural disasters. Data were not available on the age of buildings accommodated by businesses in the Jackson county survey.

In Jackson County approximately 51% of businesses own the building in which they are located, 42% lease, and 4% indicated other (e.g., home office). In Beaverton, 27% of businesses own the building in which they are located, 61% lease, and 12.4% indicated other. Leasing property can add some additional difficulties in preparing a business for emergency or disaster events. Some business owners may not want, or be able, to make structural retrofits to a building that they do not own. In addition, the building owner's willingness to retrofit the building may vary as well. Therefore, people that are planning to lease a building

for their business should attempt to establish flexible lease agreements so in the event that a natural disaster occurs, the tenant is free to relocate the business, particularly if the building cannot be repaired quickly. Further, when businesses are considering property, an inspection of the structural integrity of the building and potential hazards that exist if an emergency or disaster event occurs should be evaluated prior to the signing of the lease agreement.

The city of Beaverton and Jackson County were asked to rate the impact of certain natural hazard events in terms of the possible impact on their businesses. All three counties responded similarly to the survey questions. Overall, businesses in both Beaverton and Jackson County were most concerned about the potential impacts caused by earthquakes, windstorms, flooding and severe winter weather. Businesses were least concerned about the potential impacts resulting from volcanic eruptions, wildfires, landslide and drought.

In addition to natural hazard events, businesses were asked to rate the importance of essential services to their business operation. On average, 75% of businesses indicated that electricity is critical to their business operation. Overall, nearly 97% of all businesses surveyed in both counties indicate that electricity is important, if not very important or critical, to their business operations. Approximately 96% of businesses surveyed indicated that phone/internet service is important, very important, or critical to their operations. Approximately 70% of businesses considered water to be important, very important, or critical to their operations. Other services indicated as at least important by a majority of the

businesses surveyed were transportation and sewer and wastewater treatment.

History has shown that during severe winter storms, earthquakes, windstorms, wildfires, and other natural hazards, many of these essential services are negatively impacted. Given that many of these services are important to business operations, it follows that conducting mitigation activities to reduce the impact of disastrous events is a vital component that all businesses should embrace.

In the city of Beaverton 54.3% of businesses have purchased flood and/or earthquake damage, and an additional 2.7% plan to purchase insurance in the future. Thirty percent of businesses indicate that they have purchased business interruption insurance, with 5.7% indicating that they plan to purchase such insurance in the future. In Jackson county 17% of businesses have purchased insurance to protect against flooding, and 39% have purchased business interruption insurance. In both cases, an additional 3% indicate they would like to purchase flood insurance or business interruption insurance in the near future.

Approximately 30% of businesses in both areas have talked with employees about what to do in case of a natural disaster. They have developed a plan to notify employees and stored emergency supplies. In Beaverton, 20% of business have an emergency response plan, and 14% have an emergency recovery plan. In Jackson County, 36% have an emergency response plan, and 17% have an emergency recovery plan. Approximately 10% of businesses in both areas have conducted disaster drills or exercises at their business.

Businesses were asked to indicate specifically what type of operations each essential service was used for in their business. Services were broken into groups: electrical power, telecommunications, water and sewage disposal, and natural gas. Examples were provided for each of these groups. Uses of electrical power, in order of importance for Beaverton businesses surveyed, were: lights, heating-ventilation-A/C, computers/cash registers, and then machinery. In Jackson County, the uses of electrical power in order of importance were: lights, computers-cash registers, heating-ventilation-A/C, and machinery.

Telecommunications was the second group, and was broken down into sub-groups of regular telephone calls, fax machines, computer-modems, and credit card machines. Both the city of Beaverton and Jackson County rated the order of importance of each operation to their business the same, regular phone calls, computer-modems, fax machines and credit card machines.

For the third group (water and sewer disposal), the city of Beaverton and Jackson County rated the business uses of water in the same order of importance, bathroom-sanitary, drinking-cooking, heating ventilation-A/C, and industrial use. For third and fourth groups (water and sewage disposal and natural gas), both were listed as important, very important, or critical for bathroom-sanitary uses; and natural gas was most often used for heating-ventilation-A/C purposes in both counties. After rating of essential services and how these essential services are used in business operations, and then being informed of the potential impact natural events could have, businesses were asked to indicate from a list of potential

mitigation activities that which they feel would be most useful to their business operations. Businesses were asked to use a rating scale of very useful, somewhat useful, not useful and already addressed. For the city of Beaverton and Jackson county the following mitigation activities were indicated as being the most useful: road access issues and debris removal, back-up sources of power, data and equipment protection, making information “one phone call away,” and a single point of contact for reporting any utility failures.

Lastly, businesses were asked to indicate, in ranked order, the most effective way for to receive information about reducing risks to natural hazards. Fact sheets / brochure, handbook, and the internet were ranked the most effective.

This study collected data on small businesses in Benton County to help understand the level of concern about natural disasters. In addition, this study identifies what steps business owners have taken to prepare, respond, recover, and resume business following and emergency or disaster event. The following subset of questions helped to answers these main questions.

The first research question assesses the level of concern about the potential impact to businesses caused by natural disasters. Based on the survey responses, business owners are most concerned about the potential impact resulting from earthquakes, flooding, severe winter storms, and wind storms. Table 4. Based on findings presented in the Benton County Hazard Analysis (2002), these survey findings indicate that business owners are knowledgeable about potential Benton County Hazards. Businesses were asked to rate only the estimated degree of

“impact” caused from each natural disaster and not weigh other factors such as, probability, history, and vulnerability which may explain the difference in ranked order between the Benton County Hazard Analysis and businesses. Overall, businesses were consistent with the Benton County Hazard Analysis is determining the top four hazards in Benton County.

Table 4:

Hazard Events: The Estimated Degree Of Impact To Benton County Businesses						
n=103	Severe (%)	Moderate (%)	Slight (%)	None (%)	No need to address (%)	
Earthquake	36.6	25.8	29	5.4	2.2	
Flooding	15.1	35.5	20	17.2	4.3	
Severe winter storms	14	26.9	46.2	8.6	4.3	
Wind storms	8.6	29	46.25	8.2	5.4	

Based upon these findings we reject the null hypothesis (1) that local small business owners are not concerned about emergency and disaster preparedness.

The second research question assesses how severely small businesses in Benton County would be impacted if a natural disaster interrupted community services. Businesses were given a list of seven community services and asked to rate the anticipated impact to their business if services were interrupted. Table 5. Overall, business owners/managers estimate loss of electricity, phone/internet usage, and transportation interruptions would seriously impact their business operations.

Historical examples of natural hazards show that community services (electricity, phone, and transportation) are vulnerable. Based on the Benton County Hazard Analysis (2002), the community is at risk to natural disasters that

would likely interrupt these essential services and ultimately have serious repercussions on small businesses.

Table 5:

Essential Services: The Estimated Impact To Benton County Businesses If Services Were Interrupted						
n=103	Serious (%)	Moderate (%)	Slight (%)	None (%)	No Need To Address (%)	
Electricity	87.1	5.4	4.3	1.1	1.1	
Phone/Internet	63.4	21.5	9.7	3.2	2.2	
Transportation	49.5	36.6	6.5	6.5	1.1	
Water	43	25.8	18.3	10.8	1.1	
Sewer	31.2	31.2	23.7	11.8	1.1	
Postal	20.4	35.5	36.6	6.5	1.1	
Natural Gas	23.7	20.4	24.7	25.8	3.2	

The third research question estimates how long businesses could be closed following a natural disaster before suffering major financial loss. Seventeen percent of businesses reported that they would suffer immediate losses in the event that their business was forced to close.

An additional 73% of business reported that they would suffer losses within days if forced to close following a natural disaster. The average number of days businesses estimate they could be closed before suffering major losses was 23 days (standard deviation [SD] = 53 days, median and mode = 7 days). The minimum number of reported days closed was one day; the maximum was 365 days. Extreme outliers were removed from the analysis.

Question four is assessed based on a list of business preparedness activities asked in the survey. Businesses were asked to report which preparedness activities they have done, or plan to do, to protect their business from a disabling interruption as a result of a natural disaster. Table 6.

Table 6:

Preparedness Activities Benton County Businesses, Have or Have Not Done.				
n=103				
Preparedness Activities:	Have Done (%)	Plan To Do (%)	Not Done (%)	N/A (%)
Talked with employees about what to do in case of a natural disaster?	28	7.5	47.3	14
Developed a plan to notify employees?	37.6	8.6	37.6	12.9
Purchased insurance for your business (e.g. earthquake, flood)?	58.1	1.1	23.7	13
Purchased business interruption insurance?	20.4	3.2	52.7	17.3
Stored extra fuel, batteries or other emergency supplies?	31.2	6.5	54.8	5.4
Developed a business emergency response plan?	23.7	8.6	59.1	5.4
Developed a business emergency recovery plan?	15.1	8.6	63.4	10.8
Conducted any disaster drills or exercises?	17.2	7.5	64.5	7.6
Made arrangements to move the business to another location in case of disaster damage?	14	4.3	58.1	21.6

The most commonly completed preparedness activities are: purchasing of earthquake or flood insurance, developing a plan to notify employees in the event of an emergency situation, and storing of emergency supplies. Less than 30% of businesses have completed any of the remaining preparedness activities listed in Table 6. In addition, less than 9%, and in some cases as few as 1%, of respondents plan to do any of the listed preparedness activities.

Part of the criteria for developing an emergency and disaster function includes activities needed to prepare businesses for emergency and disaster events. Using the Two-Dimensional Assessment Model (Veltri et. al., 1997) businesses were rated based on the eight criteria outlined in the model, and then compared to the standard hazard assessment score for Benton County. Table 7. The model

provides specific examples of activities that help to determine which level a business fits into. Table 7. Outlines the relative degree of exposure to natural hazards in Benton County. The highest rated hazards are severe weather and earthquakes.

Table 7:

Results: Two Dimensional Assessment Model						
Standardized Hazard Analysis Rating For Benton County Businesses, Based on Benton County Hazard Analysis Report						
Dimension I						n=10
Type of Disabling Business Interruption	Incident Probability	Employee Impact	Estimated Physical Plant Impact	Potential Loss Revenue Impact	Perceived Duration of Recovery & Business Resumption	Total
	High 12—1 Low	High Impact 12 —1 Low Impact			High 12— 1 Abbreviated	
Severe Weather	12	12	12	12	12	60
Earthquake	8	12	12	12	12	56
Fire/Wildland Fire / Flood	12	8	8	8	8	44
Flooding	12	8	8	8	8	44

Table 8. Shows the average development of emergency and disaster function for the ten businesses interviewed in this study.

Table 8:

Results: Two Dimensional Assessment Model					
The Average Level of Development of Emergency and Disaster Function for Benton County businesses is Determined Based on Specific Business Activities.					
	Dimension II				n=10
	Level 1	Level 2	Level 3	Level 4	
Formulated Strategy		5.3			
Organization Structure		4			
Financing Arrangement		4.44			
Performance Evaluation	3				
Emergency Preparedness		5.33			
Emergency Response		5			
Business Recovery/Resumption		5			
Research and Development		5.22			
Total Average Score = 37					
Overall level of development		Level 2			

Based on the businesses that were interviewed, the average level of development of small businesses' emergency and disaster function is currently at Level Two (active). Table 8. This means that the small businesses interviewed had an emergency and disaster function of common quality, undistinguished, and of average performance ability (Veltri et. al., 1997). The two dimensions of the model can be used to determine a "capability ratio index," which details the "relative degree of exposure over the developmental level of performance." For example, severe winter weather was given a relative degree of exposure rating of 60. The average developmental level for all businesses was 37 (Level Two). For earthquakes, the relative degree of exposure rating is 56, compared to the developmental level of 37. For wildfire and flooding the relative degree of exposure is 44, compared to the developmental level of 37. "Based on the information extrapolated from the organization's relative degree of exposure and developmental level of performance," (Veltri et. al., 1997) the average developmental level of most businesses emergency and disaster function does not sufficiently protect them from the relative degree of exposure to natural hazards in Benton County. (Appendix E)

Based upon the overall findings from both the survey and the interviews, the null hypothesis (2) that business owners have not taken steps to prepare, respond, recover, and resume business following an emergency or disaster event is rejected.

Based upon all survey responses, question five assesses the relationship between level of concern (serious, moderate, slight) about natural disasters and the amount of preparedness activities the business has done, or plans to do, to reduce the risk of a significant business interruption. A single-sample chi-square test was conducted to assess these relationships. The only significant relationship ($\chi^2 = p < .05$) was between businesses that reported being seriously to moderately concerned about the potential impact caused from severe winter weather and those businesses that have stored emergency and disaster supplies. The lack of significant findings between level of concern and preparedness activities may have been in part a result of a small sample size.

Question six assesses any relationship between industry type and the number of preparedness activities that have been implemented or plan to be implemented. A single-sample chi-square test was conducted to assess this relationship. No significant relationships were found ($\chi^2 = p > .05$).

Results generated from both the survey and interviews indicate little difference between industry groups and the steps they have taken to prepare and protect their business from emergency and disaster events, and therefore the null hypothesis (3) is not rejected. However, one industry type (agricultural) as lined to an increase in level of concern about the potential impacts resulting from drought and wildfires.

Question seven assesses any relationship between industry type and level of concern about potential impacts of natural disasters. The results of the chi-

square test for industry type-drought and level of concern for natural disasters were significant ($\chi^2 = p < .05$). In addition, there was a significant relationship between industry type-wildfire, and the number of preparedness activities that have been implemented or plan to be implemented ($\chi^2 = p < .05$).

Due to the limited variability in the data, some survey questions (e.g., industry type) were collapsed. The lack of variability limited the number of chi-square tests that could be evaluated between the specific research questions. Chi Square test is based on asymptotic results (i.e. large sample size) therefore if the number of observations per cell was less than five responses then a chi-square analysis would not have been credible.

Question eight examines the survey feedback to determine what type of mitigation activities would be most beneficial to Benton County small businesses. Thirty-three potential mitigation activities are listed on the survey, and respondents were asked to indicate if the activities would be very useful, somewhat useful, or not useful to their business. Table 9. The top four potential mitigation activities rated most useful by the Benton County businesses that were surveyed are: road access issues and debris removal, back-up sources of power, data and equipment protection, and water supply. This information could be very useful in determining where resources should be focused to help meet the needs of small businesses in the event of an emergency or disaster.

Table 9:

Businesses were asked to rate the usefulness of potential mitigation activities.

Potential Mitigation Activity	n=103	Very Useful	Some what Useful	Not Useful
		%	%	%
Facility and Road Access				
Road access issues and debris removal		60.2	31.2	4.3
Alternate route availability		39.8	45.2	5.4
Data and equipment				
Data and equipment protection		49.5	33.3	6.5
Retrieval of critical data from storage		47.3	32.3	9.7
Utilities				
Making information "one phone call away"		35.9	46.7	6.5
Back-up sources of power		55.9	35.5	4.3
Single point of contact for reporting any utility failures		44.1	43	4.3
Alternate communications		33.3	49.5	9.7
Alternate shipping/transportation		18.3	41.9	29
Wastewater treatment		20.4	43	28
Water supply		48.4	35.5	9.7
Businesses helping businesses				
Share resources among businesses in an emergency situation		34.4	38.7	19.4
Work with "like" businesses on mitigation projects		19.4	46.2	25.8
Mentoring program between more and less prepared businesses		12.9	44.1	34.4
Mutual aid networks for emergency shelter and food		26.9	43	21.5
Food vendors able to supply large facilities, which could in turn host smaller businesses		11.8	30.1	48.4
Developing a plan for direct notification to vulnerable businesses		19.4	44.1	28
Developing a central contact office to quickly disseminate information.		33.3	38.7	19.4
Training and public outreach				
Need for communication with Benton County Emergency Management Office		22.8	51.1	19.6
Planning and publicizing alternate commute routes		28	45.2	19.4
Alternate school/day care sites so employees can leave home for work		15.1	38.7	37.6
Help employees make plans to protect themselves and their home		18.3	52.7	22.6
Develop a website for business & community to report damages and recovery after a disaster		18.3	49.5	23.7
Risk Reduction Incentives				
Loans and grants for structural retrofits and other disaster preparedness measures		28	39.8	25.8
Expedite permit process for mitigation projects		30.1	40.9	21.5
Information that emphasizes disaster preparedness and recovery as part of business operations		17.2	46.2	30.1
Community wide activities				
Regulatory approaches for reducing risk (e.g. policies limiting development in hazardous areas)		20.4	38.7	31.2
Non-regulatory approaches to reducing risk (e.g. site specific mitigation actives)		16.1	49.5	23.7
Mix of regulatory and non-regulatory approaches to reducing risk		15.1	47.3	26.9
Use of federal and/or local tax dollars to reduce risk		14	33.3	45.2
Cooperation among agencies, citizens, non-profit organizations, businesses and industry		26.9	48.4	14
Inventories of at-risk buildings and infrastructure		17.2	51.6	23.7

* Non-Response Frequency for All Questions: Mean=6 SD=1.8

Top 4 activities: Very Useful

Question nine attempts to identify if there is a relationship between businesses that own versus lease the building in which the business is located and the number of preparedness activities in which they have done or plan to do. A single-sample chi-square test was conducted to assess this relationship. The results of the test were significant ($\chi^2 = p < .01$) for businesses that own versus lease and businesses that have or plan to talk with employees about what to do in case of a natural disaster. Results also indicated a significant relationship ($\chi^2 = p < .01$) between businesses that own versus lease the building and whether or not they have purchased earthquake or flood insurance.

Lastly a significant relationship ($\chi^2 = p < .05$) was identified between businesses that own versus lease and whether or not they had purchased businesses interruption insurance.

For all three of these relationships, businesses that owned the property in which their business was located were more likely to have conducted the preparedness activities.

Question ten seeks to determine the most effective way to deliver information to Benton County small businesses about reducing risks to natural disaster. Based on the survey responses, the majority (68%) of small businesses indicated that a fact sheet or brochure would be the most effective way to receive information. An additional 43% of businesses indicated that receiving information by Internet would be effective. Table 10. Workshops were listed to be the least effective way to disseminate information; this is likely because small business

owners do not have the time to leave work for a workshop or training. Making information and training convenient and inexpensive is important so that the largest number of businesses can benefit.

Table 10:

Potential Ways To Distribute Information To Businesses	
n=103	
Source for Information	Frequency (%)
Fact Sheet	68/103
Internet	43/103
Handbook	25/103
Newspaper	22/103
Radio / TV	19/103
Workshop	14/103
Chamber of Commerce	13/103
Administrative Meetings	3/103
Other	3/103

* % is > than 100 due to respondents choosing more than one answer.

Chapter V – Conclusions and Recommendations

The problem involved in this study was to determine the extent to which businesses have developed their emergency and disaster function in order to prepare, respond, recover and resume business following a natural disaster; and to provide research based information to help businesses make decisions regarding emergency and disaster preparedness in the future.

The following tasks were completed to evaluate the research hypotheses and questions. A literature review of past research in the area of emergency and disaster preparedness for small businesses was conducted. A survey was mailed to small businesses in Benton County to assess current disaster preparedness of Benton County small businesses. This study helps to understand small business needs in reducing risk and loss from natural disasters, and to gauge business owners' knowledge about risk reduction tools and techniques. In addition to a mailed survey, interviews were conducted with small number of businesses to provide a more in-depth understanding of how small businesses in Benton County approach emergency and disaster preparedness.

Conclusions

The following conclusions are drawn from the results of this study. Small businesses in Benton County are aware of the potential hazards inherent to the community. Business owners are concerned about the potential impact of natural

disasters on their business and anticipate that such an event could have serious repercussions on the long-term sustainability of their business. 91% of businesses reported being at least slightly concerned about the potential impacts resulting from an earthquake. Of those 62% were moderate to severely concerned. 71% of businesses reported being at least slightly concerned about the potential impacts resulting flooding. Of those, 51% were moderate to severely concerned. 87% of businesses reported being at least slightly concerned about severe winter storms, and 84% of businesses reported being at least slightly concerned about the impacts of windstorms on their ability to do business. On average, 88% of businesses feel interruption of community services (e.g. electricity, phone/internet and transportation) would have serious to moderate effects on their business operations.

Although small businesses realize the threat of natural disasters, they have done little to prepare, respond, recover, or resume business following a natural disaster. 58% of businesses have purchased earthquake or flood insurance. 37.6% of businesses have developed a plan to notify employees in the event of a natural disaster. 31% of businesses have stored extra fuel, batteries or other emergency supplies. Less than 30% of businesses have completed any of the remaining preparedness activities. Less than 10% of businesses intend to do any of the mitigation activities in the future.

Because many small businesses in Benton County are located in older buildings that have not been retrofitted, the potential for extensive damage to

building structures and business operations is great. Businesses located in older buildings may not be eligible to buy earthquake or flood insurance.

Based on in-person interviews conducted with ten small businesses in Benton County, businesses were evaluated on the level of development of their emergency and disaster function. Several themes became apparent during the interviews. First, most small business owners/managers are more concerned about day-to-day activities than they are about planning for natural disasters.

Businesses that practiced environmental stewardship and other sustainable business practices tended to be more interested in protecting their business and in training management and employees to prepare, respond, recover, and resume business. Examples of environmental stewardship and sustainable business practices were the use of organic foods, environmentally friendly packaging, environmentally friendly food (menu) selections, and extra care with hazardous waste management.

Business owners weren't sure how to protect their business from large-scale hazards. The cost versus benefit of emergency and disaster preparedness was of concern for many business owners. They wanted to know what activities would reduce their risks, and at what cost. Businesses that were currently experiencing slow businesses as a result of the economy slump were less likely to feel that spending energy and resources on emergency and disaster planning was in the best interest of their business. For these businesses a natural disaster could be the "last straw," and they may choose not to reopen their business.

Lastly, businesses that provided non-essential services, such as screen-printing for clothing or a furniture store were less prepared for an emergency or disaster event than those who provided a more essential service. There are a few businesses that are likely to profit from a natural disaster. Businesses have a vested interest in ensuring that they can reopen quickly following a natural disaster, which in some cases can even mean a sharp increase in business activities. For example, an auto body and collision repair shop would likely experience a drastic increase in business following a severe weather emergency. If it can be operational soon after the event, the business may profit substantially more than during standard operation. Alternatively, if the business is unable to remain open, and customers must take their automobiles elsewhere to get repaired, not only is this an immediate financial loss, but this lost clientele might be difficult to regain.

Recommendations

This study's findings could have been improved by a better response rate for the mailed surveys and by the addition of more in-person interviews. Because there is no one-size-fits-all plan for emergency and disaster preparedness, the open-ended discussion with business owners/managers provides insight into what they feel is truly important to their business and what activities they feel could reduce their risks.

I believe small businesses in Benton County would greatly benefit from additional training and information about how they can protect their businesses

from natural disaster. The challenge is to move businesses from knowing about emergency and disaster preparedness to actually performing the mitigation activities needed to protect their business. A user-friendly handbook, such as the “Open-for-Business Toolkit for Small Businesses” would be a valuable asset for many small businesses. Trainings such as CPR and first aid, earthquake preparedness, vulnerability analysis of business operations, structural, non-structural mitigation activities, and business partnerships, are all trainings that local business owners could benefit from. Acquiring this knowledge can reduce the potential for losses in a natural disaster.

Now that a foundation has been established regarding the level of knowledge and concern for natural disasters among Benton County small business owners, training business owners and managers how to best prepare, respond, recover, and resume business is the next step in creating a more disaster-resilient community.

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APPENDIX A

Coverletter, Survey and Reminder Card

DEPARTMENT OF
PUBLIC HEALTH



OREGON
STATE
UNIVERSITY

256 Waldo Hall
Corvallis, Oregon
97331-6406

Telephone
541-737-2686

Fax
541-737-4001

Date May 2003

Dear Business Owner or Manager:

It is estimated that 25% of small businesses would not reopen following a significant business interruption resulting from an emergency or disaster event (source: Institute for Business and Home Safety). Small business owners make up an essential part of the Benton County business foundation and the community. Taking steps to prepare and protect your business investment is important for you as a business owner or manager and the local community. Benton County Emergency Management Department and I (Tiffany Chona, OSU Graduate Student) are developing a program to assist small businesses in Benton County to prepare for future emergency and disaster occurrences. The goal of this project is to increase awareness about the importance of emergency and disaster preparedness for small business owners in Benton County. In addition, the project will be designed to encourage local business owners to take steps to prepare, respond, recover and resume business as quickly as possible in the event of an emergency or disaster event. The information collected from the enclosed survey will help Emergency Management Coordinators in their effort to ensure that efforts made to address local hazards and concerns will meet the needs of local business owners.

We are asking you to provide important information that will help create a more disaster resilient community through emergency and disaster preparedness. We would appreciate it if you would take about 10 minutes to respond to the enclosed questionnaire and return it in the envelope provided. Your responses, together with others, will be combined and used for statistical summaries only. Your participation in this study is voluntary and you may refuse to answer any question. Only a small sample of small business owners will receive the questionnaire, so your participation is vital to the study.

The answers you provide will be kept confidential to the extent permitted by law. Special precautions have been established to protect the confidentiality of your responses. The number on your questionnaire will be removed once your questionnaire has been returned. We use the number to contact those who have not returned their questionnaire, so we do not burden those who have responded. Your questionnaire will be destroyed once your responses have been tallied. There are no foreseeable risks to you as a participant in this questionnaire; nor is there any direct compensation. However, your participation is extremely valued.

If you have any questions about the survey, please contact me at (541) 737-2686 or by e-mail at Tiff1Ro1@aol.com. If I am not available when you call, please leave a message and I will call back. If you have questions about your rights as a participant in this research project, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator at (541) 737-3437 or by e-mail at IRB@oregonstate.edu.

Thank you for your help. We appreciate your cooperation.

Sincerely,

Tiffany Chona - Graduate Student, Department of Public Health, Oregon State University

OSU IRB Approval Date: 5/16/03
Approval Expiration Date: 5/18/04

Benton County

Business Preparedness Questionnaire

Instructions. This questionnaire has three sections: (1) assessing the disaster preparedness of Benton County businesses; (2) understanding business needs in reducing risk and loss from natural hazards; and (3) gauging business owner knowledge of risk reduction tools and techniques. This information will help improve coordination activities that could help to reduce risk to natural disasters, and assist in local recovery efforts should a disaster occur. An owner, manager or other employee that has a thorough understanding of your business's operations should complete the questionnaire. Please take a few minutes to complete this questionnaire and return it in the enclosed envelope.

Your returned survey indicates your willingness to take part in the study. Your participation in this study is voluntary. If you have questions regarding your rights as a research participant, please contact the Office of Sponsored Programs and Research Compliance, 312 Kerr Administration Building, Oregon State University, Corvallis OR 97331-2140 or call (541) 737-3437. All individual survey responses are kept confidential to the extent permitted by law, and are for research purposes only.

GENERAL INFORMATION

1. How many years has your business been in operation?
 _____ (Number of years)

2. Which of the following categories does the business fall under: (Check only one)
 - An individual firm with no other units
 - An individual firm with multiple units
 - A franchise
 - Part of a chain of businesses
 - Other, Please Explain: _____

3. Please indicate the type of industry or profession that most accurately describes your business. (Check only one)

<ul style="list-style-type: none"> <input type="checkbox"/> Agriculture, Forestry, Fishing <input type="checkbox"/> Transportation, Communication, Utilities <input type="checkbox"/> Construction <input type="checkbox"/> Finance, Insurance, Real Estate <input type="checkbox"/> Business Services <input type="checkbox"/> Health Services <input type="checkbox"/> Other Services <input type="checkbox"/> Consulting 	<ul style="list-style-type: none"> <input type="checkbox"/> Apartment Management <input type="checkbox"/> Wood Products Manufacturing <input type="checkbox"/> Other Manufacturing <input type="checkbox"/> Retail trade <input type="checkbox"/> Eating and Drinking Establishment <input type="checkbox"/> Wholesale Trade <input type="checkbox"/> Other (specify): _____
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4. Does the business own or lease the building in which the business is located?
 - Own
 - Lease
 - Home Office
 - Other, Please Explain: _____

5. If the business leases the building in which the business is located would you be willing to do any structural or non-structural mitigation?

- Structural
 Non-structural

6. What is the age of the building that your business occupies?

- Less than 5 years old
 5 to 10 years old
 10 to 20 years old
 Older than 20 years

7. What type of structure does your business occupy?

- Wood
 Steel
 Concrete
 Masonry
 Other, Please Explain: _____

8. How many employees does the business employ?
 _____ (Number of employees)

9. On average, how long does it take employees to commute to work?

- 0-4 minutes
 5-14 minutes
 15-29 minutes
 30-44 minutes
 45-59 minutes
 60 or more minutes

10. Corvallis is vulnerable to several natural hazards. Please rate these hazard events in terms of possible impact on your business.

[Check the appropriate box for each hazard]

Hazard	Serious	Moderate	Slight	None	No need to address now
Wind damage	<input type="checkbox"/>				
Flooding	<input type="checkbox"/>				
Landslide / Debris Flow	<input type="checkbox"/>				
Severe Winter Storm	<input type="checkbox"/>				
Drought	<input type="checkbox"/>				
Earthquake	<input type="checkbox"/>				
Volcanic Eruption	<input type="checkbox"/>				
Dust Storm	<input type="checkbox"/>				
Wildfire	<input type="checkbox"/>				
Other: _____	<input type="checkbox"/>				

11. A natural hazard event could impact some of the communities' essential services. Please rate the impact on your business if these services were knocked out or unavailable.

[Check the appropriate box for each service]

Service	Serious	Moderate	Slight	None	No Need To Address Now
Electricity	<input type="checkbox"/>				
Water	<input type="checkbox"/>				
Natural gas	<input type="checkbox"/>				
Phone/Internet	<input type="checkbox"/>				
Postal	<input type="checkbox"/>				
Sewer and waste water treatment	<input type="checkbox"/>				
Transportation, e.g. roads, rail	<input type="checkbox"/>				

12. If the business was forced to shut down during a natural hazard event such as a flood or winter storm, how long could you afford to be closed without suffering major financial loss?

[Please check only one box]

- Would immediately suffer major losses
- Hours - how many? _____
- Days - how many? _____

13. Upon which of the following transportation systems does the business depend?

[Please check all that apply]

- Private roads
- City streets
- County roads
- State highways
- Interstate highways
- Air
- Rail
- Other, please explain: _____

PREPAREDNESS ACTIVITIES AT YOUR BUSINESS

14. Your business can do many things to prepare for a natural disaster such as a flood or wildfire. In the following list, please check all those things that you have already done at your business, plan to do in the near future, have not done, or are unable to do.
[Please check one answer for each action]

At your business, have you or your employees:	Have Done	Plan To Do	Not Done	Unable To Do	N/A
A. Talked with employees about what to do in case of a natural disaster?	<input type="checkbox"/>				
B. Developed a plan to notify employees?	<input type="checkbox"/>				
C. Purchased insurance for your business? (e.g. flood, earthquake)	<input type="checkbox"/>				
D. Purchased business interruption insurance?	<input type="checkbox"/>				
E. Stored extra fuel, batteries or other emergency supplies?	<input type="checkbox"/>				
F. Developed a business emergency response plan?	<input type="checkbox"/>				
G. Developed a business emergency recovery plan?	<input type="checkbox"/>				
H. Conducted any disaster drills or exercises?	<input type="checkbox"/>				
I. Made arrangements to move the business to another location in case of disaster damage?	<input type="checkbox"/>				

Question 15 includes nonstructural and structural modifications that make your business more resistant to earthquakes. There are many measures that can be taken for other natural hazards, such as wildfires and floods.

15. What nonstructural or structural modifications for earthquake have you made to your business?

(Please check all that apply)

15a. Nonstructural

- Anchor bookcases, cabinets to wall
- Secure ceiling tiles and lighting fixtures
- Install latches on drawers/cabinets
- Fit gas appliances with flexible connections
- Securing Water Heater
- Others (please explain):

15b. Structural:

- Secure building to foundation
- Brace inside of cripple wall with sheathing
- Brace unreinforced masonry & concrete walls and foundations
- Others (please explain):

16. How important are each of the following types of service in conducting your business?
 [Please circle the corresponding number for each service]

1. **Critical** - Business would have to close without it.
2. **Very Important** - Loss would cause major disruption.
3. **Important** - Loss would cause some disruption
4. **Not Very Important** - Loss would cause minor inconvenience.
5. **Not Used** - Business doesn't use this service.

Service	Critical	Very Important	Important	Not Very Important	Not Used
Electrical power for:					
A. Computers / Cash registers	<input type="checkbox"/>				
B. Machinery	<input type="checkbox"/>				
C. Lights / Office	<input type="checkbox"/>				
D. Heating; ventilation; A/C	<input type="checkbox"/>				
E. Other: _____	<input type="checkbox"/>				
Telecommunications for:					
F. Phones	<input type="checkbox"/>				
G. Fax machines	<input type="checkbox"/>				
H. Computers – Modems	<input type="checkbox"/>				
I. Credit card machines	<input type="checkbox"/>				
J. Other: _____	<input type="checkbox"/>				
Water used for:					
K. Drinking – Cooking	<input type="checkbox"/>				
L. Bathrooms – Sanitary	<input type="checkbox"/>				
M. Industrial use	<input type="checkbox"/>				
N. Heating ventilation A/C	<input type="checkbox"/>				
O. Other: _____	<input type="checkbox"/>				
Sewage disposal:					
P. Bathrooms – Sanitary	<input type="checkbox"/>				
Q. Industrial wastewater	<input type="checkbox"/>				
R. Other: _____	<input type="checkbox"/>				
Natural gas used for:					
S. Industrial processes	<input type="checkbox"/>				
T. Heating ventilation A/C	<input type="checkbox"/>				
U. Other: _____	<input type="checkbox"/>				

17. Following is a list of potential mitigation activities from which businesses can benefit. Please rate the importance of each measure to your business and employees using the following scale:

1. **Very Useful**
2. **Somewhat Useful**
3. **Not Useful**
4. **Already Addressed**

Activity	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Facility and road access				
1. Road access issues and debris removal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Alternate route availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data and Equipment				
3. Data and equipment protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Retrieval of critical data from storage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilities				
5. Making information "one phone call away" for businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Back-up sources of power	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Single point of contact for reporting any utility failures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Alternate communications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Alternate shipping/transportation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Wastewater treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Water supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Businesses helping businesses				
12. Share resources among businesses in an emergency situation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Work with "like" businesses on mitigation projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Mentoring program between more and less prepared businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Mutual aid networks for emergency shelter and food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Food vendors able to supply large facilities, which could in turn host smaller businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Developing a plan for direct notification to vulnerable businesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Developing a central contact office to quickly disseminate information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Activity	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Training and public outreach				
19. Need for communication with Benton County Emergency Management Office	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Planning and publicizing alternate commute routes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Alternate schools/day care sites so employees can leave home for work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Help employees make plans to protect themselves and their home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Develop a website for business & community to report damages and recovery after a disaster	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk reduction incentives				
24. Loans and grants for structural retrofits and other disaster preparedness measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Expedite permit process for mitigation projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Information that emphasizes disaster preparedness and recovery as part of business operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community wide activities				
27. Regulatory approaches for reducing risk (e.g. policies limiting development in hazard areas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Non-regulatory approaches to reducing risk (e.g. site specific mitigation activities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Mix of regulatory and non-regulatory approaches to reducing risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Use of federal and/or local tax dollars to compensate land owners for not developing in areas subject to natural hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Use of local tax dollars to reduce risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Cooperation among agencies, citizens, non-profit organizations, business and industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Inventories of at-risk buildings and infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. What is the most effective way for your business to receive information about reducing its risk to natural hazards?

[Please check all that apply]

- Handbook
- Fact sheet / Brochure
- Newspaper
- Radio / TV
- Internet

- Chamber of Commerce
- Workshop
- Administrative meetings, i.e. monthly, quarterly
- Other, please explain: _____

Please provide any additional comments in the space provided:

THANK YOU VERY MUCH FOR PROVIDING THIS INFORMATION

*The Oregon Natural Hazards Workgroup at the University of Oregon's
Community Service Center prepared this survey for Benton County
For more information, please contact Oregon Natural Hazards Workgroup at
1209 University of Oregon, Eugene, OR 97403-1209, call (541) 346-3653, email
showcasestate@oregon.uoregon.edu or visit www.OregonShowcase.org*



Date: 07/08/2003

A Few weeks ago you were mailed a survey and asked to participate in a study investigating emergency and disaster planning activities of small businesses in Benton County. Our records show that we have not yet received a completed questionnaire from your organization.

In Order to acquire representative data regarding emergency and disaster planning practices, it is essential that each business return the questionnaire. The answers you provide are kept confidential to the extent permitted by law. Your responses, together with others will be used for statistical summaries only.



OREGON STATE
UNIVERSITY
Department of Public Health

Reminder

If you would like another copy of the survey or if you have any questions please contact:

Tiffany Chona
Graduate Student,
Department of
Public Health
256 Waldo Hall
Corvallis, Oregon
541-757-8605
Email: TiffR01@aol.com

Your cooperation is greatly appreciated.

APPENDIX B

Informed Consent Document and Interview Questions

OSU IRB Approval Date: 5/16/03
Approval Expiration Date: 5/16/04**INFORMED CONSENT DOCUMENT**

Project Title: Emergency Preparedness for Small Businesses in Benton County
Principal Investigator: Dr. Anthony Veltri, Department of Public Health
Research Staff: Tiffany Chona, Graduate Student

PURPOSE

This is a research study. The purpose of this research study is to build a more disaster resilient community by encouraging small business owners and managers to prepare, respond, recover and resume business following an emergency or disaster event. In addition, this research study is designed collect information from business owners and managers about efforts they have taken to protect the business, what your future plans are, and why you have chosen to address emergency and disaster preparedness the way you have currently. Information from this study will be used to help local emergency management coordinators tailor future emergency and disaster planning efforts in the community. Businesses will be grouped by industry type to identify any trends in emergency and disaster planning efforts by specific industries. The purpose of this consent form is to give you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask any questions about the research, what you will be asked to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When all of your questions have been answered, you can decide if you want to be in this study or not. This process is called "informed consent". You will be given a copy of this form for your records.

We are inviting you to participate in this research study because you own or manage a small business in Benton County. Approximately 30 business owners or managers are expected to participate in this study.

PROCEDURES

If you agree to participate, your involvement will last for approximately 30 minutes.

The following procedures are involved in this study. If you choose to participate in this study you will be asked to have an in-person consultation with Tiffany Chona to discuss emergency and disaster preparedness as it pertains to your business. During the consultation you will be asked to discuss what you believe are potential hazards that your business faces, what you have done to minimize those hazards, what you plan to do in future, and why you choose to address emergency and disaster preparedness in this way. During the consultation, handwritten notes will be taken to record your responses. Your responses will be compared to other business owners and managers participating in this study. Following the consultation you will have the option of filling out an additional drawing form to allow your business to be acknowledged in the local Chamber of Commerce Newsletter for your participation in this study, the local Benton County Emergency Management Department is sponsoring this advertisement. In addition, you will be asked if you would like to be included in a drawing for a 72-hour emergency kit. Only participants, who choose to be acknowledged and entered into the drawing, will be. No specific information will be provided in the advertisement regarding information



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Revised 08-02

collected or your responses to questions asked during the study. Only the name of your business will be acknowledge for its participation. If you choose not to be included in the advertisement or the drawing, it does not effect your participation in the study.

RISKS

There are no foreseeable risks to participating in this study.

BENEFITS

The potential personal benefits that may occur as a result of your participation in this study are receiving information about potential hazards in Benton County that could effect your businesses and information and literature about how to minimize some of these risks. The researchers anticipate that society may benefit from this study by helping to build a stronger more resilient community through emergency and disaster preparedness.

CONFIDENTIALITY

Records of participation in this research project will be kept confidential to the extent permitted by law. However, federal government regulatory agencies and the Oregon State University Institutional Review Board (a committee that reviews and approves research studies involving human subjects) may inspect and copy records pertaining to this research. It is possible that these records could contain information that personally identifies you. Any notes taken during the consultation will be coded with identification numbers. Documentation linking the identification numbers with your business name will be kept separately. In the event of any report or publication from this study, your identify will not be disclosed. Results will be reported in a summarized manner in such a way that you cannot be identified.

VOLUNTARY PARTICIPATION

Taking part in this research study is voluntary. You may choose not to take part at all. If you agree to participate in this study, you may stop participating at any time. During the consultation you are free to skip any question asked during the interview if you choose. If you decide not to take part, or if you stop participating at any time, your decision will not result in any penalty or loss of benefits to which you may otherwise be entitled. If you choose to withdraw from participating in the consultation, any information collected prior to your withdrawing will be destroyed and not used as part of the research study.

QUESTIONS

Questions are encouraged. If you have any questions about this research project, please contact: Dr. Anthony Veltri and student researcher Tiffany Chona at 541-737-3831. If you have questions about your rights as a participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator, at (541) 737-3437 or by e-mail at IRB@oregonstate.edu.

OSU IRB Approval Date: 5/9/03
Approval Expiration Date: 5/12/04

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

Participant's Name (printed):

(Signature of Participant)

(Date)



OREGON
STATE
UNIVERSITY

256 Waldo Hall
Corvallis, Oregon
97331-6406

RESEARCHER STATEMENT

I have discussed the above points with the participant or, where appropriate, with the participant's legally authorized representative, using a translator when necessary. It is my opinion that the participant understands the risks, benefits, and procedures involved with participation in this research study.

(Signature of Researcher)

(Date)

OSU IRB Approval Date: 5/19/03
Approval Expiration Date: 5/19/04

Telephone
541-737-2686

Fax
541-737-4001

Tiffany Chona – Thesis Project**Interview Questions**

Formulated Strategy: Do you have a formulated strategy in place (or are you planning to put in place) that deals with emergency preparedness for your business? Does this strategy cover preparation, response, recovery and business resumption efforts?

Organizational Structure: What staffing structure do have in place that supports this strategy, are resources assigned? Does this structure prepare your business for response, recovery and business resumption efforts?

Financing Arrangement: What kind of financial management is in place to deal with emergency-management type functions?

Implementation Strategy: How do the resources interact, go about their implementation, of recovering from an emergency? Do you feel this strategy will handle long-term needs as well as handling the day-to-day functions of your business?

Performance Evaluation: Do you have a way to measure or evaluate the success of your emergency preparedness program/activities? Are the key areas; preparedness, response, recovery and business resumption activities covered?

Emergency Preparedness: What types of regulations, compliance or other strategies for mitigating emergency disaster preparation are in place at your business? Are employees involved with this type of strategy, training? Are efforts with critical suppliers and customers coordinated?

Emergency Response: Are people in your business trained or have the capabilities to respond to emergencies that may occur within your business? Do you know who you would contact to help your business recover form such an event? Are contacts set up with regional and community recovery teams and programs?

Business Recovery: What actions or plans are outlined to insure that recovery of the business would be successful if an emergency took place? What steps would your business take directly after a significant business interruption? Are these plans integrated through your key strategic business units?

Business Resumption: Is there a strategic plan in place to resume full business operations after such an event? Does the plan incorporate critical suppliers, customers and the company to focus on resumption activities?

Research and Development: Are there activities or plans around providing resources to perform research and develop designs around the enhancement of emergency preparedness?

APPENDIX C

Telephone Recruitment Script

Telephone Recruitment Script:

Introduce Myself: Hi, my name is Tiffany Chona (Oregon State University Graduate Student)

I am currently conducting a project as part of my thesis work at Oregon State University and by request from the Benton County Emergency Management Department to:

- (1) Assess current disaster preparedness of Benton County small businesses.
- (2) Develop an understanding of small business needs in reducing risk and loss from natural and human-caused hazards.
- (3) And to gauge business owner knowledge of risk reduction tools and techniques.

Small businesses make up a very valuable part of our local community. In the event of a significant emergency or disaster event, such as a flood or earthquake, the Institute for Business and Home Safety estimates that approximately 25% of small businesses would be unable to resume business. However, research has shown that planning for an emergency or disaster event can reduce the impact to your business in the event of an emergency situation. Your participation in this project is important to create a better understanding of the needs and concerns of local business owners regarding emergency and disaster preparedness. Understanding how a disaster might affect your businesses and identifying ways to reduce the damage when disaster strikes will provide valuable information to help focus future emergency and disaster management efforts for your business and the community.

As part of this project, your business, along with 29 other small businesses in the Benton County, have been randomly selected from the Oregon Department of Employment Database to participate in an interview. Participating in this study would involve setting aside approximately 30 minutes to meet with me and discuss emergency and disaster preparedness and how it relates to your business. During our interview I will be providing toolkits of resources that you may find helpful in developing emergency and disaster plans for your business. In addition, I will be bringing along examples of a 72 hour emergency and disaster kit, structural and non-structural mitigation equipment, such as equipment strapping, and wall anchors, that could easily be used to protect your employees, equipment, processes, and structure, in the event of an emergency or disaster event. These items will be shown as examples of the types of tools that are available to help you protect your business.

Your participation is voluntary, if you choose to participate in an interview, you are free to withdraw from the project at any time. All handwritten notes taken during the interview will be kept in a locked cabinet and access to this data will be limited to those on the research team. The completed notes will be destroyed once the information has been coded for analysis. Do you have any question about this project or your role as a participant?

Are you willing to participate in this study and allow me to spend approximately 30 minutes with you discussing ways to help prepare and protect your businesses in the event of an emergency or disaster event?

If Yes,

Set up Time and Place, exchange contact information.

If No,

Thank you for your time, if you have any other questions regarding this project please contact Tiffany Chona at Oregon State University, Department of Public Health @737-2686.

APPENDIX D

Participation Form Given To Manager

Acknowledgment Advertisement

Dear Business Owner,

ID# _____

Benton County Emergency Management would like to thank all of the businesses that have taken part in this study. One way for us to show our appreciation is to include your business name in an advertisement in the local Chamber of Commerce Newsletter. Your participation in this advertisement will not compromise the confidentiality of the information you provided on the surveys or during any other part of the project.

In addition, to thank you for taking the time to participate in this study we could like to include you in a drawing for a 72-hour emergency kit. Please check the box below if you would like to participate in this drawing.

If you would like your business to be recognized in an advertisement please write your business name and provide a signature below. In addition, please check the "Acknowledgement Advertisement" Box Below. If you choose not to be recognized for your participation in this study or choose not to enter the drawing there is no need to return this document. Business's that do not return this document will NOT be listed in the advertisement.

"Together we're building a more disaster resilient community"

- 72-Hour Emergency Disaster Kit - Drawing**
 Acknowledgement Advertisement (See Reverse For Example of the AD)

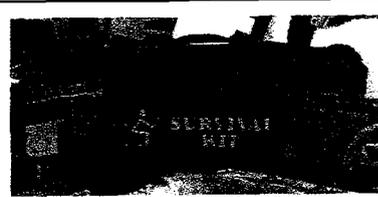
Thank you,
Benton County Emergency Management

Business Name: _____ Phone # _____

Signature: _____ Date: _____

Benton County Emergency Management and I
 Would Like to Thank the Following Businesses For
 Participating in a Local Study. Analyzing Emergency Management
 For Small Businesses in Benton County.

- **Big River Breads**
- **Main Auto Body**
- **Perma Grafix Tattoos**
- **West Hills Animal Hospital, Inc.**
- **Shirt Circuit**
- **TCBY & Mrs. Fields**
- **United Way of Benton County**



Big River Breads – Winner of a 72
 Hour Emergency and Disaster Kit

In addition, we would like to thank all business owners and managers
 that responded to the mailed survey, the information
 you provided was very important to the success of this project. Your
 participation will help us better understand the emergency and disaster needs
 for small business in Benton County.

Peggy Peirson (Emergency Service Program Coordinator-Benton County)
 and Tiffany Chona (Oregon State University-Graduate Student)

For More Information about Emergency and Disaster
 Management, Contact: Peggy Peirson @ 766-6864

“Together We’re Building a More Disaster Resilient Community”

APPENDIX E

Two-Dimensional Assessment Model Worksheets

DIMENSION II - QUALITATIVE ASSESSMENT
Rating Estimate and Record Form

Assessment Period:
Raw Score =

	Levels of Strategic and Technical Development and Performance											
	Level I Reactive			Level II Active			Level III Proactive			Level IV Dynamic		
1. Formulated Strategy. The process of determining the strategic intent (vision) and mission statement that is necessary for guiding the strategic performance of the organization.	1	2	3	4	5	6	7	8	9	10	11	12
2. Organization Structure. The approach used for structuring strategy and the positioning arrangement for the function within the organizational chart of the company.	1	2	3	4	5	6	7	8	9	10	11	12
3. Financing Arrangement. The process of funding emergency management-type functions.	1	2	3	4	5	6	7	8	9	10	11	12
4. Performance Evaluation. The process employed to measure the performance of the emergency management function.	1	2	3	4	5	6	7	8	9	10	11	12
5. Emergency Preparedness. The technical (pre-event) approaches needed for preparing the organization to effectively minimize the economic consequences of potential disruptive business interruptions.	1	2	3	4	5	6	7	8	9	10	11	12
6. Emergency Response. The technical (event) approaches used for enabling and coordinating assistance to victims and for avoiding further adversity caused by disabling business interruptions.	1	2	3	4	5	6	7	8	9	10	11	12
7. Business Recovery/Resumption. The technical (post-event) approaches required to effectively and efficiently recovering from resource disablement's resulting from disabling business interruptions.	1	2	3	4	5	6	7	8	9	10	11	12
8. Research and Development. The process of applying research and development methodology for solving emergency management problems and creating new ways of sustaining business performance.	1	2	3	4	5	6	7	8	9	10	11	12

Directions: Circle the point value most characteristic of the developmental performance level within each area.

TWO DIMENSIONAL RECORD FORM

Assessment Period:
Historical Assessment Score and Level

1995	_____	_____
1996	_____	_____
1997	_____	_____

DIMENSION I																		
Area	Point Value Index	Developmental Level	Comparison Scale															
1. Formulated Strategy			<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;"><u>Level</u></th> <th style="text-align: left; padding: 2px;"><u>Point</u></th> <th style="text-align: left; padding: 2px;"><u>Raw Score</u></th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">I.</td> <td style="padding: 2px;">12-36</td> <td></td> </tr> <tr> <td style="padding: 2px;">II.</td> <td style="padding: 2px;">37-66</td> <td></td> </tr> <tr> <td style="padding: 2px;">III.</td> <td style="padding: 2px;">67-99</td> <td></td> </tr> <tr> <td style="padding: 2px;">IV.</td> <td style="padding: 2px;">100-126</td> <td></td> </tr> </tbody> </table>	<u>Level</u>	<u>Point</u>	<u>Raw Score</u>	I.	12-36		II.	37-66		III.	67-99		IV.	100-126	
<u>Level</u>	<u>Point</u>	<u>Raw Score</u>																
I.	12-36																	
II.	37-66																	
III.	67-99																	
IV.	100-126																	
2. Organization Structure																		
3. Financing Arrangement																		
4. Performance Evaluation																		
5. Emergency Preparedness																		
6. Emergency Response																		
7. Business Recovery/Resumption																		
8. Research and Development																		
<i>Raw Score</i>																		
DIMENSION II Capability Ratio Index = $\frac{\text{Relative Degree of Exposure}}{\text{Developmental Level of Performance}}$		Correlation Information Based on the information extrapolated from the organizations relative degree of exposure and developmental level of performance it can be concluded that the organization needs to consider the following recommendations.																