CHAPTER 16

# Businesses and Disasters: Vulnerability, Impacts, and Recovery

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As units of analysis in disaster research, businesses have only recently begun to be studied. Far more research has been conducted on public sector organizations such as local emergency management agencies, public safety agencies, and other governmental organizations. Researchers studying the economic impacts of disasters have tended to focus on units of analysis that are larger than individual firms and enterprises, such as community and regional economies. Until fairly recently, very little was known regarding such topics as business vulnerability, loss-reduction measures adopted by businesses, disaster impacts on businesses, and business recovery. Systematic research was lacking despite the singular importance of businesses for society. Private businesses provide a vast array of goods and services that literally make life possible in our complex global economy. A recent governmental report on the U.S. critical infrastructure points out that "[t]he lion's share of our critical infrastructures and key assets are owned and operated by the private sector" (White House, 2003, p. 32)[1]. Businesses are the foundation of local, regional, and national economies; when businesses are affected by disasters, that disruption produces not only direct business losses, but also indirect losses and economic ripple effects. Destruction of and damage to businesses, along with disaster-related closures, result in the loss of jobs, negatively affecting incomes and creating even greater challenges for households, neighborhoods, and communities as they attempt to recover from disasters. After disasters, business owners face a host of challenges, including how to finance business recovery, and often how to cope simultaneously with damage to both business and residential property. Disasters can produce both psychological distress and additional debt burdens for business owners. At the community level, business destruction and damage can result in lost tax revenues for communities and can undermine the viability of business and commercial districts.

[1] In the United States, the "critical infrastructure" is defined as composed of the following elements: agriculture and food; public health; emergency services; the defense industrial base; telecommunications; energy; transport; banking and finance; chemical production and hazardous materials; and postal and shipping enterprises. It is commonly said that about 85% of the U.S. critical infrastructure is in private hands.

This chapter reviews social science research on businesses and disasters, focusing on business vulnerability, the ways disasters affect business operations, and post-disaster business recovery. In this discussion, the term business is used to refer to organizations that are operated for profit, as opposed to public sector and nonprofit organizations. The term applies to a range of business types, including sole proprietorships, partnerships, and corporations, irrespective of the goods and services they supply, and whether they do business in one location (establishments) or multiple locations (enterprises). The concept covers both large and small businesses, including owner-operated businesses with no employees. The chapter is heavily weighted toward U.S. research and to English-language publications, in part because of the attention U.S. researchers have paid to disaster-related business issues. The chapter closes with recommendations for future research, including a recommendation centering on the need for more systematic, comparative research on these issues.

## BUSINESS VULNERABILITY TO EXTREME EVENTS

### How and Why Businesses Are Vulnerable to Disasters

Business vulnerability to disasters stems from a variety of interrelated factors that include physical location, the conditions under which businesses operate, and business and community characteristics. Consistent with the *social vulnerability* paradigm, business vulnerability can be thought of as stemming not only from exposure to the potential physical impacts of hazards, but also from societal conditions and trends that render certain businesses and types of businesses less able to cope with "environmental shocks," including disasters (Cutter, 1996; Cutter, Mitchell, & Scottal., 2000; Dahlhamer, 1998). Vulnerability thus has both physical and social dimensions; like communities and households, businesses are differentially vulnerable to disaster impacts.

### Vulnerability of Place

In the most general sense, business vulnerability to disasters is related to the hazardousness of the locations in which business and economic activity take place. Around the globe, many primate cities and "megacities"—the urban places that serve as economic engines for entire societies—are located in areas with high hazard exposure. Tokyo, Istanbul, Caracas, Manila, and Tehran are examples (Parker & Mitchell, 1995; Solway, 1994; Wisner, n.d.). In the United States, many cities that account for a substantial amount of the nation's economic activity, including Greater Los Angeles, Miami, Houston, San Francisco, and New York City, are vulnerable to both natural disasters and terrorist attacks. When hurricane Katrina struck Mississippi, Alabama, and Louisiana, it resulted in the closure of tens of thousands of businesses, the shutdown of one of the nation's busiest ports, and massive disruption of the petrochemical industry in the impact region. Just weeks later, Hurricane Rita threatened comparable impacts for Houston and the oil facilities in the western Gulf of Mexico.

While virtually all communities are vulnerable to hazards to some degree, within individual communities some locations are more vulnerable than others. However, business owners are typically more concerned about finding the best locations for generating business revenues

than about the disaster vulnerability of those locations or of the buildings they occupy. For many retail and service businesses, the most desirable business properties may be located in older downtown commercial areas where structures do not meet current codes. Historic downtown shopping districts are good places for some businesses to locate from a purely financial standpoint, but such locations may also be more vulnerable to hazards when disasters strike. The California cities of Coalinga, Whittier, and Santa Cruz all had historic commercial districts that were heavily damaged by earthquakes that occurred in 1983, 1987, and 1989, respectively. In the 1992 Nisqually earthquake, commercial damage was heaviest in Seattle's historic Pioneer Square area (Chang & Falit-Baiamonte, 2003). Memphis and Shelby County Tennessee face the risk of a major earthquake owing to their proximity to the New Madrid Fault. A survey conducted in the early 1990s with a randomly selected, representative sample of Memphis/Shelby County businesses found that 24% of the businesses in the sample were located in non-earthquake-resistant brick buildings,—that is, the types of buildings most likely to collapse or sustain serious structural damage in an earthquake—and that small businesses in the service and the finance, insurance, and real estate sectors were more likely than others to be housed in these types of structures. Overall, small businesses in Memphis and Shelby County, as opposed to large ones, were more likely to be located in hazardous structures (Tierney & Dahlhamer, 1997).[2]

## Business Choices and Disaster Vulnerability

Business decisions also affect vulnerability to disasters. In their efforts to locate near needed resources, such as raw materials, transportation routes, and skilled and able workers, as well as to take advantage of synergies that come about through co-location, businesses and business sectors may inadvertently put too many of their assets at risk from hazards. In the late 1970s, concern with mitigating and managing earthquake hazards in the United States began to intensify, partly out of recognition that so many defense-related research and development and production facilities were located in vulnerable areas in Southern California. For this reason, the earthquake hazard also began to be seen as a national security threat (Federal Emergency Management Agency [FEMA], 1980). California's Silicon Valley is another example of industry concentration in a high hazard area. A major center for the computer and semiconductor industries, Silicon Valley also sits in a very vulnerable location with respect to earthquakes. Recognizing this problem, some Silicon Valley firms have been making their facilities and business operations more dispersed geographically in order to reduce vulnerability. In many cases, businesses choose to stay in hazardous locations but upgrade their facilities to make them more disaster resistant. In other cases, owners choose to hope for the best, rather than undertaking costly loss-reduction projects.

Renting a business property, as opposed to owning the property outright, can also be a factor in business vulnerability. Renting is often a necessity, rather than a choice for businesses. However, businesses that rent space typically have fewer options with respect to the loss-reduction measures they can undertake. They cannot, for example, decide to make their buildings more flood, wind, or seismically resistant through structural upgrades (although they can take steps to protect inventory and equipment). Instead of being able to act independently,

[2] Another study conducted around the same time found that, based on square footage, 45% of the commercial and industrial space in Memphis and Shelby County was located in buildings that were vulnerable to earthquake damage (Jones & Malik, 1996). The business survey, however, focused on individual businesses, rather than buildings.

renters are often subject to the mitigation choices made by building owners. Similarly, when disasters strike, renters are dependent on building owners for needed repairs, particularly when there is structural damage. If the landlord has difficulty financing repairs, those renting or leasing space may be forced to relocate or to operate their businesses under adverse conditions. Research suggests that when lease agreements are made between businesses and landlords, leases do not adequately address the circumstances in which both tenants and landlords may find themselves in the event of a disaster (Alesch, Holly, Mittler, & Nagy, 2001).

## Market Characteristics and Vulnerability

Market diversification and the degree of competitiveness within different market niches are also factors that affect business vulnerability. There is evidence suggesting that, other things being equal, businesses that are primarily dependent on local markets can experience greater financial difficulty than those that serve a more diversified market base, in part because disasters affect consumer behavior (Chang & Falit-Baiamonte, 2003; Webb, Tierney, & Dahlhamer, 2002). Businesses that depend heavily on discretionary spending by local residents, who are themselves disaster victims, may be especially vulnerable.[3]

When businesses experience disruption, such as forced closure, their competitors are in a position to benefit. Consumers who need to replace lost items quickly will turn to whatever business—either within or outside their communities—that can provide those items. Extensive disruption of operations can result in permanent losses for businesses. For example, the Port of Kobe, Japan was one of the largest container ports in the world at the time that the Great Hanshin-Awaji earthquake struck in 1995. The port was severely damaged, and during the period in which it was being repaired and restored, shippers turned to other container ports in the region. When the Kobe port returned to capacity, which also entailed making a number of important post-earthquake improvements, there was still no particular reason for shippers to bring their business back to Kobe. The port, which had already been experiencing revenue declines before the earthquake, never regained its position (Chang, 2001).

## Community-Level and Infrastructure Influences on Vulnerability

The vulnerability of individual businesses is also determined in part by what communities choose to do—or not do—with respect to disaster loss-reduction. The fates of businesses following disasters are influenced by such community-level factors as whether their communities had been effectively managing hazards through prudent land-use strategies; whether they had adopted up-to date codes for new construction; whether they required retrofitting for structures that do not meet codes; and whether steps had been taken to reduce disaster-induced lifeline service disruption. With respect to codes and retrofitting, for example, the earthquake-stricken communities of Coalinga, Whittier, and Santa Cruz California, which were discussed

[3] One possible exception is the case of businesses that supply items that disaster victims need to replace, such as carpeting and window glass. However, local businesses can lose their inventories of items like these when disasters occur, and they can also be undercut by outside providers of needed goods and services that see an opportunity to increase their profits in the aftermath of disasters. It appears that following Hurricane Katrina, numerous goods and services are being offered by businesses from outside the impact region, since such a large proportion of affected businesses simply could not reopen. In any case, whatever benefits businesses reap from disasters are short lived; once lost and damaged articles are replaced, subsequent demand for those articles drops.

above, either had no seismic retrofitting programs for older unreinforced masonry buildings such as those that sustained heavy damage, or had not gotten started on implementing such programs.

Many businesses fail to recognize how much their operations depend on uninterrupted lifeline services. The critical infrastructure that enables individual businesses to operate is a "system of systems" characterized by various interdependencies and vulnerabilities. Despite efforts to understand and map these interdependencies, the consequences of local infrastructure failures for larger infrastructure systems, as well as for businesses and business sectors, may become apparent only when disaster strikes. For example, Mendonca, Lee, and Wallace (2004) have shown how failures in electrical power and telecommunications systems following the World Trade Center (2001) attacks had a major impact on the banking and finance sector, another component of the critical infrastructure.

Among various lifeline services, electrical power is often considered most critical, since so many of the other infrastructural systems and resources that make it possible for businesses to function depend in one way or another upon electricity (Tierney & Dahlhamer, 1997). Business losses in disasters are influenced significantly by steps lifeline service providers have taken to mitigate damage and rapidly restore services. In the 1993 Midwest floods, for example, business interruption losses were extensive. During the floods, almost half of the businesses in Des Moines, Iowa were forced to close for at least some period. However, only about 15% of all Des Moines businesses experienced direct flood damage. Instead, businesses were required by the city to close because lifeline services were disrupted after vulnerable water and sewage facilities were flooded out (Tierney, Nigg, & Dahlhamer, 1996).[4] In this case, businesses suffered losses not so much because of direct damage, but rather because of decisions (and non-decisions) that had been made at the community level with respect to lifeline protection. Des Moines subsequently undertook a mitigation project to avoid such problems in the future. When underground flooding occurred in downtown Chicago in 1992, the "Loop," the city's main business district, was forced to shut down because the flooding caused a loss of electrical power. The lack of power in turn affected water service (including water for fire suppression) and public transportation in downtown Chicago.

Businesses are dependent on governmental capacity to undertake pre-disaster mitigation measures and to respond effectively following disasters—and they are vulnerable when communities are unable to do so. Hurricane Katrina is a dramatic case in point: business and residential losses stemmed directly from government's failure to provide sufficient protection for the city against large hurricanes. After disasters strike, businesses again rely on government-initiated loss-containment measures—for example, responding to secondary threats such as fires and hazmat spills, providing security, and rapidly clearing debris and restoring transportation so that businesses can reopen. Government actions with respect to allowing business owners to reenter damaged areas to retrieve inventories and business records, as well as policies for condemning and demolishing damaged business properties, can also create additional burdens on business owners.

As discussed later in this chapter, the fates of individual businesses also depend on local capacity to manage the recovery process, which includes the ability of the community, to undertake pre-disaster recovery planning; gain access to, package, and leverage different

[4] This disaster also showed what a small factor insurance can be in assisting businesses in recovering from disasters. Of the businesses that were flooded, only one fourth had any flood insurance coverage. Few businesses had business interruption insurance capable of paying for the costs of closure, and many owners who did have insurance did not use it because their losses were not covered.

sources of aid for businesses; and take advantage of knowledgeable experts both from within and outside the community during the recovery process.

## Broader Business and Economic Trends and Disaster Vulnerability

Businesses are sensitive both to general economic trends and to the economic climate in particular business sectors. Disasters can exacerbate "everyday" vulnerabilities, while pre-disaster economic health can cushion the impacts of extreme events. Eighteen months after the Northridge earthquake, for example, firms in industries that had been experiencing growth in the 2-year period just before the earthquake were significantly less likely than firms in declining industries to report being worse off than before the disaster (Dahlhamer, 1998). In studies on the longer-term impacts of Hurricane Andrew and the Loma Prieta earthquake, business owners who considered the general economic climate to be positive for their firms were significantly more likely to report positive recovery outcomes (Webb et al., 2002).

## Regulations, Standards, and Vulnerability

The existence of and compliance with mandates, regulations, and standards are also factors that affect business vulnerability to disasters. Generally speaking, there are few outright mandates governing business disaster mitigation, preparedness, response, and recovery. Exceptions to this pattern include businesses in the highly-hazardous nuclear and chemical industries. The Nuclear Regulatory Commission places strict requirements on nuclear facilities, including requirements related to in-plant safety, public education, and emergency planning in areas surrounding those facilities (see, e.g., Nuclear Regulatory Commission, 2005). Laws such as the Emergency Planning and Community Right to Know Act and the Clean Air Act regulate safety and emergency preparedness for chemical facilities in the United States Since the terrorist attacks of September 11, 2001, security procedures at such facilities have received even greater scrutiny (Government Accountability Office, 2005; White House, 2003).

Loss-reduction requirements are also relatively strong for businesses in the finance, insurance, and real estate sectors, and there is some evidence suggesting that businesses in that sector tend to do more to prepare for disasters (Dahlhamer & D'Souza, 1997). However, most safety measures that businesses undertake are done voluntarily. For example, NFPA 1600 (National Fire Protection Association, 2004) is a comprehensive set of standards recommending steps that businesses and other types of organizations should take to reduce their vulnerability and prepare for, respond to, and recover from disasters. First promulgated in 1995, the standard has been updated twice, most recently in 2004.[5] While NFPA 1600 provides guidance on best practices that should help all businesses better cope with hazards and disasters, it is nevertheless a voluntary standard, not a requirement that all businesses must meet.

No systematic data currently exist regarding factors associated with business adoption of NFPA 1600, nor is it clear how effective the standard will be in reducing business losses following disasters. Such research is badly needed. In the meantime, however, given the

[5] Both businesses and public sector organizations are being urged to adopt the standards by FEMA and by the Department of Homeland Security. The 9/11 Commission Report also recommends its adoption, stating that "[t]he experience of the private sector in the World Trade Center Emergency demonstrated the need for these standards" (9/11 Commission Report, 2004, p. 398).

comprehensiveness of the standard and the difficulty involved in implementing many of the recommended measures, it is safe to assume that it will be more readily adopted by very large and prosperous corporations that have the expertise to implement such large-scale programs.

Unfortunately, it is quite common for business interests to actively fight proposed loss-reduction measures out of a concern for how such measures will affect their profits. For example, landlord associations were perhaps the strongest opponents to the seismic retrofit program for unreinforced masonry buildings that was put forward by local officials (and eventually adopted) in Los Angeles, because landlords were unwilling to bear the expense of retrofitting their rental properties (Alesch & Petak, 1986).

## Business and Owner Characteristics

Business size is a factor that has been consistently shown to be associated with business vulnerability. Small businesses are often described as the engines that drive the economy, both through job creation and through innovation. The small business sector in the United States is extremely large, and most small businesses are extremely small. Of the approximately 7.1 million business establishments covered in the most recent "Statistics of U.S. Business" survey, about 5.1 million had fewer than 20 employees (U.S. Department of Commerce, 2001a).[6] While they represent the majority of U.S. businesses, small businesses are inherently more vulnerable to disasters than their larger counterparts. Even under non-disaster conditions, small businesses generally experience more financial stress than larger ones; many are undercapitalized and may be operating with only marginal profits. The economic sectors in which the majority of small businesses are located—specifically the service and retail sectors—are also highly competitive sectors that generally see more business failures and turnover among firms during non-disaster times.

Size is to some extent a proxy for resources: larger enterprises generally have a greater ability to cope with misfortunes of all types because they have larger cash reserves. Larger firms can afford to hire specialists, such as risk managers and emergency management professionals, to reduce their vulnerability to extreme events. The vast body of research that has been conducted on businesses indicates that overall larger businesses do more to prepare for disasters than smaller ones (see, e.g., Dahlhamer & D'Souza, 1997; Mileti et al., 1992; Webb, Tierney, & Dahlhamer, 2000). Even though the adoption of standard recommended preparedness measures may actually have little to do with post-disaster business outcomes, as discussed later in this chapter, researchers concur that size conveys many advantages for businesses, both during normal times and in disasters. However, the vast majority of businesses are small ones.

Size is also frequently associated with business owner characteristics that are in turn associated with business vulnerability. Minority- and woman-owned businesses, which are particularly vulnerable to shifting economic trends, tend to be concentrated in the small business sector; 82% of minority-owned businesses are single proprietorships, as opposed to partnerships or corporations (U.S. Department of Commerce, 2001b). Minority- and woman-owned businesses are currently increasing at a faster rate than the national average for businesses in general. The number of woman-owned businesses grew 20% between 1997 and 2002; during that same period, Hispanic-owned businesses grew by 31%. It is worth noting that

[6] About 10% of this number had no employees at all—that is, the businesses were operated by self-employed individuals.

minority-owned businesses constitute a high proportion of the businesses in high-risk states such as California and Florida and in high-risk metropolitan areas in those states, such as Los Angeles and Miami (U.S. Department of Commerce, 2002).

Even within the fragile minority-owned business sector, businesses are differentially vulnerable. Recent data indicate that businesses owned by African Americans are more likely to fail than other ethnic businesses (Hocker, 2005). Nearly two thirds of black-owned businesses are in the service and retail trade sectors, both of which see relatively high rates of business failure during non-disaster times. About 40% of African-American businesses are woman-owned, a far larger proportion than among other minority-owned businesses (U.S. Department of Commerce, 2001c). Research on ethnic economies suggests that African-American entrepreneurs reap substantially fewer economic benefits from their businesses, compared to both whites and other minority business owners (Light & Gold, 2000).

## WHEN DISASTER STRIKES: IMPACTS ON BUSINESSES

### Negative Impacts of Disasters

The degree of physical damage businesses sustain in disasters is but one in a series of factors that affect the ability of businesses to survive when disasters strike. In dealing with disasters, businesses face a variety of challenges, many of which are unrelated to the magnitude of damages they experience. As the following sections show, many of these challenges stem from the interdependencies that exist among businesses, their customers, and their communities.

### Direct, Indirect, and Ripple Effects

Direct impacts of disasters on businesses include structural damage to business properties, damage to nonstructural elements in those properties (e.g., windows, lighting systems, utility pipelines inside business structures, telecommunications and computer services, and equipment), and damage to or loss of contents, inventories, and business records. Direct business impacts resulting from disasters also include impacts that result from disaster-induced failures in critical systems both within and outside the business property itself, including in particular utility service losses.

Direct impacts also include losses that occur due to business interruption. As discussed elsewhere in this chapter, business interruption may result from direct physical damage to the business or from a range of other factors, including utility loss, transportation system damage, or governmental action, such as cordoning off highly damaged areas. Thus, even if a business remains undamaged in a disaster, it may still be forced to close. As noted earlier with respect to the city of Des Moines during the 1993 floods, the majority of businesses in Des Moines had to close because they lost lifeline services, not because of flooding.

Indirect impacts and economic ripple effects consist of "downstream" effects that result from disasters, such as the disruptions in the flow of goods and services and supply-chain problems. These types of second-order effects can also create additional business interruptions and job losses, over and above those resulting directly from initial disaster impacts. Analyses of economic ripple effects highlight the fact that disasters affect not only individual businesses and

business districts, but also larger units of aggregation, such as regional economies (Okuyama & Chang, 2004; Rose & Guha, 2004; West & Lenze, 1994).

Researchers who focus on assessing the aggregate economic losses resulting from disasters have developed methodologies for estimating and measuring those losses. Much of this research depends critically on understanding what happens to individual businesses during disasters and how firm-level damage and losses contribute to business interruption, other indirect losses, and economic ripple effects (see Rose, 2004 for a recent example).

## Post-Disaster Operational Problems and Owner Burdens

Other problems that accompany disasters can negatively affect both business operations and aggregate-level economic activity. Such problems include difficulties businesses experience because customers cannot reach the business location owing to disaster damage, or because customers have left the area, either temporarily or permanently. Other problems include downtime associated with business clean-up, difficulties with shipping products to clients, the need to find a property to which to relocate, and loss of employee productivity because of difficulties employees experience following disasters. Business owners may also be torn between family-related post-disaster needs (such as having to make home repairs or find a new place to live) and getting the business back on its feet. Owners must also cope with complicated disaster assistance requirements, insurance reimbursement applications (if they are fortunate enough to have insurance), and additional financial pressures, such as increased debt, brought on by the disaster (for more detailed discussions on the impact of these sorts of difficulties, see Webb et al., 2000; Alesch et al., 2001).

## Indirect Effects on Nondamaged Businesses: Examples from the World Trade Center Disaster

As indicated throughout this chapter, businesses may be adversely affected even if they have not experienced direct disaster impacts. This is particularly true for businesses whose fortunes are closely linked to those of damaged businesses, business districts, and residential areas. The World Trade Center (WTC) attacks dealt a devastating blow to businesses located in the Trade Towers and in nearby structures. In addition to these direct impacts on businesses in the WTC complex, many businesses located near Ground Zero experienced a variety of different types of losses. Business revenues were affected initially, for example, by security measures designed to keep residents and tourists from entering lower Manhattan; retail businesses trying to operate in blocked-off sections adjacent to the Trade Center complex abruptly lost customers unless they were able to relocate their operations. According to a 2002 report by the Asian American Federation of New York, businesses in nearby Chinatown experienced a variety of persistent negative impacts. The report estimated that in the first 2 weeks after the September 11 attack, 75% of the Chinatown workforce was without work, and 3 months later, 25% were still unemployed. Chinatown tourist revenues for the summer of 2002 were 40% lower than for the summer of 2001, and the Chinatown garment industry lost an estimated $500,000,000 in revenues in the year following the attacks (Asian American Federation of New York, 2002). Negative effects were especially pronounced for businesses in the restaurant, retail trade, hotel, air transport, and building services (Fiscal Policy Institute, 2001). Many businesses located near

the Ground Zero reconstruction area are still being affected by the fact that tens of thousands of people who once needed the goods and services they offered are working elsewhere. When the Trade Towers and other structures were lost, many of these businesses, especially those dependent on local foot traffic, effectively lost their markets.

### Other Negative Effects

Businesses—even those that do not suffer direct losses—can be negatively affected in still other ways. For example, following disaster, insurance may become more costly and more difficult or even impossible to obtain. Again focusing on September 11 and its impacts on businesses, a survey of insurance agents and brokers serving businesses in all five New York City boroughs found that insurance providers had increased their premiums for all lines of insurance after the terrorist attacks, with increases ranging from 39% to 73%. Increases were particularly steep for businesses operating in high-rise structures in Manhattan, especially businesses located in or near landmark and "iconic" properties. Insurance also became significantly harder for businesses to obtain at any price following 9/11 (Thompson, 2002). Other disasters, most notably Hurricane Andrew in 1992 and the 1994 Northridge earthquake, caused insurance providers to either raise premiums significantly or withdraw completely from offering both residential and commercial insurance.[7] Impacts on insurance markets can affect businesses nationwide. Current projections suggest that homeowners and businesses throughout the nation will see a hike in their premiums, both as a direct consequence of Hurricanes Katrina and Rita, and also because the insurance industry now recognizes that it must prepare for future hurricane losses that will result in escalating damage in the coming years.

## BUSINESS DISASTER RECOVERY AND LONGER-TERM IMPACTS

As noted in the introduction to this chapter, it is only recently that social scientists have begun to study businesses as units of analysis affected by disasters. Most research on disaster recovery processes and outcomes has focused on other units of analysis, such as households and communities. Research in economics and regional science did shed some light on the macroeconomic and regional impacts of disasters (see, e.g., Albala-Bertrand, 1993: Jones & Chang, 1995; Kunreuther & Rose, 2004; Rose, Chang, Szczesniak, & Lim, 1997), but again individual firms were not the focus of that research. However, because of the substantial amount of research that has now accumulated on business disaster recovery, it is possible to provide at least provisional answers to questions related to recovery processes and outcomes. Unfortunately, because so little research has been conducted outside the United States, it is not clear how generalizeable findings from U.S. research may be to other societies. Cross-nationally, there will likely be significant differences in business recovery processes and outcomes owing to societal differences in forms of economic organization, the availability of risk management instruments such as insurance, and the types of recovery assistance provided to businesses. A second important caveat is that most of what is currently known about business recovery

[7] Following the Northridge earthquake, the crisis in insurance availability was so acute that in 1996 the State of California formed a new agency, the California Earthquake Authority, as a means of making insurance available. New policies now differ from those offered before the earthquake in terms of rates, deductibles, and exclusions.

is based on studies of "typical" disasters, rather than catastrophic events such as Hurricane Katrina. The need for further research in these two areas is discussed later in the chapter.

## Do Businesses Recover?

The answer to this question depends in part on how the question is asked: how recovery is conceptualized, how the concept is operationalized, what types of businesses are selected for study, and how studies are conducted. A series of studies on short- and longer-term business recovery following four different disasters—the Loma Prieta earthquake (1989), Hurricane Andrew (1992), the Midwest floods (1993), and the Northridge earthquake (1994)—were conducted by the University of Delaware's Disaster Research Center (DRC) during the 1990s. These studies, which were carried out through mail surveys with owners of randomly selected, stratified samples of all businesses in the disaster-affected regions, asked owners to assess business well-being, compared with how well the business had been doing prior to the disaster. Specifically, owners were asked to indicate whether the business was "worse off," "better off," or "about the same" as before the disaster. The surveys covered both short-term (the 1993 floods and the Northridge earthquake) and longer-term business outcomes (Loma Prieta and Andrew; for a summary of this research, see Webb et al., 2000; Tierney & Webb, forthcoming, 2006).

These studies showed that even in the short-term (i.e., a year to 18 months after a disaster event) most businesses do at least return to pre-disaster levels of economic performance. For example, a little over a year after the Midwest floods and the Northridge earthquake, 12.2% and 23.3% of businesses, respectively, reported being worse off, and comparable numbers actually reported being better off. With respect to the longer term, 21% of businesses in hard-hit Santa Cruz County reported being worse off, but 37% said they were better off than before the earthquake. Findings were roughly the same for businesses in South Dade County 6 years after Hurricane Andrew; while 34% of businesses surveyed reported being worse off, 31% were better off than before the hurricane.[8]

Even in an event as devastating as the World Trade Center attack, businesses show great adaptability. In a 1-year follow-up, *New York Times* reporters located 500 businesses (out of an estimated total of 600 to 700) that had been operating in the Trade Center complex on September 11, 2001. Only 39 were no longer in business, and 30 more were operating out of private homes. More than 350 were continuing to do business in Manhattan, some very close to Ground Zero. The majority of businesses were still struggling with many challenges, but they had at least managed to relocate and stay afloat during the first year after the attack (*New York Times*, September 11, 2002).

Other research on the prospects businesses face following disasters paints a slightly different picture. Daniel Alesch and his collaborators (Alesch & Holly, 1997; Alesch et al., 2001, n.d.) have engaged in studies on short- and long-term business recovery following several disaster events, including Hurricane Andrew; the Northridge earthquake; the severe 1997 flooding on

[8] These surveys were conducted on business "survivors"—that is, businesses that were operating before the disasters occurred and that were still in operation when contacted at a later date. Businesses that failed or disappeared completely where thus not included in the Disaster Research Center (DRC) studies. However, despite urban legends indicating that a large proportion of businesses fail following disasters, that does not appear to be the case. Moreover, quitting business after a disaster may be a prudent choice for some business owners, rather than an indication of disaster induced failure (Alesch et al., 2001).

the Red River of the North that caused extensive damage in communities such as Grand Forks, North Dakota; and floods caused by Hurricane Floyd in 1999. Unlike the Disaster Research Center studies, which focused on randomly selected representative samples of businesses, their work concentrated specifically on small businesses and nonprofit organizations in communities and neighborhoods that experienced high levels of damage and disruption following disaster events. Such businesses were thus prime candidates for experiencing poor outcomes following disasters.

Also in contrast with the DRC questionnaire surveys, the studies conducted by Alesch and his colleagues involved in-depth, open-ended interviews with business owners, many of whom were interviewed more than once over time. These more qualitative studies focused on the lived experiences of business owners as they attempted to recover following severe disaster losses. Among the findings from this research was that the idea of "recovery" as the reconstitution of business activity as it had been before the disaster, had little meaning for these business owners. Even years after suffering disaster losses, owners were still struggling and still trying to come to terms with the "new normal" ushered in by disaster. Indeed, Alesch and his colleagues argue that those struggles—and ultimate outcomes for businesses—may be far more painful for owners who cling to the past instead of attempting to innovate, change their business operations, and seek new opportunities. Noting that for many the disaster experience never really ends, they conclude that (Alesch et al., 2001, p. 15):

> . . . long after the physical evidence of the destruction is gone, long after water is being distributed and sewage collected, long after new buildings are built, and long after the grass grows over scars on the land, the effects of the disaster linger. They linger economically, socially, and psychologically. We have come to believe that, for organizations that suffer significant losses from a natural hazard event, return to the *status quo ante* is a chimera—a mythical illusion that can never be achieved.

Alesch et al. (2001) nevertheless argue that business owners do recover following even very severe disaster impacts, although to varying degrees. Their criteria for assessing the extent of business recovery include the following: (1) the organization is still in business and is doing at least as well as it was before the disaster; (2) even though it may not be as profitable as before, the business has successfully adapted to the new post-disaster economic environment; (3) the business is at least surviving, even if it is not totally viable; and (4) the owner is able to maintain his or her financial resources, even if he or she has been forced to branch out into another type of economic activity. These recovery indicators allow for the fact that an *owner* can continue in business and even eventually make a profit, despite the fact that the original *business* may no longer be in existence. The Alesch et al. research also emphasizes that permanent closure following disasters is not, in and of itself, an indicator of disaster-induced failure; rather, in light of new post-disaster circumstances, it can be a wise strategic business decision. Unfortunately, however, according to their studies, many business owners simply refuse to acknowledge that their circumstances have been radically altered by disaster, Instead of adapting, they continue to pump money into enterprises that have essentially no possibility of success—a pattern that Alesch et al. refer to as the "dead business walking" syndrome.

## Factors Affecting Business Recovery

Business recovery outcomes following disasters can be thought of as the result of a combination of vulnerability and resilience factors. This conceptualization recognizes that even among

businesses that are vulnerable and that suffer loss and disruption, recovery trajectories can differ because some businesses are more able than others to cope with losses and to adapt during the recovery process.

## Vulnerability Factors for Poor Post-Disaster Business Outcomes

The existing literature on businesses and disasters has identified several factors that appear to make businesses more vulnerable to negative outcomes (for more general discussions on these factors, see Alesch, Taylor, Ghanty, & Nagy, 1993; Alesch et al., 2001; Dahlhamer, 1998; Drabek, 1994; Tierney & Webb, 2006; Webb et al., 2000). As discussed earlier in the section on business vulnerability, some types of firms are more vulnerable than others even during non-disaster times, as indicated, for example, by their higher propensity to fail. Disasters only serve to exacerbate these inherent vulnerabilities. Thus, studies show that smaller businesses are at larger risk for poor recovery outcomes than larger ones. Dahlhamer (1998) suggests that the difficulties that small businesses experience following disasters are related to a pattern that has been identified in the broader literature on organizations, termed the "liability of smallness" (see Baum & Oliver, 1991), which makes small businesses more likely to fail and less likely to be profitable than their larger counterparts.

Also showing continuity with general research on more general business risk factors, it appears that post-disaster recovery outcomes also differ according to economic sector. Businesses in the wholesale and retail sectors seem particularly vulnerable to disasters, no doubt owing in part to the high competitiveness and normally high rates of business failure and turnover within that sector. Construction-related businesses tend to enjoy higher revenues in the aftermath of disasters even though those effects may be short-lived (Dahlhamer & Tierney, 1998).

With respect to post-disaster recovery, it is again important to point out that recovery processes and outcomes are affected not only by the direct physical impacts businesses experience at the time of the disaster, but also by the ways in which disasters create longer-term problems for business owners. Those problems can include extended periods of business interruption, difficulties with shipping and receiving products, revenue declines due to loss of customers, and other operational problems. Research on long-term recovery following the Loma Prieta earthquake and Hurricane Andrew indicated that such problems were very common after both disasters and that they were significant predictors of poor recovery outcomes years after those events (Tierney & Webb, 2006, in press).

In a related vein, even undamaged businesses can experience recovery-related difficulties if they happen to be located in especially hard-hit areas where damage is extensive (Dahlhamer, 1998). This is particularly true in situations in which businesses are interdependent with one another—as many businesses are—and when businesses depend on local foot traffic for their livelihoods. For example, if a large grocery store is the "anchor" business in a shopping center that contains other smaller businesses people typically visit when they shop for groceries, and if that store is destroyed, those smaller businesses will also suffer. One of the most serious recovery-related problems in New Orleans following Hurricane Katrina is that for many individual businesses, future survival will depend on the extent to which not only residents and workers, but also other businesses, return to the city. Individual businesses depend critically on robust local business ecologies. The initial returnees to the city will face an uphill battle to recover, and without critical mass of consumers, workers, and other enterprises that are back in operation, business recovery outcomes will likely be very poor.

## Business Resilience Factors

Few studies on businesses directly address the question of what makes some businesses more resilient than others in the face of disasters. Nonetheless, based on the literature, it is possible to identify in at least a preliminary way a number of resilience factors that seem to make a difference for recovery processes and outcomes. Following Rose (2004), resilience can be seen as having two components, which he terms inherent and adaptive. Inherent resilience factors consist of business characteristics that help to cushion or mitigate the effects of disasters on business operations. The concept of adaptive resilience refers to other factors, including decisions made by business owners, that increase business options and business adaptability in the aftermath of disasters.

Some proportion of inherent business resilience stems simply from being less vulnerable in the first place—that is, businesses can be said to be more inherently resilient if they possess fewer of the vulnerability factors discussed above. Inherent resilience can thus be associated with larger business size; being in better financial condition when the disaster strikes; doing business during periods of economic expansion and in more robust economic niches, rather than fragile ones; having a diversified market base, as opposed to an exclusively local one; and taking steps to mitigate damage and disruption and ensure business continuity, rather than simply engaging in workplace preparedness.

Inherent resilience is also related to the relationship between business disruption and income streams. Certain types of businesses, such as those that provide unique, nonsubstitutable services, are more resilient than those that provide substitutable ones. In this respect, establishments such as restaurants and hotels lack inherent resilience; losses from rooms not rented and meals not served can never be recovered. In contrast, many businesses can recoup their losses through stepped-up production once their operations resume.

Adaptive resilience, which Rose defines as "ability in crisis due to ingenuity or extra effort" (2004, p. 42), consists of factors that increase owners' ability to contain negative disaster impacts and increase recovery options. In his research on resilience, Rose (2004) points to such factors as a business's ability to overcome lifeline service disruption by instituting conservation measures or by locating alterative sources for needed services (generators when electricity is lost, bottled water when water systems fail, etc.), noting that "[i]n the aftermath of a disaster, people behave in a more urgent manner and are more likely to call forth ingenuity" (2004, p. 46). In other words, they cope, improvise, and innovate.

In their research, Alesch et al. (2001) also address issues of inherent and adaptive resilience—but more explicitly from the point of view of the business owner and actions he or she may take before, during, and after disasters. With respect to the inherent dimension of resilience, they underscore, for example, the importance of what they term "management mitigation," or "management techniques used to reduce both exposure and vulnerability through smart business practices" (p. 25). Such techniques include seeking to increase customer diversity, storing inventories in multiple locations, doing business out of more than one location, and backing up and otherwise protecting critical business records.

Alesch et al. (2001) place equal emphasis on adaptive resilience, or business owner capacity to innovate and respond realistically to new economic conditions following disasters. They emphasize that while virtually all businesses struggle to remain viable after they experience disaster-related losses and disruption, many struggle while at the same time failing to recognize how the disaster event itself has altered the operating climate for the business. For example, if there has been so much residential damage that the business's clientele has moved elsewhere (perhaps never to return), it makes little sense to reopen in the same location. If a

business enterprise depends on selling luxury items, when customers have no or only limited funds for discretionary purposes, the business will be in jeopardy. Alesch et al. stress that owners must objectively assess their post-disaster chances of survival and profitability. The more resilient businesses are those that are alert to adverse changes and able to adapt—even if that means ceasing operations or moving into an entirely new line of business. Owners who succumb to the "dead business walking" syndrome will likely find themselves much worse off, both with respect to business viability and with respect to their own personal finances.

## Governmental Action and Business Recovery

As noted earlier, businesses are dependent in many ways on actions that their communities undertake (or fail to) before, during, and after disasters. To appreciate the significance of governmental and community capacity, one only needs to think of the immense additional losses suffered by businesses in New Orleans following Hurricane Katrina that were due not to the disaster event but rather to the city's lack of fire-fighting capability and its inability to provide even minimal security protection in the first days after the hurricane. In contrast, following the 1989 Loma Prieta earthquake, the San Francisco fire department was able to contain fires that were burning in the city's Marina district, despite broken water lines, low water pressure, and the failure of the city's auxiliary fire-fighting water supply system through the innovative use of a portable water system, thus saving both residential units and business properties (Scawthorn, Porter, & Blackburn, 1992).

As noted earlier, many business losses stem directly from damage and loss of capacity in lifeline systems, including transportation lifelines. Following the Northridge earthquake, for example, Gordon, Richardson, and Davis (1997) found that approximately 23% of overall business interruption losses were attributable to transportation system disruption.[9] Businesses are critically dependent upon community-wide mitigation, preparedness, response, and recovery strategies for their own survival. Indeed, business owners should be very concerned about the status of their communities' comprehensive emergency management efforts, since their livelihoods depend on such efforts.

Just as businesses benefit from community adoption of pre-disaster mitigation and preparedness measures and from community-level response effectiveness, they also benefit when their communities employ knowledge and foresight during the post-event recovery process. Unfortunately, while most communities have developed disaster *response* plans, the vast majority have done little in the way of *pre-disaster recovery planning.* Such planning is badly needed, because once a major disaster occurs, there is little time to develop such plans de novo, as well as a greater potential for poor decision making. Currently, except for a very small number of exceptional cases—Los Angeles, for example, has been engaged in pre-event planning for post-event recovery for nearly 20 years—communities will have no choice but to improvise and engage in ad hoc decision making for recovery. In such situations, businesses will be faced with having to press to have their post-disaster recovery needs met, even as they struggle to stay afloat.

[9] These same researchers estimated that total business interruption losses following Northridge totaled approximately $6.5 billion—a substantial sum even when compared with the estimated $30 billion in structural damage that was caused by the earthquake.

More than 20 years ago, based on their analyses of recovery following fourteen different disaster events, Rubin, Sapirstein, and Burbee (1985) developed a series of empirical generalizations regarding factors that affect community recovery outcomes. Their work emphasized the importance of three general attributes—personal leadership, knowledge of appropriate recovery actions, and the ability to act—that local governments must possess in order to facilitate community recovery. Recovery chances for individual businesses and business districts depend in important ways on appropriate government action. With respect to post-disaster recovery strategies, Berke, Kartez, and Wenger (1993) emphasize that recovery processes and outcomes are influenced by a range of factors, key among which are (1) public participation in recovery decision making; (2) horizontal community integration, or the extent to which strong networks exist among various community organizations and institutions; and (3) vertical integration, or the extent to which strong ties exist among local communities, higher levels of government, and other extra-community resource providers. Obviously, communities possessing strong networks along both horizontal and vertical dimensions are in a much better position to successfully manage post-disaster recovery—including business recovery. Other studies suggest that the implementation of community-wide pre-disaster recovery plans following disasters both speeds up the process of housing recovery and also helps to ensure that mitigation of future hazards is integrated into the recovery process (Wu & Lindell, 2004; see also Spangle and Associates, 1991). Although no comparable research has been done on business recovery, it can be hypothesized that pre-event planning also has a positive effect on business recovery.

Other recent research points to the ways in which businesses depend upon early recovery decisions made at the local community level regarding repair and restoration priorities. Stephanie Chang and her collaborators (see Miles & Chang, 2003) have recently begun research to explore ways of optimizing the recovery process through organizational and community decision making that takes into account interdependencies among infrastructural elements, households, neighborhoods, businesses, and local economies. Based on extensive reviews of the literature and analyses of their own data on disaster recovery, they have developed agent-based simulation models that show how both pre-disaster community policies (e.g., policies regarding code adoption, pre-disaster recovery planning) and response and early recovery decisions affect recovery trajectories (and their interrelationships) at various levels of analysis. Their simulations indicate, for example, that pre-disaster mitigation measures directed at lifeline systems significantly shorten the recovery period for both businesses and households. Another finding points to the importance of transportation system restoration following disasters, because so many other early recovery activities depend upon having transportation access to affected communities.

These models and scenarios represent the first-ever attempt to analyze recovery processes and outcomes across various domains, including critical infrastructure elements, housing, neighborhood viability, jobs, and business and economic recovery, and to understand interrelationships among these different domains throughout the recovery process. The aim of this research is to develop decision-support systems that will enable those who attempt to manage post-disaster recovery to visualize the outcomes of different pre- and post-event decisions. Unless and until such models are improved, refined, and adopted by local communities and other levels of government, communities—and their businesses—must rely either on (practically nonexistent) pre-disaster recovery plans or on post-disaster improvisation.

Hurricane Katrina was the first catastrophic disaster event to strike the United States in a century. It will be important to chart business recovery processes and outcomes following this unprecedented disaster event. As of this writing, there is little evidence of systematic, integrated, comprehensive planning for short- and long-term recovery needs in New Orleans and

other heavily-damaged communities—either with respect to households and neighborhoods or with respect to businesses and business districts. Some early news is quite discouraging. For example, outside contractors are routinely being employed to engage in recovery activities that businesses in the affected region are quite able to undertake. These contract arrangements, many of which have been made on a no-bid basis, run counter to Stafford Act provisions stipulating that strategies should be put in place to ensure job and livelihood recovery in disaster-affected areas.[10] Practices such as the use of outside contractors do nothing to help local businesses get back on their feet following disasters, and they also create resentment among victim populations. And again, had the intergovernmental response to the hurricane been more rapid and effective, damage, disruption, and losses could have been contained, and businesses would have a better chance of recovering.

## What Should Make a Difference for Business Recovery, But Does Not

Some factors that might be expected to have an influence on business recovery outcomes make essentially no difference. Although it seems intuitive that the greater the damage to a business property, the more difficulty the business will have in its struggle to recover, this is not the case. As discussed elsewhere in this chapter, business recovery is determined by a broad set of factors that go well beyond the degree of physical property damage. On the one hand, a business whose property has been completely destroyed but that has access to an alternative business location may suffer little disruption as a consequence of a disaster. On the other, businesses can experience little or no direct damage but still suffer prolonged disruption and high losses. Moreover, at least some research suggests that, as odd as it may seem, physical damage per se is not even a significant factor in business *losses*, let alone recovery. In a study of businesses affected by the 2001 Nisqually earthquake, for example, important determinants of total business losses included size, with small businesses being more vulnerable to loss; occupancy tenure, in which renters are more vulnerable; and neighborhood effects, such as loss of foot traffic or the stigma of being located in a high-damage area. This study found that physical damage was not a significant predictor of business loss (Chang & Falit-Baiamonte, 2003).

Another factor that fails to predict recovery outcomes is the degree to which businesses engage in preparedness activities prior to the occurrence of the disaster. This is not to say that no anecdotal examples can be found of businesses that survived and thrived as a result of good pre-event planning, nor is it an argument against enhancing business preparedness for extreme events. Rather, research finds that *in the aggregate and controlling for other factors*, standard recommended preparedness measures have little impact on short- and long-term business recovery outcomes (Webb et al., 2000). There are likely several reasons for this counterintuitive effect. One possible reason is that, as indicated in various studies (see, e.g., Dahlhamer & D'Souza, 1997) the majority of businesses actually do very little to prepare for disasters—so much so that in surveys even the "more prepared" businesses typically score quite low on preparedness measures (Cavanaugh, 2000). However, the lack of association between workplace preparedness and recovery outcomes is more likely due to a combination of other factors. As noted above, at the most fundamental level, preparedness appears to have no impact on the size of actual disaster losses (Chang & Falit-Baiamonte, 2003). In addition, as

[10] See Robert T. Stafford Disaster Assistance and Emergency Relief Act 42 U.S.C. (307) 5150, "use of local firms and individuals."

discussed earlier, many sources of business loss, disruption, and negative recovery outcomes, such as infrastructure failures, residential dislocation, and the quality of community-level response and recovery efforts, are essentially beyond the control of the individual business owner. Moreover, recommendations for what businesses should do to prepare for disasters may themselves be flawed. As Alesch et al. (2001) note, most business preparedness guidance stresses protecting the business property and its contents, developing disaster response plans, stockpiling supplies, and taking other steps designed to protect life-safety and reduce direct property losses. The DRC surveys on businesses suggest that these are the types of measures businesses are most likely to undertake, if they do anything at all in the way of preparedness. Guidance on planning and worker safety generally does not address other issues, such as what to do in the event that a disaster radically alters the overall business climate or results in a decline in demand for the goods and services a business offers. Nor does most preparedness literature provide suggestions on how to cope through months and perhaps even years of disaster-induced community disruption. In short, most guidelines for business disaster preparedness do little to help prepare business owners for the large array of real-world problems they will face in the aftermath of disasters.[11]

Although the stated purpose of post-disaster assistance is to help businesses recover, the various forms of assistance that are available to help recover also appear to have little impact on how businesses fare in the aftermath of disasters. Neither formal sources of aid such as Small Business Administration disaster loans and insurance nor informal sources of assistance, such as financial help from relatives, make much difference in recovery outcomes for disaster-affected businesses. Indeed, surveys following the Northridge earthquake even suggested that the more aid sources businesses used following the earthquake, the less likely they were to report positive recovery outcomes (Dahlhamer & Tierney, 1998).[12] The lack of a relationship between post-disaster aid and business recovery, which has been found consistently across a range of studies, is likely due to several factors. First, the types of aid that are available to businesses generally come in the form of loans, either from agencies like the Small Business Administration or from banks. This automatically leads to increased debt for the business owner. Second, even if aid is obtained, it typically covers only a portion of the losses businesses experience in disasters. Third, no amount of assistance can offset problems such as a loss of customers, disaster-induced declines in demand for goods and services, or losses associated with the disruption of local business ecologies. Nor can assistance reverse pre-disaster trends that affect business fortunes over the long term.[13]

Many businesses, particularly small ones, do not carry insurance that provides protection in the event of a disaster. In other cases, owners believe that they have adequate insurance coverage, only to find that the damage and disruption they experience in disasters is not included in their insurance policies—or worse yet, that they have been misled by insurers. For example, based on their interviews, Alesch et al. (2001) recounted numerous problems business

[11] There are, of course exceptions. Alesch and his colleagues have developed more-comprehensive guidance for business owners, and the "Open for Business" program developed by the Institute for Business and Home Safety highlights numerous factors businesses should consider in seeking to survive the impacts of disasters.

[12] One likely reason for this relationship is that businesses that are having the most difficulty following disasters continue to struggle and seek multiple forms of assistance—even when such assistance ultimately does nothing to help the business recover.

[13] For example, if a business is located in a damaged central business district, and if even before the disaster occurred, customers had already begun to shop in outlying areas, perhaps for lower prices and better parking, that pattern will continue, and may well intensify, after the disaster. Aid to individual businesses will have no effect on business recovery under such circumstances.

owners experienced with respect to insurance, such as finding out belatedly that they had been sold the wrong type of policy—one that did not cover their losses; being covered but never compensated because the insurance company went out of businesses; and having insurance that covered only a fraction of business losses. Even businesses that are adequately covered with respect to damage may lack business interruption insurance. Insurance problems will be numerous and complex following Hurricane Katrina, since so many property owners who had insurance were only protected from wind damage, but not from hurricane-related flooding, and since business interruption is likely to be very protracted for many business enterprises.

## FUTURE RESEARCH NEEDS

### Impacts, Recovery, and Issues of Scale

As the U.S. Gulf region and Florida struggle to recover from Hurricanes Katrina, Rita, and Wilma, it is important to recall that most knowledge on disasters, their impacts, and household, business, and community recovery is not based on studies of truly catastrophic disaster events. It is widely recognized in the field of disaster research that just as disasters are not just "big emergencies," catastrophic events are not just "big disasters." As Quarantelli indicates with respect to disasters and catastrophes (2005a, p. 333–334):

> . . . there are both qualitative and quantitative differences in the references of the two terms . . . . In a catastrophe, most/all of the total residential community is impacted, making it impossible for the homeless to go to friends and relatives who are in a similar situation . . . most of the facilities and operational bases of emergency operations are themselves impacted . . . local officials are unable to undertake their usual work roles not only in the crisis period, but also into the recovery period . . . most of the everyday community functions are sharply and simultaneously interrupted across-the-board.

These are the exact conditions that Hurricane Katrina produced. With so much infrastructure and property damage, disruption, and displacement of victims, and with such immense mitigation-related challenges, recovery will be extremely difficult.

Well-informed decision making is needed that can take into account interdependencies among critical infrastructure elements, as well as among units within the social structure. Investments in recovery much be prioritized and coordinated—a massive challenge with which this nation has had little experience.

More research is needed on Katrina and other catastrophic events and their broader effects on communities and regions. Such research could reveal that what is currently known about businesses and disasters may not be scalable to catastrophic events. If we do not develop a knowledge base on the distinctive challenges presented by catastrophic and near-catastrophic disasters, we have little chance of managing the consequences of such events.

### Cross-Societal and Comparative Research on Businesses and Disasters

With the exception of discussions on the economic impacts of the Kobe earthquake, this chapter has focused almost exclusively on research that has been conducted on U.S. disasters by U.S. researchers. This could give readers the mistaken impression that businesses have not been studied in any societies except the United States and Japan. There has been a good deal of research on private-sector enterprises in other societies. However, a considerable amount of

that work has focused on how business enterprises have contributed to disasters, especially environmental ones, rather than on business preparedness, response, recovery, and other topics discussed here (see, e.g., Shrivastava, 1987, on Bhopal). On the basis of studies that have been translated into English, it appears that research in other societies has tended to consist of onetime studies on specific disasters, making it difficult to amass cumulative findings and discern patterns over time. International periodicals, such as the *Journal of Contingencies and Crisis Management*, published by Blackwell, occasionally publish studies on businesses and disasters, but they also include studies on many other topics not related to business issues.

As this chapter has shown, research on U.S. businesses has uncovered a number of factors that appear to work fairly consistently to make businesses either more or less vulnerable to disasters. However, this research cannot be generalized to other societies because societies differ along so many dimensions, including economic systems, business–state relationships, financing mechanisms, availability and types of hazard insurance, societal capacity to manage hazards and disasters, and the availability of post-disaster aid for businesses. Without a great deal more comparative, cross-societal research, it will be very difficult to reach conclusions regarding business vulnerability and resilience and other topics discussed in this chapter.

## Integrating Disaster Studies and Organizational Research

As preceding discussions show, there is a great deal to be gained by analyzing issues facing businesses in disasters in the context of broader research on organizations. For example, the concept of the "liability of smallness," which predicts that small businesses are more fragile and less resilient during normal times, is also applicable to the study of disaster-stricken businesses. However, other streams of research on business vulnerability and on how organizations manage risks and cope with turbulent environments have not been integrated into business disaster research. In the field of organizational safety and risk, the contrasting theoretical perspectives of "normal accidents" (Perrow, 1999) and "high-reliability organizations" (Roberts, 1989; Roberts, Rousseau, & La Porte, 1993 ) appear to be directly related to questions of business vulnerability and resilience in disasters, but disaster researchers tend not to employ such frameworks or cite the sizable literature on these opposing perspectives (for a direct empirical comparison of these paradigms, see Sagan, 1993). Do the factors that make business enterprises vulnerable to normal accidents also make them more vulnerable to disasters? Can normal-accidents concepts such as linearity and tight coupling help us better understand how and why some systems fail during disasters and how such effects might be mitigated? Can the study of the normal accidents literature provide insights on how to prevent cascading failures that could result from disasters of all types, including those produced by willful acts? Is the high-reliability concept applicable to both organizational safety and disaster resilience?

Similarly, general social science theories on organizations and organizational processes are seldom employed in studies on organizational behavior during and after disasters. One important exception is Lee Clarke's book *Acceptable Risk: Making Decisions in a Toxic Environment* (1989), which employed "garbage can" theory, framed at the interorganizational level, to explain how organizations responded following a hazardous materials release in a state office building. Another exception is Diane Vaughan's acclaimed study on the factors that contributed to the space shuttle Challenger accident, *The Challenger Launch Decision* (Vaughan, 1996), which attempts to explain how and why organizations claiming to be committed to safety drift gradually begin permitting unsafe practices. Despite the fact that Vaughan's perspective is

highly applicable to both public- and private-sector organizations, it seems to have had only a small impact on the disaster research field.

Focusing on other research in the organizational literature, research on businesses and disasters indicates that the decisions that business owners undertake before, during, and after disasters can be critical for business viability. Yet disaster studies tend not to draw upon research in fields such as business administration and organizational behavior that focus on leadership and decision-making styles within business organizations, particularly with respect to risk management and crisis-related decisions (see, e.g., Mitroff, Pauchant, Finney, & Pearson, 1989; Mitroff & Pauchant, 1990; Pauchant & Mitroff, 1992). What can disaster researchers learn from the crisis management literature that might provide insights on how businesses approach and manage disaster-related problems? If organizational leaders have a high tolerance for risk during normal times, do they also make riskier decisions regarding disaster loss reduction? Do businesses that are recognized for their good management practices fare better in disasters? Is a business entrepreneur who has a track record of innovation and adaptability to changing business environments also better equipped to cope when disasters strike? How can the literature on management and business leadership inform the study of businesses in disasters?

## Knowledge Transfer and Applications: The Practical Literature on Business Disaster Management

For decades, consultants and consulting companies have offered guidance on business disaster preparedness and business continuity and recovery planning. Government agencies such as FEMA have also sought to raise awareness and suggest best practices for business disaster management. The field of disaster business consulting grew by many orders of magnitude in the years and months prior to December 31, 1999, as businesses worldwide struggled to reduce and cope with potential problems associated with Y2K, or the "millennium bug." Y2K forced many businesses to think for the first time about how to identify and protect their most critical business functions and how to address supply chain vulnerabilities. Under the scrutiny of the U.S. Congress and regulators, both public-sector organizations and private businesses associated with elements in the critical infrastructure, such as transportation, utility lifelines, and banking and finance, undertook massive programs to ensure continuity of operations during the Y2K turnover.

The September 11 attacks provided a further stimulus for business preparedness and continuity planning. While the Pentagon was also targeted, the 9/11 attacks focused primarily on businesses and on the iconic Twin Towers; this caused great alarm among many businesses that also considered themselves potential targets, particularly those located in tall structures. Like Y2K, 9/11 further stimulated business loss-reduction efforts.

As a result of these previous crises, books, manuals, toolkits, checklists, and training programs have burgeoned in recent years (for representative publications, see FEMA, 1998; Gustin, 2004; Hiles, 2000; Institute of Business and Home Safety, 2005; Laye, 2002; Shaw, 1999; Wallace & Webber, 2004). Those who provide business loss-reduction solutions have their own professional association, the Association of Contingency Planners, and a number of professional journals, such as the *Disaster Recovery Journal.* Despite the fact that guidance now exists in great quantity, there have been essentially no empirical studies regarding the quality and potential effectiveness of such efforts in actual disaster situations. There are, of course, anecdotal accounts and single case studies on "success stories," but testimonials are not the same as systematic research.

The activities and visibility of the business loss reduction industry raise many questions for further research. What types of businesses are most likely to use special consulting services, and what types of services are typically offered? For example, do consultants tend to provide more assistance with IT-related issues, such as data backups and "hot sites," or is the guidance they offer more comprehensive? How do businesses choose among alternative services and service providers? On what criteria do they base their decisions? To what extent does current business preparedness practice draw upon empirical research on businesses and disasters or on studies of organizational crisis management?

It would be useful to carry out research on randomly selected businesses that followed particular types of guidance or used particular consulting services, and then later experienced disasters, in order to determine the extent to which selected loss-reduction measures actually made a difference for business continuity and viability. Perhaps some measures are more effective than others. Along other lines, guidance to businesses may have unintended consequences. Perhaps steps taken to reduce disaster losses bring additional benefits even if no disasters occur. If that is the case, it would be important to document those additional contributions to business organizations. Since businesses and particularly large ones frequently spend substantial amounts of money on business consulting and continuity services, it would be interesting to conduct research on the extent to which various measures businesses adopt turn out to be cost-effective when assessed over the long term.