Keywords:
Community resilience, post-disaster recovery, adaptive strategies, businesses

Article Information

Received:
01 December 2017
Received in revised form:
02 July 2018
Accepted:
10 July 2018
Available online:
14 July 2018

Integrating Adaptation Strategies of Businesses with Community Resilience: A Case from Turkey

Ezgi ORHAN*

Abstract

In developing countries bounded by traditional approaches of disaster management, post-disaster policies may not lead to resilience at aggregate level. Turkey exemplifies the case with its experience in the 1999 Izmit earthquake. The policies applied following the 1999 trajectory to create a safer built environment incorporated resettlement and reconstruction efforts, yet businesses were largely unregulated by local and national governments during the recovery process which leads to development of their own adaptive strategies to survive after the disaster. This paper aims to analyse the adaptation strategies of private enterprises in the face of disasters. In this respect, a case study research was undertaken in Adapazari, Turkey to inquire their adaptive strategies after the disaster with respect to the independent variables of business size and occupancy status. This paper contributes to the field of disaster studies by showing businesses' adaptive capacities that enable them to survive following a disaster. The key findings of this study present that businesses adapt for survival after a natural disaster in accordance with their business size and occupancy status. Although small firms and lease-holder firms challenge with organizational and financial problems, they are able to develop locational strategies which increase their survival change and adaptability against their larger and owner occupied counterparts.

*Çankaya University, Faculty Architecture, Department of City and Regional Planning, Ankara, Turkey
ezgiorhan@cankaya.edu.tr

Anahtar kelimeler:
Toplumsal dirençlilik, afet sonrası iyileşme, uyum stratejileri, işyerleri

Makale Bilgileri

Alındı:
01 Aralık 2017
Düzeltilmiş olarak alındı:
02 Temmuz 2018
Kabul edildi:
10 Temmuz 2018
Çevrimiçi erişilebilir:
14 Temmuz 2018

İşyerlerinin Uyum Stratejilerinin Toplum Dirençliliğine Entegrasyonu: Türkiye'den Bir Saha Çalışması

Ezgi ORHAN*

Öz

Geleneksel afet yönetimi yaklaşımlarıyla sınırlanan gelişmekte olan ülkelerde afet sonrası politikalar toplum düzeyinde dirençlilik yaratamayabilir. 1999 Depremini deneyimlemiş olan Türkiye böyle bir durumu örneklemektedir. 1999 trajedisinin ardından güvenli bir yapılı çevre oluşturmak için uygulanan politikalar yeniden yerleştirme ve yeniden yapım çabalarını içermektedir, ancak iyileşme sürecinde işyerlerinin yerel ve merkezi yönetimlerce kapsamlı düzenlemelere dahil edilmemesi afetten sonra ayakta kalmak için kendi uyum stratejilerini geliştirmelerine neden olmuştur. Bu çalışma afete maruz kalan işyerlerinin uyum stratejilerini araştırmayı amaçlamıştır. İşyeri büyüklüğü ve mülkiyet sahipliliğini gösteren bağımsız değişkenlere göre işyerlerinin afet sonrası uyum stratejileri Adapazarı örneğinde bir saha araştırması ile ele alınmıştır. Bu çalışma işyerlerinin afet sonrasında kendilerini ayakta tutacak uyum kapasitelerini ortaya koyarak afet çalışmaları alanına katkı koymaktadır. Araştırmanın temel bulguları işyeri büyüklüğü ve mülkiyet sahipliliğine göre işyerlerinin bir doğal afetten sonra ayakta kalmaya uyumlandıklarını göstermektedir. Küçük ve kiracı olan firmalar her ne kadar organizasyonel ve finansal sorunlar yaşasalar da geliştirdikleri yer seçim stratejileri ile büyük ve mülk sahibi rakiplerine karşın hayatta kalma ve adapta olabilme şanslarını artırmaktadır.

*Çankaya Üniversitesi, Mimarlık Fakültesi, Şehir ve Bölge Planlama Bölümü, Ankara, Türkiye
ezgiorhan@cankaya.edu.tr

Introduction

In developing countries bounded by traditional approaches of disaster management, post-disaster policies may not lead to resilience at aggregate level. Turkey exemplifies the case with its post-disaster experience following the Izmit earthquake. On August 17, 1999 an earthquake with a magnitude of 7.4 on the Richter scale struck the Marmara Region leading to death of 17,225 people and injury of 23,781 people (Prime Ministry Crisis Centre, 2000). 23 per cent of total deaths and 22 per cent of total injuries were observed in Sakarya. In addition to casualties, urban areas of the affected region experienced physical destruction; more than 213,000 housing units and 30,000 business premises were affected directly from the earthquake (Bibbee, et al, 2000). Particularly, in Adapazarı city, the centre of the Sakarya province, suffered from the disaster with the loss of 49 per cent of the total housing stock and 51 per cent of total business premises. In addition to the direct impacts of disasters, the region was challenged by the economic losses due to the interruptions in transportation, infrastructure, production and service sectors (State Planning Organization - SPO, 1999; Orhan, 2014).

Following the earthquake, recovery process was firstly handled by central government, and soon after by local governments. In Adapazari case, initial efforts were made to resettle the distressed community into safer locations through allocation of public resources (Orhan, 2015). Besides the recovery initiatives of state, local governments carried out the recovery process by regulating land-use decisions and development rights in the affected areas (Orhan, 2016d). Post-disaster process in Adapazari, therefore, incorporated both the resettlement and reconstruction policies. In this respect, the affected population were resettled in geologically safer locations which were nearly 12 km away from the centre. Moreover, the impaired downtown was regulated by reconstruction policies including a control on and reduction in building heights and densities; by this way it was aimed to achieve a low density development in the damaged area. Despite the resettlement of households in permanent housing district, the area was not able to attract the business community, because firms preferred to recover in affected urban centre city (Orhan, 2015; Orhan, 2016b). During the recovery process, a third urbanization model emerged in the west fringes of the affected downtown. The western periphery of the city began to be constructed by private entrepreneurs with limited development rights due to the adjacent location to the disaster-prone downtown despite its relatively safer geophysical conditions (Orhan, 2016d).

Even though the damaged city has been set up by the initial recovery goals, nearly ten years later the urban development of the city does not reflect the desired case. Current situation shows that resettlement districts could not go beyond to be a residential zone, because the district was settled by households, while downtown keeps its centrality for residential, commercial and industrial purposes (Orhan, 2016d; Orhan, 2017).

Departing from the given problem statement, this study argues that businesses that are largely unattended during the recovery process by local and national governments, develop their own adaptive strategies to survive after the disaster which may differentiate from the local and central-level policies. With respect to the argument, the paper is formulated by the following research question: "how do the adaptation strategies of businesses vary in the face of disaster if businesses are unattended by local or central governments in community resilience policies?".

Community Resilience and Adaptive Capacity of Businesses

A substantial literature has been developed on resilience and adaptive capacities since the influential study of Holling in1973. Firstly introduced in ecological studies, the concept of adaptive capacity refers the resources with dynamic attributes, i.e. diverse and autonomous components having local interactions and the chance of enhancement (Folke, 2006; Norris, et al, 2008) to manage resilience collectively (Walker, et al, 2004). Resilience, in this respect, is used describe the adaptive capacity of a system to restructure and return to equilibrium after displacement (Walker, et al, 2004), through both absorbing the impacts and facilitating the ability of reorganizing and learning to respond to a threat (Cutter, et al, 2008; Folke, 2006). Resilience of a system does not only aim to return to pre-event state (Walker et al, 2004; Folke, 2006), rather it deals with the attributes of the systems that enhance the ability to sustain and restructure the organization. That is, the properties of robustness, redundancy, resourcefulness, and rapidity provide opportunities for development rather than protecting the system against external stressors.

In social studies, "community resilience" concept is developed to refer "a process linking a network of adaptive capacities to adaptation after a disturbance or adversity" (Norris, et al, 2008; 127). Resilience of a community is positive attribute that enables the community to learn how to cope with the stressor through its components. Tobin (1999; 13) describe the term in disaster research as "the structural organization to minimize the effects of disasters and, at the same time, having the ability to recover quickly by restoring the socio-economic vitality of the community". Moreover, Godschalk (2003; 137) identifies resilience at urban level as "a sustainable network of physical systems and human communities, capable of managing extreme events; during disaster, both must be able to survive and function under extreme stress". In this respect, resilience at aggregate level requires the functioning of the whole system and concerns with connections and relations between natural, physical and social systems (Cutter et al., 2008).

Measures and post-disaster policies integrated for community resilience enhance the adaptive capacity of the system in absorbing the impacts and facilitating the ability of reorganization. Post-disaster interventions applied to an affected urban community serve for refunctioning of physical,

economic, social and spatial systems. Dealing with such a complexity requires comprehensive analysis of potential outcomes of the applied policies.

Promoting community resilience comprises the functioning of elements and resources, employment of adaptive capacities, and thus being adaptable for further changes in the system and for possible threats. For businesses, adaption strategies are developed to engage in the new conditions emerged due to the disturbance. Here, adaptation which is interrelated with adaptive capacity and resilience, refers to "as responses to risks associated with the interaction of environmental hazards and human vulnerability or adaptive capacity" (Smit and Wandel, 2006; 282).

A growing web of literature displays that functioning of business activities can be accomplished thorugh adaptive strategies (Tierney and Dahlhamer, 1997; Herbane et al, 2004; Boin and McConnell, 2007). Because business continuity is the main goal of companies, they develop post-disaster strategies "to acquire and maintain resources, human or material" after a disaster (Pitt and Goyal, 2004; 88). The adaptation strategies of businesses, in the recovery period, to reach the new normal may vary with respect to several factors, i.e. business size, sector, age, occupation status, pre-disaster financial condition, preparedness level (Alesh, et al., 2001; Webb, et al, 2002; Tierney and Webb, 2001; Chang and Falit-Baiamonte; 2002; Dahlhamer and Tierney, 1998; Runyan, 2006; Zhang, et al, 2009; Wasileski et al, 2011; Corey and Deitch, 2011; Orhan, 2016c; Orhan, 2017). Depending on these factors, businesses attempt to change their circumstances in order to achieve a less vulnerable condition. The extent of their capability to withstand the disruption determines the adaptive structure of organisations. Not all firms developed similar adaptation strategies. Therefore, there is a need to critically evaluate the ways that the businesses react in response to actual impacts.

Previous studies on business recovery showed that disasters influence firms in different ways. The reasons of the variation of disaster impacts on businesses may associate with the severity of damage, disruption of operational facilities, and extent of preparedness level (Corey and Deitch, 2011). Based on the previously conducted studies and scope of this study, the factors that are decided upon affect the differentiation in adaptive capacities among firms include business size and occupancy status.

In literature, scholars agree that small businesses show higher vulnerabilities to hazards than their larger counterparts (Tierney and Webb, 2001; Alesh, et al, 2001; Orhan, 2016c). Tierney and Webb reported that "on an everyday, non-disaster basis, smaller firms have more difficulty than their larger counterparts in raising money, competing for labour, and coping with tax burdens and other expenses associated with business operations" (2001; 9). Originating from their vulnerable conditions, small businesses are claimed to be experience more problems in comparison to large firms against disasters (Dahlhamer and Tierney, 1998; Webb, et al., 2002; Zhang, et al, 2009) due

to their ease of access to resources following a disaster, obtaining diverse input-output linkages and ability of spreading risks. On the contrary, small businesses are more likely to challenge from disasters than larger firms as they could not allocate resources for preparedness and post-disaster recovery. Furthermore, the recovery process seems to be more difficult since "they are disproportionately locate in buildings that have higher probability of collapsing or sustaining severe structural damage" (Tierney and Dahlhamer; 1995;11).

Similar to business size, previously conducted studies put forward that occupancy status of businesses relates with the business recovery. In this regard, firms operating in owner-occupied firms are less vulnerable than renters of business properties (Nigg, 1995; Tierney and Dahlhamer, 1997; Chang and Falit-Baiamonte, 2002; Powell and Harding, 2009; Wasileski, et al, 2011; Orhan, 2016c). Renters are more likely be challenged by disasters than owners since owners of property can borrow loans and credits for mitigation and recovery easier in comparison to lease holders put the relation between recovery and occupancy tenure as renters have more difficulty in recovery than owners of a business (Chang and Falit-Baiamonte, 2002; Dahlhamer and Tierney, 1998).

Limiting the scope of the study to business size and occupancy status related to characteristics of businesses, may serve as proxies for understanding the variations in adaptive capacities of businesses in recovery period.

Methodology

Due to the absence of a regular basis in the business cycle, it is difficult to identify how businesses adopt the new circumstance following a disaster. This investigation examines the adaptation strategies of businesses following a disaster. The city of Adapazari, Turkey is selected purposively for the research since the city enables us to observe the long-term consequences of the Izmit earthquake in physical, economic and spatial terms.

This study depended on the data gathered through questionnaire. The survey instrument was designed to put forward adaptation strategies of businesses following the disaster. The questionnaire included questions on business size, occupancy tenure, business sector, preparedness levels, resource allocation for recovery, and pre- and post-disaster location choices of businesses. The data gathering method of the study was based on face-to-face meetings to business owners or managers, therefore the study had to be restricted to a selected number of firms rather than the entire business population, which constitute the limitation of the study. In this respect, data was gathered from 232 firms operating in Adapazari Metropolitan Municipality. To obtain the database, two-stage stratified sampling method was applied where the stratification was done in accordance with eligibility and location criteria. For the first criteria, the

selected firms were supposed to be experienced the earthquake and had been operating during the time of the survey which was coinciding in June 2012. Exclusion of closed or relocated firms is a limitation in understanding the adaptation strategies of businesses accurately since we did not have any knowledge about the survival process of failed and relocated firms. For the second phase of sampling, firms were selected to represent the post-disaster urbanization models emerged in Adapazari. Hence, the stratification was based on their location, either in resettlement district, periphery or downtown. For the analytical procedure of the research, the data obtained through the questionnaire was transferred into descriptive statistics and analysed through cross tabulation method.

The indicators of 'business size' and 'occupation status' of firms were used as independent variables to define the variations in the adaptation strategies of firms. Table 1 shows the descriptive statistics of selected businesses in line with their size and occupancy status before the earthquake. The variables of business size and occupancy were measured dichotomously; whether the firm had employees less than thirty or not; and whether the property was owned or leased. Business size of firms denotes the number of employees including the part-time and full-time personnel. Firms having employees less than 30 were accepted as small whereas those with more than 30 employees were accepted as large firms.

Table 1 Distribution of the firms in the sample according to their size and occupancy status

Internal characteristics of firms		**%**	**N**
Business size	Small firms	82,3	191
	Large firms	17,7	41
Occupancy	Own	60,3	140
status	Lease	39,7	92
Occupancy	Small firms with owner occupation	56,5	108
status by	Small firms with rented property	43,5	83
business size	Large firms with owner occupation	78,1	32
	Large firms with rented property	39,7	9

In Adapazari, the sample represented the dominance of small firms in the city in line with the claim of Runyan arguing that "downtowns of small and medium-sized cities are typically stored with small businesses" (2006; 14). As Table 1 displays, 60.3 per cent of all respondent firms claimed to be owner of the property, while 39.7 per cent mentioned to be lease-holder. Among all businesses, 78.1 per cent of large businesses and 56.5 per cent of small businesses were owner-occupied firms. Here, it was seen that prior to the disaster, small businesses were more likely operate as tenants than larger counterparts due to the financial constraints.

Analysis on Adaptive Strategies of Businesses

Problems caused by disasters that are observed as primary and secondary effects of earthquake can impede the functioning of firms. Due to the disaster-induced problems, firms may suffer from the disruption such as temporary closure or business discontinuity, and consequently, develop adaptation strategies against encountered disturbances.

In Adapazari case, almost all businesses stayed closed immediately after the disaster earthquake. The median length of closure in the sample was thirty days. The length of business closure differed with respect to the business size; this findings revealed that large firms with a mean value of 75.0 tended to close longer periods than small firms whose mean value in length of closure was 40.6. Suffered from the disruption, in the post-disaster period, affected firms developed adaptation strategies to cope with the negative outcomes the Izmit earthquake were categorized as organizational, financial and locational strategies (see Table 2). As a common strategy, 81 per cent of the respondent firms mentioned to take monetary support. Relocation was seen as the second common strategy among businesses of 35 per cent which preferred to reorganize their businesses in a different locaiton. Third main adaptive behaviour was organizational arrangements that 34 per cent of the firms in the sample applied to enhance their ability in post-disaster conditions.

Table 2 Distribution of recovery strategies of firms

Adaptation strategies	**%**	**Frequency**
Financial support	81,0	188
Organizational rearrangements	34,1	79
Relocation	34,9	81
Other	1,3	3

Organizational strategies

At first, respondent firms were asked about their organizational arrangements conducted following the disaster. As summarized in the Table 3, the organizational arrangements were observed in the sample as shrinking the entity (59.5%), enlarging the entity (15.2%), merging the entity (3.8%), and changing sector (21.5%).

Table 3 Distribution of recovery strategies of firms

Organizational strategies	%	Frequency
Shrinking the entity	59,5	47
Enlarging the entity	15,2	12
Merging the entity	3,8	3
Changing sector	21,5	17

Note. The number firms that applied organizational arrangements is 79.

A business's internal organization- observed as shrinking, enlarging or merging the entity- can be accepted a responsive behaviour against the stressor. It was observed that 21.5 per cent of the selected firms sustained their existence by operating in a different sector after the earthquake. Table 4 summarized the new distribution of the sectors of 17 firms that changed their main field of operation after the disaster. It was observed that nearly half of these firms reorganized their businesses in construction sector. The trend in construction sector can be explained through the reconstruction activities initiated in the affected parts of the downtown.

Table 4 Distribution of firms that changed their sectors, by sector

Business sector	%	N
Manufacturing	11,8	2
Type Construction	52,9	9
Trade	5,9	1
Finance, insurance and real estate	0	0
Service	29,4	5
Other	0	0

Note. The number firms that changed their sector is 17.

Apart from the strategies including labour and capital arrangements, preparedness which constitutes significant tools in increasing the ability against disturbances was integrated to organizational strategies (Orhan, 2016a). Previous studies indicated that pre-disaster planning activities correspond to resilience (Herbane, 2013). In addition to the strategies directly affecting the internal structure of the business, firms were asked about the preventive measures they undertook following the disaster. Table 5 demonstrates the distribution of firms according to their preparedness level before the earthquake. It was shown that approximately 60 per cent of businesses in the sample did not apply to any preparedness activity before the earthquake, whereas nearly 20 per cent of firms had a single measure and the remaining 20 per cent took more than one measure to be prepared for a disaster.

Table 5 Preparedness levels of firms before the earthquake

Preparedness level	%	N
No measure	59.9	139
Single measure	19.4	45
Multiple measures	20.7	48

Following the disaster, the mean score of preparedness activities increased from 0.81 to 2.61 out of 8 measures. Firms reported taking measures before and after the disaster were asked about the types of these preventive measures. In both pre and post-disaster periods, purchasing insurance for property, equipment and machinery was the most common measure among businesses. It was followed by structural measures with 55.2 per cent, hiring a disaster manager with 26.7 per cent (see Table 6).

Table 6 Type of prevention measures

Types of prevention measures	Before (%)	After (%)
Insurance for property, equipment and machinery	29,27	74,14
Business interruption insurance	3,45	30,17
Structural measures (retrofitting, fixing equipment)	22,41	55,17
Preparation of emergency plan	3,45	17,24
Training employees for disaster risk management	3,45	10,34
Hiring a disaster manager	13,36	33,62
Making alternative location arrangements	3,02	12,93
Building of redundancy into business	3,88	17,24
Other	0	10,34

The analysis on business adaptability relied on the investigation of relations between dependent and independent variables (see Figure 1).

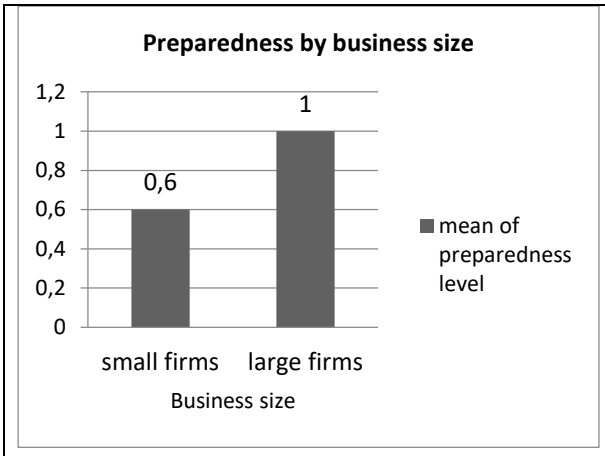

Figure 1a. Relation between preparedness and business size

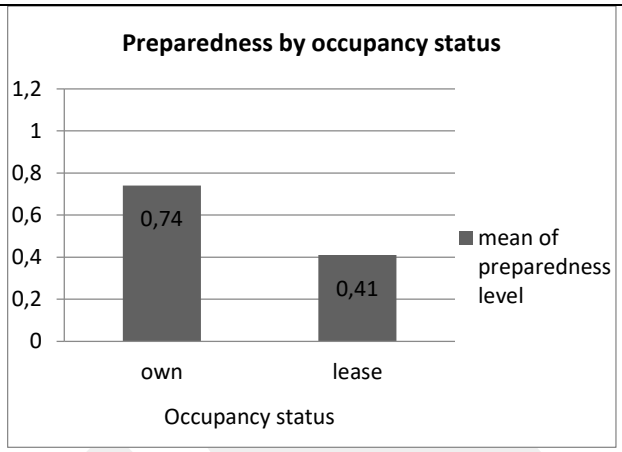

Figure 1b. Relation between preparedness and occupancy status

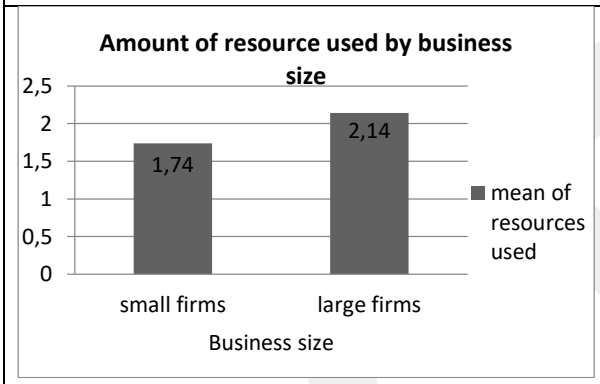

Figure 1c. Relation between use of external resources and business size

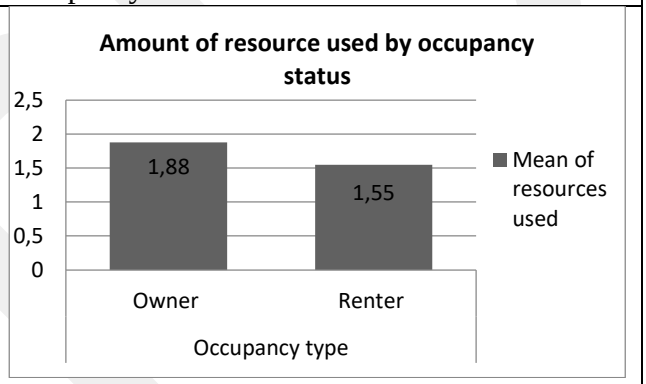

Figure 1d. Relation between use of external resources and occupancy status

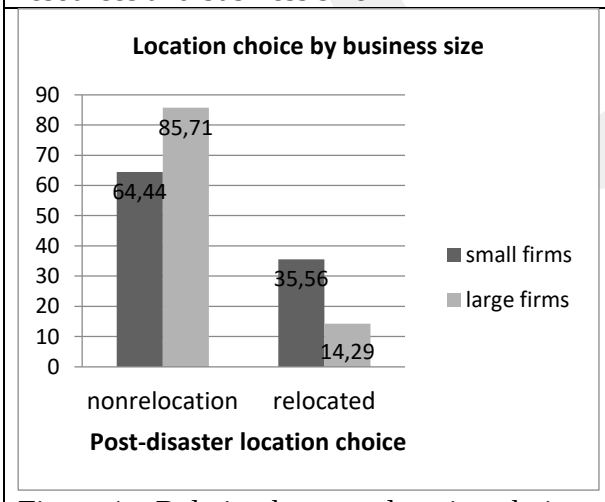

Figure 1e. Relation between location choice and business size

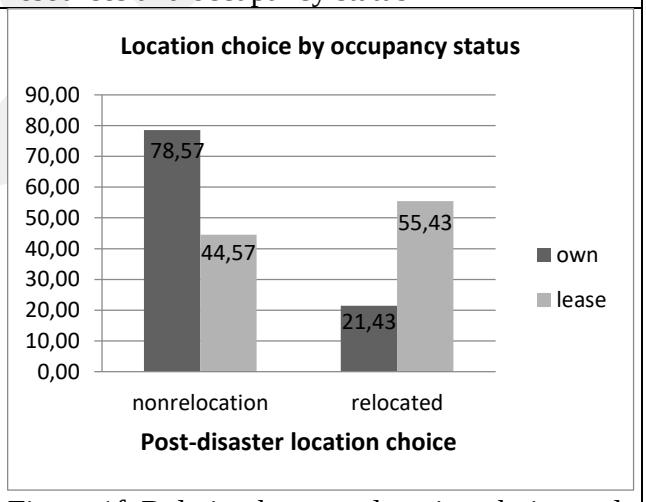

Figure 1f. Relation between location choice and occupancy status

Figure 1 Relations between adaptive strategies and independent variables (business size and occupancy status)

In order to understand the differentiation among firms with respect to their preparedness level, the relation between preparedness and the variables of business size and occupancy status was analysed. The mean value of the preparedness level before the earthquake as the index of 8 items was examined according to the independent variables. Higher scores indicate more preparedness activities for the given variable than lower scores.

For the business size indicator, this study found that small firms show fewer tendencies to carry out preparedness activities (see Figure 1a) in parallel to the findings of Tierney and Webb (2001), Dahlhamer and D'Souza, (1995). Due to the financial constraints, small firms have difficulties in adopting measures for risk reduction (Runyan, 2006). The competitiveness of market also affects small businesses in adopting preparedness policies, and they are less likely to invest in pre-disaster period. On the contrary, because large firms can avoid risks by utilizing disaster-resistant facilities, such as affording hazard insurances and locating in multiple sites, they could allocate these resources to prevent disaster risks and to contribute to a better response capacity (Zhang, et al., 2009).

Secondly, the occupancy status indicator is expected to affect the likelihood of preparedness (Dahlhamer and D'Souza, 1995). This study showed that property owners have more tendencies to invest in preparedness than lease-holders (see Figure 1b). The relation may be explained by ability of property owners in accessing a wider range of pre-disaster measures through legal arrangements allowing them to utilize measures such as retrofitting and insurance.

Figures on organizational structure of the affected firms showed that firms developed strategies to adopt the post-disaster conditions by changing their operational capacity. Adaptive strategies in the organizational structures of firms may lead to an increase in their recovery chance. In addition to internal arrangements of the firms' structure, business operability is strengthened through preventive measures. The relation between ownership status and preparedness level denoting the willingness of owner-occupied firms in preparedness reflects the chance of these firms for better adaptive performance in recovery process. Also, with respect to the business size, small firms seem to have less recovery chance than larger counterparts since they employ less preparedness measures even after the disaster.

Financial strategies

Following the 1999 Earthquake, firms mobilized financial resources to post-disaster process. The sample was asked about the categories of fiscal resources they administered after the disaster. 21.1 per cent of businesses in the sample undertook earthquake insurance and used the fiscal instrument for recovery (see Table 7). Beside the insurance, individual savings, particularly in the form of personal debt, was determined as the most applied category of resource (81%). The

extensive use of personal debt may be explained by the deficiency of public loans and low levels of engagement in insurance. Particularly, enterprises taking heavy damage from the earthquake had difficulties in reaching to commercial loan, due to the destruction of their property.

Table 7 Type of financial sources used after earthquake

Types of financial sources	**%**	**N**
Insurance	21,1	49
Loan (public)	13,8	32
Commercial loan	24,1	56
Business reserves – self-insurance	28,0	65
Individual savings	81,0	188
Donations from business environments or other sources	3,5	8
Other	3,5	8

The mean number of resource types used for recovery was analysed with respect to business occupation status and business size to examine the differential accessibility to resources. Firstly, for the business size variable, the mean value of resource used was examined (see Figure 1c). In this respect, this study showed that large businesses were more likely to allocate financial resources than small firms, in parallel to the results of Chang and Falit-Baiamonte (2002).

Secondly, for occupancy status variable, it was expected to affect the amount of resources used. This study found that property owners showed more tendencies to obtain loans and be insured than lease-holders after the disaster (see Figure 1d). The findings on the tendency of property owners may relate with their ability on accessing loans by putting their property under lien. Table 8 displays the distribution of each resource category in accordance with the occupancy status. Businesses with owner-occupation mostly addressed to the individual savings in addition to business reserves and commercial loans in post-disaster period, whereas lease-holders were able to allocate individual savings.

Table 8 Distribution of resources, by ownership status (%)

Types of financial sources	Owner	Renter
Insurance (n=49)	59,2	40,8
Public loan (n=32)	75,0	25,0
Commercial loan (n=56)	71,4	28,6
Business reserves – self-insurance (n=65)	73,9	26,1
Individual savings (n=188)	56,4	43,6
Donation (n=8)	100	0
Other (n=8)	100	0

The analysis on resource allocation in accordance with business size and occupancy status allowed us to claim that lease-holders had difficulties in accessing fiscal resources following a disaster. In this regard, lease-holders are expected to have less survival chance than firms with owner-occupation. Besides, a similar relation could be asserted for business size where small businesses could allocate small amount resources restricted with personal debt and borrowings that reduces their recovery chance in post-disaster period.

Locational strategies

Following the earthquake, firms reorganized their businesses in spatial terms in line with their recovery routes. The locational organization of businesses in the case study was mainly categorized as staying in the same lot and relocation. In this respect, 35 per cent of the businesses in the sample relocated in the post-disaster period whereas the remaining 65 per cent preferred to stay in the same location (see Table 9). Relocation choice of firms included four sub-groups as moving to two-storey building at the centre (28%), moving to resettlement district (3%), moving to periphery (3%) and moving to industrial district (1%).

Table 9 Location choices of businesses in the recovery process

Location choices		%	N
Non-relocated	Staying in the same location	65,0	151
Relocated	Moving to two-storey building in centre	28,0	65
	Moving to resettlement district	3,4	8
	Moving to periphery	2,6	6
	Moving to industrial district	0,9	2

Variations in the post-disaster location choices of firms were analysed by the variables of business size and occupancy status. First, the influence of the business size variable on the location preferences of firms was examined. It was found that 35.6 per cent of small firms changed their location, while only 14.3 per cent of large firms relocated after the disaster. That is, small firms showed higher willingness in changing location (see Figure 1e). The finding can be explained through other internal characteristics of businesses such as their market range, and financial conditions. Here, it can be said that small firms operating in a competitive business environment with limited resources may prefer to relocate a safer location to sustain their operations.

Secondly, the relation between occupancy status and location choice was analysed. It was put forward that lease-holders had higher shares in relocation in comparison to property owners (see Figure 1f). It was found that property owners were more likely to recover in their pre-disaster locations than others consistent with the findings of Wasileski, et al, 2011. That is because, renters that take physical damage from disaster tend to recover by changing their locations, while owners of properties also have the chance to rebuild or restore their buildings. Another reason for preference of owners of properties to operate within the same location may relate with the costs of relocation that is much higher for owners than renters.

In line with the locational strategies, the analysis on the business size and occupancy status variables reveals that firms showed variations about their post-disaster locations. The small size firms and lease holders were more likely to relocate following a disaster to adopt the new circumstances than large firms and owner-occupied ones.

Discussion

Since community resilience aims to minimize any interruptions in the functioning of society, enhancing the ability of businesses is necessary to assure their existence and operability. This study asserted that post-disaster strategies of community elements enhance their ability to adjust the new conditions and to achieve the new equilibrium posed by natural hazards. Each element in community requires to develop adaptation strategies following a disaster. Particularly, businesses as the economic units of community are needed to take attention in discussing resilience at aggregate level. Therefore, this study aimed to put forward the variations in adaptation strategies of businesses following a disaster by regarding these strategies in line with community resilience.

Disaster literature reveals that the most vulnerable private sector entities are small-sized and lease-holding firms. In consistent with previous studies, this study showed that vulnerability of businesses is sensitive to preparedness level of firms and allocation of resources to recover in Adapazari city. That is, firms with internal characteristics of small size and rental property may

show worse recovery performance than those with larger size and owner-occupied property. Moreover, empirical findings put forward that small firms and lease-holders show higher mobility than others despite these business characteristics associate with lower chance in recovery. In other words, the attribute of mobility increases the chance of recovery by enabling these firms to reorganize their operations in a different location. In this respect, relocation as an adaptive capacity utilized in post-disaster period may justify the recovery performance of small-sized and lease-holder firms so that strategies developed for such firms in spatial aspect may enhance their chance following a disaster.

This study reaches three main outcomes in accordance with the findings. The first outcome is about the development of a financial instrument to be operated in recovery period. Second one considers the legal arrangements to protect the rights of property owners and tenants. These proposals target to enhance the organizational structure of businesses and increase their fiscal robustness across disasters. Third one relates with the locational arrangements of businesses to shed light on the community resilience.

In organizational terms, this study displays that additional strategies are needed to support firms to carry out pre-disaster activities. The respondent firms show little tendency to invest in preparedness in both pre- and post-disaster periods, therefore compulsory adjustments are needed to be implied to support firms to get prepared at individual level in fiscal and physical terms. Moreover, since the least prepared businesses are shown as those with rental property and small businesses, special strategies addressing these firms are recommended to sustain the business environment. Since these types of firms are more vulnerable to disasters in allocating resources following any destruction financial instruments are needed to be designed for them. By this way, their adaptive capacity tends to be improved for stressors.

In spatial terms, this study showed that in the recovery process firms preferred to locational arrangements in the affected city. The reason for staying in the same location associates with the business size and ownership of the property. It was found that owner-occupied firms preserved their locations whereas lease-holders showed higher willingness to relocate. Thus, the distribution of owner-occupied firms following a disaster seems to determine the business environment in the urban morphology. It is to say that the post-disaster occupation status of businesses may not permit any variation in the urban space in future.

This study showed that in the post-disaster phase firms develop their own strategies to achieve a new normal following the disaster. Along with their locational arrangements as an adaptive process, businesses have a crucial position in the organization of urban space. Their locational distribution following a disaster may block the implementation of main targets put in the beginning of recovery phase. Since business continuity is not an independent process, recovery of the business to gain operability after a disaster requires considering the entire system, i.e.

community. Therefore, urban plans are expected to consider community resilience and integrate the business recovery into household recovery.

Conclusion

This paper presented an investigation for assessing the adaptation strategies of businesses, based on an empirical analysis. The results of this study highlight some caveats that must be borne in mind when planning for natural disasters. Especially in developing countries, community resilience must be targeted by considering all community elements such as households, businesses, non-governmental organizations, public institutions, and the relationship among them. Responding to the event and readjustment after the stressor is as vital as being prepared for disasters, and increase the ability of community elements coping capacity. Ultimately, policies should be designed to enhance adaptation of community and its components. Since these components show variations in adaptation, as presented in this study by focusing on businesses, policies should target at specific localities, groups, and sectors.

Studies on adaptability in disaster studies have provided many insights but it is still a novel concept due to the limited number practical research. This study presents a scientific approach for understanding the adaptation strategies of businesses by suggesting new debate areas. Reflection of adaptation strategies on recovery seems to be one of the most compelling among them. Further research is essential in examining the impacts of each adaptive strategy on business recovery. It enables decision-makers to recognize the problems emerge in the recovery period and the impacts of policies on the adaptation performance of firms with different vulnerable characteristics. Thus, understanding the ability of reorganization of businesses in post-disaster period is crucial to develop appropriate policies to achieve community resilience.

Acknowledgments

This work was supported by the Scientific and Technological Research Council of Turkey under the Grant no. 111K577. The ideas expressed here do not reflect the views of the Council.

REFERENCES

Alesch, D.J, Holly, J.N, Mittler, E, and Nagy, R. (2001), "Organizations at Risk: what Happens when Small Businesses and Non-for-Profits Encounter Natural Disasters", Small Organizations Natural Hazards Project, First Year Technical Report, University of Wisconsin-Green Bay: the Public Entity Risk Institute, Fairfax, Virginia, USA.

Bibbee, A, Gonenc, R, Jacobs, S, Konvitz, J, and Price, R. (2000), "Economic Effects of the 1999 Turkish Earthquakes: An Interim Report". OECD Economics Department Working Paper no. 247, An Interim Report, OECD Publishing.

Boin, A, and Mc Connell, A. (2007), "Preparing for critical infrastructure breakdowns: the limits of crisis management and the need for resilience", Journal of Contingencies and crisis management, vol.15, no.1, pp. 50-59.

Brooks, N, Adger, W.N, and Kelly, P.M. (2005), "The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation", Global Environmental Change. vol. 15, pp. 151-163.

Chang, S.E, and Falit-Baiamonte, A, (2002), "Disaster Vulnerability of Businesses in the 2001 Nisqually Earthquake". Environmental Hazards, vol. 4, pp. 59-71.

Cutter, S.L, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E, and Webb, J. (2008), "A place-based model for understanding community resilience to natural disasters". Global environmental change, Vol 18, pp. 598-606.

Dahlhamer, J.M, and Tierney, K.J. (1998), "Rebounding from Disruptive Events: Business Recovery Following the Northridge Earthquake", Sociological Spectrum, Vol.18, pp. 121-141.

Dahlhamer, J.M, and D'Souza, M.J. (1995), "Determinants of Business Disaster Preparedness in Two U.S. Metropolitan Areas". University of Delaware, Disaster Research Centre, Newark, DE: Preliminary paper no. 224.

Corey, C.M, and Deitch, E.A. (2011), "Factors affecting business recovery immediately after Hurricane Katrina", Journal of Contingencies and Crisis Management, vol. 19, No.3, pp. 169-181.

Folke, C. (2006), "Resilience: The emergence of a perspective for social–ecological systems analyses", Global Environmental Change, vol.16, pp. 253-267.

Godschalk, D.R. (2003), "Urban hazard mitigation: Creating resilient cities", Natural Hazards Review, vol. 4, pp. 136-143.

Herbane, B, (2013), "Exploring Crisis Management in UK Small- and Medium-Sized Enterprises", Journal of Contingencies and Crisis Management, vol.21, no. 2, pp. 82-95

Herbane, B, Elliott, D, and Swartz, E.M. (2004), "Business continuity management: time for a strategic role?", Long Range Planning, vol.37, pp. 435-457.

Holling, C.S. (1973), "Resilience and Stability of Ecological System", Annual Review of Ecology and Systematics, vol. 4, pp. 1-23.

Norris, F.H, Stevens, S.P, Pfefferbaum, B, Wyche, K.F, Pfefferbaum, R.L. (2008), "Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness", American Journal of Community Psychology, vol. 41, pp. 127-150.

Orhan, E. (2014), "The role of lifeline losses in business continuity in the case of Adapazari, Turkey", Environmental Hazards, vol. 13, No.4, pp. 298–312.

Orhan, E. (2015), "The consequences of security cognition in post-disaster urban planning practices in the case of Turkey", Natural Hazards, vol. 76, no.1, pp. 685–703.

Orhan, E. (2016a), "Building community resilience: business preparedness lessons in the case of Adapazarı, Turkey", Disasters, vol. 40, no.1, pp. 45-64.

Orhan, E. (2016b), "Urban spatial structuring following disasters: empirical findings from location choices of businesses in Adapazari, Turkey", Journal of Risk Research, vol. 19, no.7, pp. 964-982.

Orhan, E. (2016c), "Lessons learned from businesses to ensure community level recovery in a post-disaster period: Case from Adapazari, Turkey", Natural Hazards Review, vol. 17, no.1 pp. 05015002-1-12.

Orhan, E.,(2016d) "Reading vulnerabilities through urban planning history: an earthquake-prone city, Adapazari case from Turkey, METU Journal of Faculty of Architecture, vol. 33, no.2, pp.139-159.

Orhan, E., (2017) "Factors affecting post-disaster location choices of businesses: an analysis of the 1999 earthquake", Environmental Hazards, vol. 16, no.4, pp. 363-382.

Pitt, M, and Goyal, S. (2004), "Business continuity planning as a facilities management tool", Facilities, vol. 22, no. 3-4, pp. 87-99.

Powell, F, and Harding, A. (2009), "Business Recovery and the Rebuilding of Commercial Property. Proceedings of 'Shaken Up' a workshop on recovery following the Gisborne Earthquake", held in Wellington on 7 December 2009.

Prime Ministry Crisis Centre, (2000), Earthquakes 1999. T.R. Prime Ministry Press, Ankara.

Renschler, C.S, Fraizer, A.E, Arendt, L.A, Cimellaro, G, Reinhorn, A.M, and Bruneau, M. (2010), "A framework for defining and measuring resilience at the community scale: The PEOPLES

resilience framework", US Department of Commerce, National Institute of Standards and Technology.

Runyan, R.C. (2006), "Small Business in the Face of Crisis: Identifying Barriers to Recovery from a Natural Disaster", Journal of Contingencies and Crisis Management. Vol.14, no.1, pp. 12-26.

Smit, B, and Wandel, J. (2006), "Adaptation, adaptive capacity and vulnerability", Global Environmental Change, vol. 16, pp. 282-292.

SPO (State Planning Organization). (1999), "Economic and social impacts of disasters, possible financial needs, measures taken in short- and medium-terms". SPO Publications: Ankara, Turkey.

Tierney, K.J. (1997), "Business Impacts of the Northridge Earthquake", Journal of Contingencies and Crisis Management, vol. 5, no.2, pp. 87-97.

Tierney, K.J, and Webb, G.R. (2001), "Business Vulnerability to Earthquakes and Other Disasters", Newark, DE: University of Delaware, Disaster Research Centre, Preliminary paper no. 320.

Tierney, K.J, and Dahlhamer, J.M. (1997), "Business Disruption, Preparedness and Recovery: Lessons from the Northridge Earthquake". Newark, DE: University of Delaware, Disaster Research Centre, Preliminary paper no. 257.

Tobin, G.A. (1999), "Sustainability and Community resilience: The holy grail of hazards planning?" Environmental Hazards. Vol.1, pp. 13-25.

TurkStat, (2001), "The Report on the Survey Conducted between the Dates of 4-11 October 1999 to Determine the Impact of the Earthquake Zone that a Severe Earthquake Occurred on 17 August 1999". Turkish Statistical Institute, Ankara.

Walker, B.C.S, Holling, S, Carpenter, R, and Kinzig. A. (2004), "Resilience, adaptability and transformability in social–ecological systems", Ecology and Society. vol.9, no.2, pp. 5.

Wasileski, G., Rodrigues, H., and Walter, D. (2011), "Business closure and relocation: A comparative analysis of the Loma Prieta Earthquake and Hurricane Andrew", Disasters, Vol. 35, no.1, pp. 102-129.

Webb, G.R., Tierney, K.J., and Dahlhamer, J.M. (1999), "Businesses and Disasters: Empirical Patterns of Unanswered Questions", Newark, DE: University of Delaware, Disaster Research Centre, Preliminary paper no. 281.

Webb, G.R., Tierney, K.J., and Dahlhamer, J.M. (2002), "Predicting Long-term Business Recovery from Disaster: A comparison of the Loma Prieta Earthquake and Hurricane Andrew", Environmental Hazards. Vol. 4, pp. 45-58.

Zhang, Y., Lindell, M.K., and Prater, C.S. (2009), "Vulnerability of Community Businesses to Environmental Disasters", Disasters, vol.33 no.1, pp. 38-57.

Biography of the Author

*Ezgi Orhan graduated from the city and regional planning department of Middle East Technical University in 2007, and received her PhD degree from the discipline in 2012. Her doctorate thesis was funded by the Scientific and Technological Research Council of Turkey. Her research interests are community resilience, business geography, and urban planning. She has published articles in various journals about disaster management, location choices of public and private entities, and planning history. She is currently working as an assistant professor at Department of City and Regional Planning at the Çankaya University.