Effects of Kahramanmaras Earthquakes on Small Businesses and Factories

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Abstract

On February 6, 2023, a series of catastrophic earthquakes centered in Kahramanmaras struck Turkey, resulting in one of the most severe disasters of the century in terms of both human casualties and economic damage. This study examines the impact of these earthquakes on the local economy, with a particular focus on small businesses and factories within the affected zone. The analysis reveals extensive damage to numerous small businesses, which are critical to local economic stability. To mitigate this disruption, temporary workplaces were established, enabling business continuity and providing essential economic support to the affected communities. Similarly, the industrial sector faced significant challenges due to extensive damage to factories. The response involved a strategic approach where the majority of the affected factories underwent either reinforcement or complete reconstruction. This effort aimed not only at restoring production capabilities but also at enhancing resilience against future seismic activities through improved infrastructure and safety measures. The study provides an examination of the damages, the recovery measures implemented, and their effectiveness in revitalizing the regional economy.

Key words: Kahramanmaras Earthquakes, Small Businesses, Factories, Economic Loss

1. Introduction

Two major earthquakes centered in Pazarcik (Mw7.7) and Elbistan (Mw7.6) districts of Kahramanmaras occurred 9 hours apart on February 6, 2023. It has been determined that at least 50,000 people died and many more were injured in the Kahramanmaras earthquakes, which have entered the literature as the most destructive earthquakes in Turkey's history[1]. Following the earthquakes, a state of emergency was declared first in 11 cities and then in an additional 6 cities (**Fig. 1**) [2]. In its report, Head of Strategy and Budget of the Presidency of the Republic of Turkey announced that the total burden of the disaster caused by the Kahramanmaras and Hatay earthquakes on the Turkish economy was estimated at approximately 103.6 billion dollars, and that the total number of workplaces in the 11 provinces hardest hit by the earthquakes was 161,187 [3]. This study examines the repercussions of these earthquakes on small businesses and factories within the affected regions.

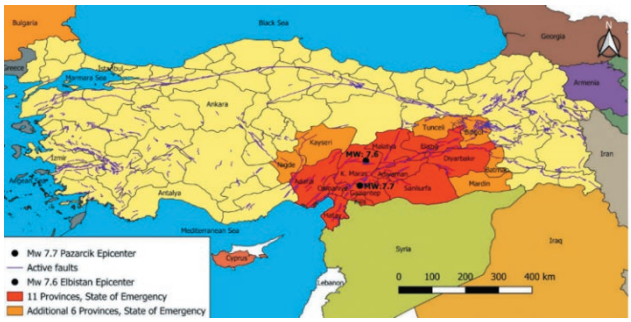


Fig. 1 Disaster Area after Kahramanmaras Earthquakes [2].

2. Earthquake Damage on Small Businesses

Many workplaces were severely damaged in Kahramanmaras, Hatay and Adıyaman, which are among the provinces most affected by the Kahramanmaras earthquakes. For instance, in the 3.5-kilometer-long bazaar in Hatay, where more than 2,500 workplaces operated before the earthquake, more than 600 workplaces turned into ruins on the night of February 6.

Kahramanmaras, where much of the destruction occurred, was densely populated with apartment buildings, often featuring retail stores and restaurants on the ground level. Following the earthquakes on February 6, which caused significant damage, 3,573 of the 4,055 temporary workplaces planned at 64 locations were delivered to tradesmen whose workplaces were destroyed or severely damaged. In addition to the heavily damaged buildings in Kahramanmaras, approximately 3,000 workplaces were heavily damaged or destroyed in Adiyaman. To support the tradesmen affected by this destruction, the state took action to facilitate their return to commercial activities. Temporary markets were established in city centers, and container and prefabricated buildings were constructed to house bazaars and individual workplaces in both container cities and city centers. As a result, 1,526 workplaces have resumed business operations in 41 temporary markets established in Adiyaman. **Fig. 2** illustrates the extensive damage to workplaces in Golbaşı, a district of Adiyaman, caused by the earthquakes [4].

a) Damaged buildings in Golbasi

b) Foundation problems in Golbasi

Fig. 2 Earthquake Damages in Golbasi [4].

This state intervention has been crucial in helping local businesses and tradesmen rebuild and continue their economic activities amidst the devastation. Several municipalities and private companies provided support to these government initiatives. For example, as part of the efforts to return life to its normal flow in the district, which was heavily damaged by earthquakes, a prefabricated market consisting of 27 containers was created by the Tokat Governorship and Tokat Municipality along the Malatya-Kahramanmaras highway.

In the Iskenderun district of Hatay, significant liquefaction effects were notably observed, particularly along Atatürk Street (**Fig. 3**) [4]. The severity of the liquefaction resulted in extensive damage to numerous businesses situated on this street. Consequently, these businesses faced prolonged service suspensions, severely impacting the local economy

a) Sand boils

b) Liquefaction ejecta

Fig. 3 Liquefaction Effects in Iskenderun [4].

(**Fig. 4**). The aftermath of the liquefaction not only disrupted daily operations but also necessitated substantial efforts for recovery and reconstruction.

Fig. 4 Liquefaction Effect on Business in Iskenderun.

3. Earthquake Damage on Factories

The Kahramanmaras earthquakes had a profound impact on the region's industrial sector, particularly affecting factories. The extent of the damage varied depending on the earthquake's intensity and the resilience of the factory structures. Both structural and nonstructural damages were prevalent, leading to significant disruptions in industrial activities. The structural damages ranged from minor to catastrophic. In some instances, factories experienced total collapse, rendering the buildings irreparable and leading to complete operational shutdowns. In less severe cases, structural damages were still extensive, necessitating considerable repair work to restore the integrity of the buildings. These repairs often involved reinforcing the foundations, repairing cracked walls, and replacing damaged structural components.

Nonstructural damages included harm to the equipment and machinery essential for production. Some factories faced challenges with broken or malfunctioning equipment, which further hampered their ability to resume normal operations. Repairing this equipment posed a significant problem, exacerbated by supply chain disruptions. The earthquakes had disrupted transportation networks, making it difficult to procure the necessary parts and materials. In response to these challenges, factory owners had to adopt innovative solutions to restart production. One such strategy involved cannibalizing parts from severely damaged equipment to repair other machines. This resourcefulness allowed some level of production to continue, despite the widespread damage and supply chain bottlenecks.

Beyond physical damages to factories and equipment, the earthquakes also caused a significant loss of labor force. Many workers were displaced from their homes or faced personal losses, which prevented them from returning to work. This shortage of skilled labor further compounded the difficulties faced by factory owners in resuming full-scale operations. The long-term implications of these disruptions are substantial. The immediate need for rebuilding and repairing infrastructure and equipment is critical, but equally important is addressing the human element of the crisis. Efforts to provide support and resources to affected workers, coupled with strategies to rebuild a resilient industrial infrastructure, are essential for the region's recovery.

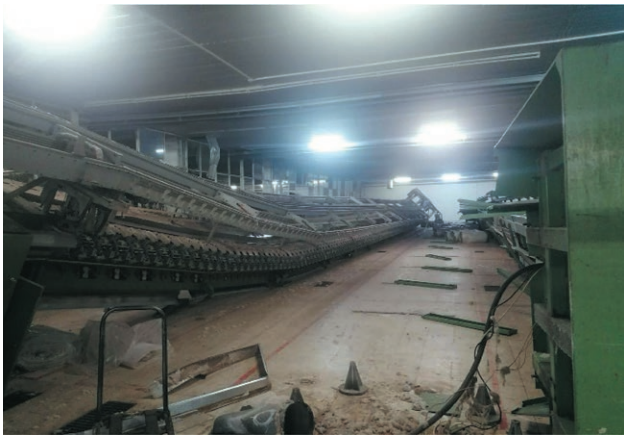
This study provides examples of earthquake effects on two factory buildings situated close to the Kahramanmaras city center. **Fig. 5** illustrates the earthquake damage sustained by Beydag Textile Factory. Despite being one of the least affected factories in the region, Beydag Textile experienced significant disruptions due to machinery damage and the explosion of a transformer. These incidents halted production, but the factory was able to resume operations two months later.

Fig. 5 Earthquake Damages in Beydag Textile.

Aral Textile, located approximately 1.5 km from Beydag Textile, was significantly more affected by the earthquake

(**Fig. 6**). **Fig. 6a** displays the damage to the roof of Aral Textile Factory, while **Fig. 6b** shows the damaged machinery inside the factory. Despite these challenges, the factory managed to produce 8 functional machines from the 12 damaged ones, allowing production to continue. Aral Textile resumed production approximately 9 months later.

a) Damaged factory roof



b) Damaged factory machine

Fig. 6 Aral Textile Earthquake Damages.

4. Results

As a result of the Kahramanmaras earthquakes, Turkey experienced an unprecedented economic loss. The extensive damage to small businesses and factories was a significant factor impeding the country's swift recovery. This study briefly discusses the impact on small businesses and factories in some of the cities most affected by the earthquake. The importance of business continuity planning has once again become evident in the aftermath of such disasters. Surveys and interviews conducted with small businesses and factories revealed a lack of preparedness, as most did not have business continuity plans in place. This lack of planning left them vulnerable to prolonged disruptions and hindered their ability to recover quickly. Factories, in general, had limited insurance coverage, which provided some relief but was insufficient to fully mitigate the extensive damages. The findings of this study underscore the critical need for disaster preparedness, resilience strategies, and comprehensive business continuity plans. Implementing these measures can significantly enhance the performance and recovery of businesses following earthquakes. By prioritizing these aspects, businesses can better safeguard their operations, reduce economic losses, and contribute to a more resilient economy in the face of future disasters.

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カフラマンマラシュ地震の中小企業および工場への影響

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要　旨

2023 年 2 月 6 日，カフラマンマラシュを震源とする大地震がトルコを襲い，人的被害と経済的被害の両面で，今世紀で最も深刻な災害の 1 つとなった．本研究では，これらの地震が地域経済に与えた影響を特に被災地域内の中小企業および工場に焦点を当てて調査した．分析の結果，地域経済の安定に欠かせない数多くの中小企業が甚大な被害を受けたことが明らかになった．事業への支障を緩和するために，仮設の就業場所が設置されることで，事業の継続が可能になり，被災した地域社会に不可欠な経済的支援が提供された．これと並行して，工場が甚大な被害を受けたため，産業部門も大きな課題に直面した．対応には戦略的アプローチが用いられ，被災した工場の大半は補強工事か完全な再建工事を受けた．この取り組みは，生産能力を回復させるだけでなく，インフラや安全対策を改善することで，将来の地震活動に対する耐性を高めることを目的としていた．本調査では，被害状況，実施された復旧対策，地域経済の活性化に向けた効果について検証している．

キーワード：カフラマンマラシュ地震，中小企業，工場，経済損失