CREATING SPACE ACCORDING TO CHANGING NEEDS: POST-DISASTER TEMPORARY HOUSING UNITS

BUSE ADA

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ETHICAL DECLARATION

I hereby declare that I am the sole author of this thesis and that I have conducted my work in accordance with academic rules and ethical behaviour at every stage from the planning of the thesis to its defence. I confirm that I have cited all ideas, information and findings that are not specific to my study, as required by the code of ethical behaviour, and that all statements not cited are my own.

Buse Ada

07/08/2023

ABSTRACT

CREATING LIVING SPACE ACCORDING TO CHANGING NEEDS:
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Master's Program in Design Studies

Thesis Advisor: Assoc. Prof. Dr. Didem Kan Kılıç

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This study aims to investigate the suitability of existing temporary housing by determining a guideline for the design of temporary housing. In this research, the issue will be discussed within the scope of meeting the temporary housing needs of disaster victims after the disaster. One of the main goals of this research is to identify a guide for designs that will provide a better solution as temporary units from a container city, where survivors can easily meet their physical and psychological needs, entitled privacy, personal space, spatial requirements. This research will contribute to the literature by examining the needs of survivors in disaster zones and temporary housing solutions used in the past. In the research, a survey study was conducted to examine the satisfaction levels of temporary housing victims living in the Bayraklı container city. As a result of the study, the results of the Bayraklı container city survey were evaluated according to the temporary housing design guide consisting of 5 main principles proposed by Felix et al. (2013). According to the findings of this study, it has been determined that the greatest dissatisfaction of

users is related to the lack of space, aesthetic requirements, sense of belonging, heating and cooling. The research and findings discussed throughout this thesis provide valuable insights that can shape the development of innovative and sustainable solutions, ultimately contributing to more effective post-disaster recovery efforts. These findings provide a roadmap for architects, designers and policy makers to develop temporary housing solutions in the post-disaster period.

Keywords: post-disaster, temporary housing units, self-setup system, modularity, nest

ÖZET

İHTİYAÇLARA GÖRE MEKAN YARATMAK: AFET SONRASI GEÇİCİ KONUTLAR

Ada, Buse

Tasarım Çalışmaları Yüksek Lisans Programı

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Bu çalışma, geçici konut tasarımı için bir kılavuz belirleyerek mevcut geçici konutların uygunluğunu araştırmayı hedeflemektedir. Bu araştırmada afetzedelerin afet sonrası geçici barınma ihtiyaçlarının karşılanması kapsamında konu ele alınacaktır. Bu araştırmanın ana hedeflerinden biri, hayatta kalanların mahremiyet, kişisel alan, mekansal gereksinimler başlıklı fiziksel ve psikolojik ihtiyaçlarını kolayca karşılayabilecekleri bir konteyner kentten geçici evler olarak daha iyi bir çözüm sağlayacak tasarımlar için bir rehber belirlemektir. Bu araştırma, afet bölgelerinde hayatta kalanların ihtiyaçlarını ve geçmişte kullanılan geçici barınma çözümlerini inceleyerek literatüre katkı sağlayacaktır. Araştırmada Bayraklı konteyner kentte yaşamakta olan afetzedelerin geçici konut memnuniyet düzeyleri incelenmesi adına bir anket çalışması yürütülmüştür. Çalışmanın sonucunda Felix vd.'nin (2013) önerdiği 5 ana ilkeden oluşan geçici konut tasarım kılavuzuna göre bayraklı konteyner kent anket sonuçları değerlendirilmiştir. Bu tez boyunca tartışılan araştırma ve bulgular, yenilikçi ve sürdürülebilir çözümlerin geliştirilmesini

şekillendirebilecek ve sonuçta daha etkili afet sonrası iyileşme çabalarına katkıda bulunabilecek değerli bilgiler sağlar. Bu bulgular, mimarlar, tasarımcılar ve politika yapıcılar için, afet sonrası süreçte geçici konut çözümleri geliştirmeleri için bir yol haritası sunuyor.

Anahtar Kelimeler: afet sonrası, geçici konut birimleri, kendi kendine kurulum sistem, modülerlik, yuva

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CHAPTER 1: INTRODUCTION

According to AFAD's definition, "Disasters are natural, technological or human-caused events that cause physical, economic and social losses for the whole or certain segments of society, stop or interrupt normal life and human activities, and the affected society does not have enough coping capacity". According to the definition made by the United Nations (UN), it means "natural disaster" if it requires inter-regional or international assistance to the affected region, thousands of people die, hundreds of thousands of people become homeless, cause serious economic losses, and have large insurance losses (Natcat, 2011). Natural disasters are divided into two as geological and meteorological origins. Natural disasters such as earthquakes, landslides and volcanic eruptions are of geological origin; heavy rain, flood, overflow, strong wind, frost, avalanche, forest fires can be given as examples of natural disasters that occur as meteorological origin. When natural disasters around the world are considered, it is seen that 28 of 31 natural disasters are formed by meteorological disasters. The types and order of importance of natural disasters also vary from country to country (AFAD, 2023). In Turkey, the disasters that cause the most loss of property and life are known as earthquakes and floods, respectively (Karatağ, 2021). Among the disaster risks faced by Turkey, earthquakes in particular constitute a separate problem area.

Turkey is located in the area of the earthquake zone. According to AFAD data (2020), 33,824 ground shaking was recorded in Turkey in 2020. Turkey has experienced many devastating examples of the earthquake in its time and the earthquake is still a natural disaster with serious implications for the country. In a country where so many earthquakes occur, post-disaster management is as important as first aid activities.

In this research, the subject we discuss within the scope of meeting the temporary housing needs of the victims after the disaster. A person whose house has been damaged or destroyed can't meet the needs in the process after the disaster. These needs are partially met in a collective space. One of the main purposes of this research is to create a guide for designs that will provide a better solution as

temporary houses from the tent or container city where the survivors can easily meet their basic needs. This research contribute to the literature by examining the needs of survivors, rapid installation construction methods and materials for temporary shelter in disaster areas.

Temporary housing is a crucial step in recovery and reconstruction after the disaster. Temporary housing can de defined as (a) an object, i.e. the physical structure people inhabit after a disaster; (b) a part of a process of re-housing after a disaster, just as Turner (1972) defines housing not as a product but as a process; (c) is a place that serves the function to shelter people during the period from the disaster until they have a permanent place to live (Johnson, 2007). Temporary housing is crucial to disaster recovery because of its ability to reach large numbers in a short period of time. Providing functional requirements related to the short life cycle and temporary housing with fast, replaceable, portable systems is an important role for survivors in the post-disaster period. In the after of a disaster, temporary housing provides a place affected families can call ‘home’, a place where they can begin to recover from the tragedy while permanent rebuilding takes place. Forms of temporary housing vary from prefabricated units to makeshift shacks by families themselves. According to Lizarralde (2006), strategic planning undertaken prior to the disaster can greatly improve temporary housing projects, both in the short and long terms. However, there are very few design studies that fulfill these features. This topic has been chosen for the research because there are no studies that can move from the research stage to post-disaster use yet.

Natural disasters are a phenomenon in the world's own structure and experienced since the first ages of history, have devastating effects on people and societies, cause loss of life and property, and interrupt the normal activities of people and the natural flow of life. Natural disasters are divided into two groups as "geological" and "meteorological" (AFAD, 2023). Geological natural disasters that take their source directly from the earth's crust or from the depths of the earth; earthquakes, landslides, volcanic eruptions, tsunami. Meteorological natural disasters that occur as a result of natural events in the atmosphere; flood, storm, typhoon, hurricane, drought, avalanche, erosion and flooding (AFAD, 2023). In the following, you can find the examples from the world and the Turkey to understand how great and devastating

effects natural disasters have.

Earthquake is the most destructive of disasters related to earth movements. The earthquakes that are in the records and cause great destruction are, in order of occurrence; Shen Shu / China Earthquake (in 1556 and 830,000 deaths), Beijing Earthquake (in 1731 and 100,000 deaths), Calcutta / India Earthquake (in 1737 and 300,000 deaths), Lisbon / Portugal Earthquake (in 1755 and 60,000 deaths), Kansu / China Earthquake (180.000 deaths in 1908) and Mesina / Italy Earthquake (in 1908 and 160,000 deaths). The biggest earthquake in recent history is the Tangushan China Earthquake. The earthquake that took place in 1976 was 8.2 Richter Scale magnitude. In this earthquake, 90% of the buildings were destroyed and 242,000 people lost their lives (Akdur, 2000). Volcanic eruptions take the second place among the disasters related to the movements of the earth. The largest recorded volcanic eruption was the eruption of the Tanbura Volcano / Indonesia in 1815, in which 92,000 people died. As a result of the volcanic eruptions in the records, more than 200,000 people lost their lives and great economic losses occurred. Flood is the most important of all disasters related to hydrosphere movements. The biggest flood disasters in the records, respectively; The flood that occurred in the Hennan Region of China in 1987 and caused the death of 900,000 people, and the flood that caused the death of 900,000 people in December 1920, again caused by the overflow of the Yellow River in China.

Table 1. Some of the great earthquakes of the last century (Source: Akdur, 2000, p.1)

TARİH	**YER / ÜLKE**	**ÖLÜ SAYISI**	**BÜYÜKLÜK**
16 Ağustos 1906	Şili	20 000	8,6
1908	Messina / İtalya	160 000	
1908	Kansu / Cin	180 000	
15 Ocak 1915	Avezzona / İtalya	29980	
16 Aralık 1920	Doğu Türkistan / Çin	180 000	8,6
1 Eylül 1923	Tokyo / Japonya	142 807	8,3
2 Mayıs 1927	Nan-Şan / Çin	200 000	8,3
25 Ocak 1939	Şili	28 000	8,3
27 Aralık 1939	**Erzincan / Türkiye**	**32 700**	**8,0**
30-31 Mayıs 1970	Kuzey Peru	66 794	7,7
12-13 Kasım 1970	Pakistan (deprem –kasırga)	500 000	

Table 1 Continued. Some of the great earthquakes of the last century (Source: Akdur, 2000, p.1)

4 Şubat 1976	Guatemela City	22 778	7,5
28 Temmuz 1976	Tangshan / Çin	242 000	8,2
16 Eylül 1978	Tabas / İran	25 000	7,7
7 Aralık 1988	Spitak / Ermenistan	55 000	6,9
21 Haziran 1990	Kuzey Batı İran	36 893	7,7
30 Eylül 1993	Marashta / Hindistan	30 000	6,4
17 Ağustos 1999	**Marmara / Türkiye**	**20 000**	**7,4**

As seen in the Table 1, when we look at the largest earthquakes of the last century prepared in 2000, many destructive earthquakes have occurred, and two of them that have been recorded are located in Turkey. Turkey is a country that encounters various natural disasters, such as earthquakes, floods, landslides, avalanches and so on due to its geological structure and climatic characteristics. Earthquakes and floods, which are among the most destructive and frequently experienced disasters in Turkey, cause human losses and great material damage. The number of people who lost their lives due to natural disasters in the last 70 years in Turkey is 100,000; the number of damaged houses is 600.000 and the number of houses affected by the earthquake in various ways is around 500.000 (İTÜ, 2023). Considering the building damage statistics caused by natural disasters that have occurred in our country in recent years, it is seen that 62% of the damage is caused by earthquakes (TBMM, 2010). 65% of deaths from natural disasters in Turkey are due to earthquakes, 15% to landslides, 12% to floods, 7% to rockfalls and 1% to avalanches. As it can be understood from these rates, the most important type of disaster in Turkey is earthquake. 3000-4000 ground shaking are recorded each year.

Table 2. Earthquakes in Turkey that resulted in more than 1000 deaths since 1900 (Source: Akdur, 2000, p. 5)

TARİH	YER	BÜYÜKLÜK	ÖLÜM
24.04.1903	Malazgirt	6,7	2626
06.05.1930	Hakkari sınırı	7,2	2514
26.12.1939	Erzincan	7,9	32968
20.12.1942	Tokat Niksar-Erbaa	7,0	3032

Table 2 Continued. Earthquakes in Turkey that resulted in more than 1000 deaths since 1900 (Source: Akdur, 2000, p. 5)

26.11.1943	Tosya Ladik Samsun	7,2	2824
01.02.1944	Bolu Gerede	7,2	3959
19.08.1966	Varto	6,9	2396
28.03.1970	Gediz	7,3	1089
06.09.1975	Lice	6,9	2385
24.11.1976	Çaldıran-Muradiye	7,5	3840
30.10.1983	Erzurum-Kars	7,1	1336
17.08.1999	Marmara	7,4	20 000

As seen some of it in Table 2, more than fifty devastating earthquakes since 1900 have affected 7.5 million people and left 2.5 million people homeless. Since 1925, there has been a heavy / destructive earthquake every 10.8 months on average (Akdur, 2000).

1.1. Problem Definition

The significance of this study is that it shows that the temporary housing used today has been inadequate from the past to the present and that despite this important inadequacy, progress has not been made. The great earthquakes that took place in Turkey in the 20th century; 1939 Erzincan, 1941 Van-Erciş, 1946 Varto, 1967 Adapazarı, 1971 Bingöl, 1976 Denizli, 1992 Erzincan, 1995 Dinar, 1998 Ceyhan and 1999 Marmara and Düzce, 2003 Bingöl, 2011 Van, 2020 Elazığ and 2021 İzmir earthquakes. On February 6, 2023, the 7.7-magnitude Kahramanmaraş, Pazarcık earthquake and the 7.6-magnitude Kahramanmaraş, Elbistan earthquake, which affected 10 cities of our country, occurred when the Southeastern Anatolian Fault Line broke, the central Kahramanmaraş province of Pazarcık district, were recorded as the second and third largest earthquakes experienced in Turkey. According to the findings of the Ministry of Environment, Urbanization and Climate Change dated February 14, 2023, with over 2,500 aftershocks, more than 190,000 residences and workplaces have been destroyed and severely damaged, and over 30,000 lives have been lost (İTÜ, 2023). After 6 February 2023 Nurdağı-Pazarcık (Mw 7.7~7.9) and Ekinözü-Elbistan (Mw 7.6) earthquakes, the search for an effective and fast permanent housing solution has begun as a result of the massive damage and

structural collapses. According to İTÜ data (2023), there is a need for more than 350 thousand houses that need to be built urgently. A significant amount of time is required for the planning of housing needs over 350 thousand, providing economic efficiency and the construction process. In this process, the transition to temporary housing should be ensured as quickly as possible. This study is important in terms of providing a solution to the rapid housing needs of those who will continue to live in the region in the short, medium and long term. The harsh weather conditions at the time of the earthquake revealed that the tents, which were emergency shelters, were insufficient. However, in addition to those who will continue to live in the region, the problem of sheltering has also arisen for those who are waiting for their relatives at the beginning of the wreckage, and for communities coming from other cities or countries for help. Finally, the need for temporary housing has emerged for the citizens whose houses were not demolished but were heavily damaged or who could not meet their need for shelter in their houses during this process due to aftershocks. The need for a temporary housing solution that will create a bridge between the emergency housing and the permanent housing is necessary not only for the disaster victims but also for all the possible situations mentioned above. Tents to meet the initial emergency shelter needs reached the region late and were insufficient in an earthquake of this magnitude. Following the 1999 earthquake in Turkey, containers were employed as permanent housing, however they failed due to their simplistic and primitive applications (Eren, 2012). This practice, which has been unsuccessful since the 1999 earthquake, is still used in the 2023 earthquake in Turkey. Therefore, this research will be beneficial for designers and the government to encourage the creation of new designs and to identify the shortcomings of the existing design and respond to needs.

I believe that existing temporary housing solutions are designed without taking into account the psychological processes and needs of disaster victims. At the same time, I think it is possible to design a rapid installation temporary housing that will meet the requirements of long-term use. My goal with this assessment list is to remove the temporary shelter and emergency shelter process and provide a direct transition to temprorary housing unit. Especially when the pandemic process is considered, the importance of providing an individual, fast-established space that can change according to physical and psychological needs can be seen more clearly. When look

at the Izmir earthquake (2021), many people were left homeless. The rent was provided with the help of a campaign and the disaster victims were placed in housing. Ervan (1996) states that as in many countries, it is impossible to move directly from an emergency shelter to permanent housing in Turkey and eliminate the problem of temporary housing. Temporary dwellings must meet the need for environmental and social lives, as well as the housing of the victims until the permanent dwellings are completed. The problem of providing temporary housing should be taken in a way that can be resolved in the long term, not with the solution of instant aid campaigns. Temporary living spaces should meet longer-term basic needs, portable, self-setup system and rebuildable construction method.

Therefore, the main research question of this research is "What are the design criteria in order to create sustainable, portable temporary housing units to meet the users' need after diasater?". For this purpose, the lack of housing and inadequate characteristics of container cities in earthquake zones after the disaster can be examined. In addition, sustainable, mobile, adaptable modular systems and portable construction methods can be studied. In addition, this research aims to answer sub-questions that will examine the stages and processes of temporary housing.

1.2. Research Questions of the Study

As stated before, the main reason why we conduct this study is to examine the problems experienced by the disaster victims regarding shelter after the disaster and to research a guide for a design proposal that provides psychological comfort by creating an adaptive, portable and sense of belonging for future disasters. As mentioned above, my main research question is "What are the design criteria in order to create temporary housing units to meet the users' need after disaster?". With this research question, we need to questions these following questions as: What are the stages of temporary housing?, What are the fundamentals temporary units?, What are the types of plan layout, materials, technical systems and furniture used in temporary units?, How should temporary housing users feel the sense of belonging?

1.3. Methodology of the Study

Methodology of this research is based on mixed method approach. This study focuses on the temporary housing problem after the disaster and tries to understand the physical and psychological needs of the earthquake victims sheltering in temporary housing in İzmir (2023). In this process, the role of the researcher in this process is to receive feedback from experiences and also to present a requirements checklist by searching for guidelines on this subject in the literature. Therefore, the mixed method strategy provides a suitable framework for this study. In this approach associate with field methods (such as observations and interviews) qualitative data were combined with (traditional surveys) quantitative data.

This study will both investigate the psychological and physical aspects of current temproray housing problems in the post-disaster period and develop a assesment list that will guide solving these problems. Within the scope of this research, firstly, data are collected as a result of questionnaire with earthquake victims sheltering in temporary housing in Izmir (2023). In line with this questionnaire, it will be ensured that the lack of post-disaster housing in earthquake regions and the inadequate characteristics of container cities will be examined.

1.4. Structure of the Study

This thesis is composed of six chapters.

Chapter 1 serves as the introductory chapter, focusing on the objectives, research inquiry, hypotheses, and methodology of the thesis. It presents the purpose, significance and methodology of the study, as well as the research question and hypotheses.

Chapter 2 is the section covering the post-disaster process and its stages.This chapter covers the investigation of the post-disaster process in Turkey by reducing the research to a more specific one. In this section, an idea is given about the literature related to the Düzce, Erciş, Kocaeli and Kahramanmaraş earthquakes and the post-disaster process.

Chapter 3 covers reviews of temporary housing solutions and designs after disasters in the literature. However, a comprehensive temporary housing design guide is selected and used to guide the evaluation in the next chapter. Also, in this chapter, temporary housing design materials and construction processes are examined.

Chapter 4, survey includes the region where the survey was conducted, the number of people, age ranges and the permit processes. It is the section where the Bayraklı container city and container units are introduced with the plan.

In Chapter 5, the results of the Bayraklı container city case study are evaluated. With the temporary housing satisfaction survey conducted for disaster victims, temporary housing is evaluated under the headings of commitment to space, spatial requirements, social requirements.

Chapter 6, draws conclusions from the analysis. It evaluates the results according to the 5 main principles of temporary housing design taken from the literature. The research has been summarized and future research directions have been proposed.

CHAPTER 2: POST-DISASTER PERIODS

2.1. Post-Disaster Stages

Temporary housing and post-disaster processes have been defined in many different ways by different authors. Johnson (2007) claimed "Temporary housing can de defined as (a) an object, i.e. the physical structure people inhabit after a disaster; (b) a part of a process of re housing after a disaster, just as Turner (1972) defines "housing not as a product but as a process"; (c) is a place that serves the function to shelter people during the period from the disaster until they have a permanent place to live" (p.38). Quarantelli (1995) defines "shelter" as the activity of staying in a place where regular routines are discontinued immediately after a disaster, while it refers to "home" as a return to routine daily activities. Johnson (2007) defined the temporary accommodation period as a process in which disaster victims begin to regain the sense of normalcy in their lives.

According to UNDRO (1982), there are eight basic types of post-disaster shelter provision: "tents, imported designs and units, standard designs incorporating indigenous materials, temporary housing, the distribution of materials, core housing, hazard-resistant housing and accelerating the reconstruction of permanent housing" (p. 685). According to Felix (2013), there are two main forms of temporary accommodation solution. First one is "Ready-made units, which are totally manufactured in factory and then transported to their future place, which may require few simple assembly work in site". Second one is "Kit supplies, which consist on the provision of all the elements that constitute the building to be totally assembled in the site." (p.68).

Torus and Şener (2015) claimed;

> *"Various materials and application procedures can be used while designing post-disaster shelters. In terms of co-production it can be collected under three categories: generally, compact fundamental modules can be obtained by using basic materials and units with several changes or it consists of*

previously manufactured materials and/or modules (or with pre-fabric elements) or it can be designed from materials manufactured on-site." (p. 272).

Mojahedi et al. (2021) defined the disaster as; "catastrophic situation that suddenly occurs naturally or by humans, imposes hardships on the human community, and requires emergency and extraordinary measures to be overcome" (p. 437). An earthquake is also a disaster that has occurred in our country in large numbers by this time and has had serious consequences. After the disaster,earthquake victims are faced with health, food and shelter problems at the first stage and therefore finding immediate solutions to these problems is of great importance. Caia (2010) stated that experiencing home loss is one of the most important stress factors for victims. As cited in Desagis (2006), defined home as "a tangible form and collection of personal images that help us realize, understand who we are, contain protection, privacy. It is a representation of personal memories. It is the way a person expresses his personality towards the outside world and the place in which somebody embodies the world order. The home is a complex mediator between privacy and community life. It is where we keep our secrets, express ourselves privately, we rest and feel safe" (p. 23). Felix et al. (2013) stated that a home is a living place that provides circumstances for family life, comfort, security, and privacy. After a disaster, housing requirements should be addressed quickly since losing a home is more than a physical deprivation; it also means losing one's dignity, identity, and privacy (Barakat, 2003). Post-disaster reconstruction is a complicated process, and temporary housing appears to be one of the most important responsibilities, as it allows people to gradually return to regular life. It is the first place for individuals to overcome the trauma of disaster, cope with the psychological effects and establish a home relationship again. Eren (2012) told that the purpose of temporary housing should be to provide a place where victims can easily overcome the trauma they experienced in the post-earthquake period and studies should be conducted to this end.

2.2. The Impact of Creating Temporary Living Space on the Economy after a Disaster

Felix et al. (2013) points out that temporary housing options in the aftermath of a disaster appear to be unsustainable in two ways: In terms of price and in terms of environmental concerns. In addition to the fact that temporary housing is far from the local context and is standard, it requires large investments. This causes many problems such as the cost spent on these structures, which are used for a short time, delays the construction of permanent residences. The relationship between the large investment requirement and its short life span is seen as a waste of funds. According to UNDRO (1982), a temporary house unit can cost more than a permanent one and some authors refer that it may be three times more expensive. Arslan and Coşgun (2021), states that if temporary structures must be constructed, their life cycle must be extended, which is frequently referred to as the end of the life cycle, so that the yearly cost of the temporary dwellings and sites in their life cycle may be reduced. Therefore, long-term temporary housing might be a smart investment for organizations with limited resources for post-earthquake restoration.

Johnson (2007), claimed The MPWS set the price at US$3300 for a 30m2 prefabricated duplex unit, totalling around US$5000 per unit inclusive of infrastructure costs. In total 40,621 temporary housing units were built throughout the affected region in 136 settlements between december 1999 and june 2000 with a 97.5% rate of occupancy. Out of the total, 31,933 were built by the MPWS in 53 settlements; NGOs and foreign governments built 11,521 units in 84 settlements through funds or in kind donations (p.42). Arslan and Coşgun (2021) points out that the earthquakes in the Düzce and Marmara regions in 1999 had a significant impact on the Turkish government budget. Johnson (2007) states that during the 1999 Marmara earthquake, heavy investments were made in temporary housing in Turkey, and many people fear that these investments will negatively affect the reconstruction of permanent residences. The government had to obtain loans from the World Bank and other international credit institutions to fund its permanent housing program. In 1999 Gölcük earthquakes, World Bank claimed "In total, the government expenditure for the temporary housing programme was US$122 million not including donations from the NGOs" (World Bank, 1999, p. 42). Şengül and Turan

(2012) stated that the number of containers sent to Van and Erciş is 28,015. Since a truck can carry only two containers, it has been made 14.000 times and when other costs are added together with the transportation cost, it can be said that the cost of a container is between 15-20 thousand TL.

Şahin and Kılıç (2016) told that Turkey is located in the Alp-Himalayan seismic zone and 42% of its surface area is in the first degree seismic zone (Şahin and Kılıç, 2016). As mentioned in the intro chapter, according to AFAD data (2020), 33,824 ground shaking was recorded in Turkey in 2020. Compared to the data a year ago, a 44 percent increase was observed in the number of earthquakes. The number of earthquakes with a magnitude of 4 and above in Turkey is also 322. In a country where so many earthquakes occur, post-disaster management is as important as first aid activities. Ünal and Akın, (2017) states that in Turkey, which ranks third in the world in terms of human loss in earthquakes and eighth in terms of the number of people affected by earthquakes, at least one earthquake with a magnitude of 5.0 to 6.0 is experienced every year on average. When the data of the last 58 years are examined; it is understood that more than 58,000 people lost their lives due to earthquakes, more than 122,000 people were injured and more than 400,000 buildings were destroyed or severely damaged (Republic of Turkey Prime Ministry Disaster and Emergency Management Presidency, 2014). Due to the construction with low resistance to disasters, uninhabitable residences cause urgent and rapid shelter needs.

Eren (2012) told that In Turkey, various studies which covering emergency shelter (tent), temporary shelter and permanent housing in earthquake zones are continuing. However, emergency and temporary shelters are not reusable, and this causes great losses for the country's economy. Eren (2012) claimed "following the 1999 earthquake in Turkey, containers were used as permanent houses, which failed as they were very simple and primitive applications" (p. 275). Ervan (1996) states that as in many countries, it is impossible to move directly from an emergency shelter to permanent housing in Turkey and eliminate the problem of temporary housing. Temporary dwellings must meet the need for environmental and social lives, as well as the housing of the victims until the permanent dwellings are completed.

2.3. Temporary Houses After Occupancy

2.3.1 Example of Düzce, Turkey (1999)

The Düzce earthquake, was a devastating natural disaster that struck the northwestern region of Turkey on November 12, 1999. This seismic event left a significant impact on the city of Düzce and its surrounding areas, causing widespread destruction and loss of life. The earthquake originated along the North Anatolian Fault, which runs through Turkey, and had a magnitude of 7.6 on the Richter scale. Its epicenter was located near the town of Gölcük in the neighboring province of Kocaeli. The tremors were felt across a large geographical area, affecting not only Düzce but also nearby cities such as Istanbul and Ankara. The Düzce earthquake resulted in a significant loss of life, with thousands of people losing their lives and many more sustaining injuries. The disaster also caused widespread displacement, leaving numerous individuals and families without homes and in need of immediate shelter and assistance (Ghasemi et al., 2002).

Arslan and Coşgun conducted a case study on temporary housing sites in Düzce in 2008. The researchers determined the research areas as Fevzi Çakmak, Gümüşpınar, Sıralık and Fidanlık temporary earthquake dwellings located in the center of Düzce. Arslan and Coşgun (2008) states that the houses built by the Disaster Work General Directorship were of the double-house variety. The panel system was used to construct the structures. Chip panel, a combination of cement and wood shaving, formed the inner and outer walls. The home was 5.50*10.60 m (roughly 30 m2) in size (Fig.1). There was no transportation problem for the site. The houses were used for 3 years (Fevzi Cakmak temporary housing site (East)).

Figure 1. Fidanlık cakmak temporary housing plan (Source: Arslan and Coşgun, 2008, p. 706)

Arslan and Coşgun (2008) states that the houses are built as 4 blocks in 1 unit. The dwellings were built with a timber structure and sat on timber posts. Plywood panels were used to cover the wood structures. The dwellings were around 16 m2 and measured 6.6m*13.4m (Fig. 2). But as the houses were timber and began to decay, the site had to be evacuated and lifted up.

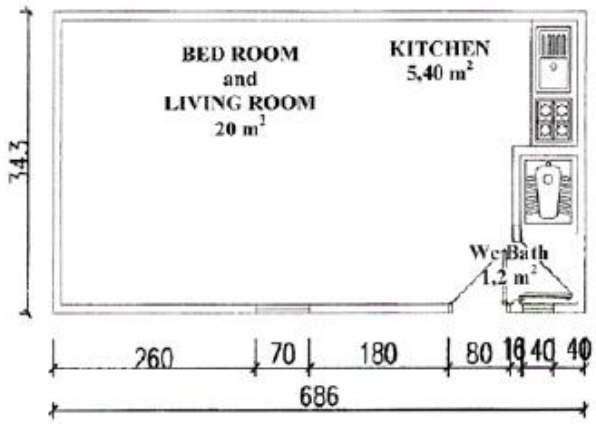


Figure 2. Fidanlık temporary housing plan (Source: Arslan and Coşgun, 2008, p. 707)

Arslan and Coşgun (2008) states that the Gümüşpınar temporary houses (Fig. 3) were built in a double-house style with a panel construction technique. Interior walls were composed of cement-wood shavings combination chipboards, while outside walls were made of zinc-aluminum panels. The site's housing sizes were 5.50*10.60m

(roughly 30 m2) (Fig.3).

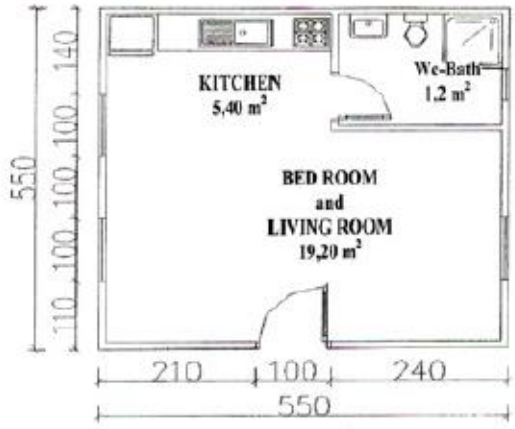


Figure 3. Gümüşpınar temporary housing plan (Source: Arslan and Coşgun, 2008, p. 707)

Arslan and Coşgun (2008) states that the Sıralık temporary houses were built using a prefabricate building technology and are of the double house type. Zinc panels were used for the exterior walls, while fibreboard panels were used for the inside walls. The house is 5.50*10.60 m and has a total area of roughly 30 m2.

Arslan and Coşgun (2008) reported that Düzce temporary housing units began and ended building procedures late, according to residents. The majority of residents claimed that the site's social facilities and roadways were insufficient. The child's play area and laundry were the focus of the high expectations according to case study. Authors states that temporary housing is insufficient as a living space. As a result, half of the residents built additions to their homes. However, they were all random and spontaneous adding.

The irregular addition to these temporary residences is an indication that the space is insufficient for users. When looking at the layout of Gümüşpınar and Fidanlık temporary housing plan, common living area and bedrooms are together. There is a plan that does not provide people with a privacy space. Since it is a plan that does not separate living spaces, people may have created these compartments by adding them themselves. Another reason why they need to make additions may be that the size of the temporary housing provided is not relative to the number of people who will live

in it. That is exactly why it is so important that a temporary housing is adaptable.

2.3.2. Example of Erciş, Turkey (2011)

The Erciş earthquake, also known as the Van earthquake, was a devastating natural disaster that struck the eastern region of Turkey on October 23, 2011. This seismic event left a profound impact on the city of Erciş and its surrounding areas, causing widespread destruction and loss of life. The earthquake originated in the province of Van, near the city of Erciş, and had a magnitude of 7.2 on the Richter scale. Its epicenter was located in a mountainous region, which intensified the impact of the tremors. In this great earthquake, 644 people lost their lives and more than 160,000 people were left homeless. In order to solve the shelter problem after the earthquake, a three-stage process was determined: Temporary shelter with tents, post-disaster temporary settlement areas consisting of containers and permanent settlement (Şengül, 2015).

Especially after the earthquake, temporary accommodation should be provided to a larger population than the population whose housing became unusable as a result of the housing becoming unusable as well as the expectation of aftershocks and the people staying away from the built areas due to the psychological trauma they experienced. Şengül and Turan (2012) points out that after the disaster, the use of rental housing for temporary settlement is encouraged by providing rental assistance by the public in Turkey, but due to the lack of housing stock, an effective solution cannot be achieved in this way. For example, after the 1995 Dinar Earthquake, some of the citizens, through rental support, solved the temporary resettlement problem themselves in undamaged neighborhoods with solid ground in Dinar. However, some of the population had to spend the temporary settlement phase in tents despite the winter conditions. Şengül and Turan (2012) points out that although temporary houses are built according to a specific plan, the construction process can continue through the families making additions over time, as they do not suit the needs of families with different sizes and lifestyles due to the long settlement period and the standard of the houses. Research carried out on temporary residences established after the 1999 Marmara Earthquake confirms this finding. Şengül and Turan (2012) stated that temporary sheltering option after a disaster imposes itself due to the

inadequacy of public buildings and rental housing stock that can be used for temporary shelter / settlement purposes, the high rate of population that cannot solve the housing problem with their own opportunity due to widespread poverty, and the different climatic characteristics of the country's geography.

Insufficient rental housing stock and cold weather conditions in this region have caused an extra challenging aspect of this earthquake. The reasons for the inadequacy of temporary housing in the Düzce earthquake have also been experienced in temporary housing in Erciş. Therfore, adaptable, modular systems temporary housing should be included in temporary housing in order to separate living spaces, enlarge them according to need and the number of people.

2.3.3. Example of Kocaeli, Turkey (1999)

The earthquake that occurred in Gölcük / Kocaeli in the Marmara Region of Turkey on August 17, 1999 was 7.4 on the Richter scale (Benko Ltd. Earthquake Information Centre, 2009; Coburn and Spence, 2002). While 18,373 dead and 48,901 people were injured in the earthquake, a total of 285,211 houses were damaged, of which 96,796 were heavily damaged. As a result, nearly 800,000 people were left homeless (Ban, 2001; Erdik, Biro and Durukal 2001; Hürriyet, 2000). Many people whose houses were destroyed in this earthquake have been faced with housing problems. That is why it is so critical to meet the need for temporary housing and living conditions.

After this earthquake, following a comprehensive research, deficiencies in meeting the physical and psychological needs of families in the design and use of temporary housing were identified (Yüksel and Hasırcı, 2012). Ten years after the Kocaeli earthquake, which is regarded significant in the development of temporary housing studies, furniture capacity, material choices in temporary housing remain insufficient, and seasonal fluctuations are ignored. These flaws have an influence on trauma-related psychological needs including comfort and privacy (Aytöre, 2005; Halaç and Yamaçlı, 2005; Limoncu and Bayülgen, 2005). The temporary residences used in the Kocaeli earthquake were evacuated ten years later in 2009 (Selvibayır, 2009; Yakut, 2004).

After the Kocaeli earthquake, Baradan (2002) surveyed victims who were residing in temporary housing about their general housing concerns, as well as their satisfaction with the homes' size, heating, security, and neighborhood quality. The findings indicate that security is significantly neglected (68%). Due to the lack of privacy and demand for different rooms, more than 60% of respondents reported adding to their homes after they moved. 96% of respondents said there were issues with their homes connected to weather and climate, and 68% said they needed to make significant repairs. The temporary housing constructed in Kocaeli following the earthquake in 1999 received just a 24% overall approval rating, with 70% stating that it was only better than a tent.

Hasırcı and Yüksel (2012) conducted a study to reach a more in-depth understanding of the issue of "privacy" in temporary housing. As a result of this study, the Hasırcı and Yüksel (2012, p. 231) states:

> *"The most important problems were the lack of privacy; lack of space; all family members sleep in the same room; lack of opportunity to take into account the feelings of others, including fear, sadness and grief; presence of mud, weather conditions; presence of public toilets and odors from these toilets; hygiene issues; toilets are constantly blocked; lack of water, including laundry or washing dishes; heating, cooling, electrical problems; humidity, infiltration of rainwater into the residential area; the presence of insects; lack of windows; lack of sunlight in homes; transportation to earthquake settlement; difficulty in obtaining food; insufficient earthquake housing; and rust in the building components".*

One of the topics that came up repeatedly in the interviews was "hygiene". Interview responses point to the requirement for separate, sanitary bathing places. According to the interviews, it is seen that the issue of "warming" is another important problem. Therefore, there is a need for good insulation and proper heating in temporary residences.

2.3.4. Example of Kahramanmaraş, Turkey (2023)

On February 6, 2023, 7.7 and 7.6 earthquakes occurred in the Pazarcık and Elbistan districts of Kahramanmaraş, which were recorded as one of the largest earthquakes of the last century. The earthquakes affecting 10 provinces caused many casualties and destruction of buildings. As a result of the earthquakes, at least 48,448 people in Turkey, according to official figures, and at least 8,476 people in Syria lost their lives and more than 129 thousand people were injured in total. After the earthquakes, nearly 17,000 aftershocks with magnitudes of up to 6.7 Mw occurred (İTÜ, 2023).

Figure 4. Satellite images of Kahramanmaraş center before and after the earthquake (Source: İTÜ, 2023, p. 54)

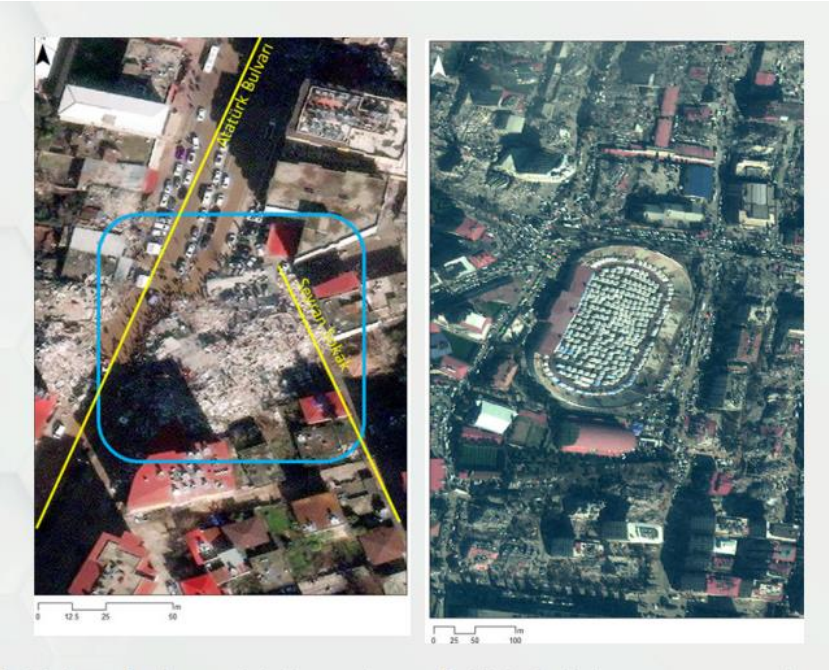


Figure 5.a. Example of road closed from Gaziantep-Islahiye satellite image (left)
Figure 5.b. Satellite image of tent areas set up in the center of Kahramanmaraş (right) (Source: İTÜ, 2023, p. 52)

Kahramanmaraş Metropolitan Municipality stated that the search and rescue activities were completed on the 45th day of the earthquake, the damage assessment works came to an end, they made significant progress in debris removal, they established most of the temporary shelters and they started the construction of permanent residences. Container and prefabricated cities have been established to meet the housing needs of earthquake victims. The preparation of temporary housing centers and the construction of permanent housing are carried out simultaneously. However, the number of tents distributed in the region reached 525 thousand and the number of containers put into service reached 32 thousand. Kahramanmaraş municipality stated that 2.5 Million citizens are served in the temporary housing centers operating throughout the region (Kahramanmaraş Metropolitan Municipality, 2023). In addition, in the first stage, transfers were made from the region to the surrounding cities. Many of the residents of the region were sent to different cities and met their housing needs in temporary housing through relatives, the immediate environment and assistance from the environment.

2.4. Chapter Discussion

The researches in this section show that the temporary housing process proceeds unsystematically in many ways and does not develop in parallel with the passing time. As Quarantelli (1995) mentioned above, the 3th phase of post-disaster housing reconstruction is a type of housing that can be accommodated for a long time, from 6 months to 3 years. When we look at the information and research in this section, we see that many factors such as climate characteristics, environmental conditions, daily-social life needs, cost, privacy, social life and infrastructure should be considered together when planning a temporary residence that will meet the need for shelter for such a long time, but the current solutions do not meet this. UNDRO in the book Shelter after Disaster (1982) explains:

> *"Universal standard shelter is not feasible because it ignores: [i] The high price and poor cost effectiveness of the product in the disaster affected country, [ii] the need to involve disaster survivors in satisfying their own needs, [iii] climatic variations, [iv] variations in cultural values and house forms [v] variations in family size, [vi] the need of families to earn their livelihood in their houses, [vii] local capacity to improve shelter, [viii] the problems of obtaining suitable land at low cost on which to build such shelters, [ix] the logistical problem of transporting and distributing, [x] problems of appropriate technology" (p. 53).*

The use of materials that are not suitable for the climate can be considered as the first problem. In order to solve this problem, materials suitable for certain climate characteristics in Turkey can be selected and the temporary housing can be designed in a way suitable for easy replacement on the housing according to the location and climate characteristics. Felix et al. (2013) points out that people are safe at shelters, but they are unable to resume their normal lives, thus making it impractical to stay longer. Similarly, temporary shelters may quickly breakdown due to external conditions, and the necessity to move people out of them so that more lasting and resistant solutions may be found highlights the need of providing temporary housing (Steinberg, 2007).

As a second issue, the first two stages of emergency shelter should be eliminated and methods should be developed in order to provide a quick transition directly to temporary residences. Many people lose their lives or are adversely affected by the disease due to earthquakes that coincide with winter days that are not suitable for tent life. Şengül and Turan (2012) stated that the most dramatic aspects of the earthquake were that the earthquakes coincided with the early winter season in the region and the struggle to survive in the tent during the freezing cold of winter. The situation of children, chronic patients and the elderly, who are not resistant to the difficulties of tent life, and those who died in tent fires have been the subject of articles examining the earthquake from various aspects.

Another issue is that the temporary housing solution should not be thought of as consisting of 4 walls that only meet the physical shelter needs of people. Temporary housing is the first place where people come together with the concept of home after the disaster and psychological processes are experienced. Therefore, the housing solution should be developed considering the needs, living conditions and cultural values of the people who will use it. It should be placed in areas that can easily integrate them into social life.

When we examine the example of temporary housing in Turkey, we see that it does not meet this expectation in the literature. When we look at the Fidanlık temporary housing project, we see that these houses are not long-lasting due to the unsuitability of the material used, that is, the wooden structure starts to rot. This brings up the problem of sheltering for the victims who will not be able to move to a permanent residence. At the same time, it is an irreversible investment as the decaying wooden structure cannot be used again. One of the most criticized aspects of temporary housing is that its cost is too high, while it is not appropriate to use a material that cannot be adapted for reuse. The fact that half of the disaster victims make additions to their houses shows that they do not meet the physical and psychological needs in a long time and are insufficient. At this point, we see problems arising from the inability of temporary housing to be adapted to changing needs and the number of people. The houses are not divided according to the number of people, and a family of 2 people and a family of 5 people use the same square meter area. If there are

systems that can be adapted according to physical and psychological needs, people will not need to make additions. Albadra et al. (2018) points out that after the 1999 earthquake in Turkey, a sociological research conducted interviews with 200 people in temporary housing communities for displaced people and reported on their satisfaction levels. According to the survey, half of the participants thought the unit size was insufficient, therefore they built their own expansion. Gümüş (2000) states that in Turkey, situations where the rehabilitation phase extended up to 30 years were experienced as a result of the delay of the reconstruction phase. In such long-term uses, temporary dwellings are loaded with non-temporary functions in terms of usage style and duration. For this reason, victims are faced with many negativities (design, implementation, social-cultural, etc.).

Apart from the Fidanlık Çakmak project, we see that the space is not even separated as a bedroom and living space. The residences were designed without considering privacy. While there are many spatial layout alternatives in the Fidanlık project, placing the toilet directly next to the entrance door is another item that is wrong as a spatial solution. Limoncu and Bayülgen (2005) states that ıt is possible to express the first source of the post-disaster sheltering problem is failure to address the problem with all interacting components as a system and not to create decision steps that each region can follow by putting its own data into a system that was already in place before the disaster. Second problem is failure to design a sustainable housing system (using temporary housing as a base for permanent housing) for efficient use of production resources and an immediate solution.

Ünal and Akın (2017) evaluated the Van earthquake container houses in terms of users with their surveys and reached the following conclusions; the most dissatisfaction with the containers are the size of the spaces. The rate of people who find the room, kitchen and bathroom inadequate is 70% as the average of all three areas. 70% of them stated that they wanted the container to grow, the bathroom and toilet to be separate, the kitchen cabinet needs to be met and 1 more room, while 30% did not think of any change. The 84% of users emphasized that they always or often feel themselves in a narrow, squeezed space when they close the room door. The 89% of the respondents spend 18-24 hours in the container. Until the survey date, life continued in these dwellings for approximately 10-12 months after the

earthquake. Considering that they have to spend a long time in temporary disaster housing, these data paint an extremely dire picture in terms of the quality of life of the users. Ünal and Akın (2017) points out that the biggest dissatisfaction of the users is related to the lack of space, the need for furniture and the heating problem of the spaces in the containers. Beyond the concept of temporary, users who have to live here for years do not feel themselves at home. The dissatisfaction rate of the interior ceiling height, natural and artificial lighting, window sizes, door and window joinery, flooring material, wall and ceiling colors varies between 2-3% and 20%. It can be said that the importance of factors such as shape, texture and color has remained in the background due to the prominence of the items piled in the space and the insufficient space and volume required by daily life functions. Ünal and Akın (2017) presents the following as a result of the research; although the residence is undoubtedly an architectural structure, it carries different meanings with the concept of "house". Unlike the concepts of housing or space, "home" carries values belonging to the user. Ünal and Akın (2017) states that as a result, in its current form, container houses cannot go beyond being a "room" with doors, walls, windows, floors and ceilings. With perception management, it is possible for the victims to be rescued from the feeling of living in a narrow and boring area and to see the houses as "home" during their time in the house. As seen in the last earthquake in Kahramanmaras which affected 11 cities in Turkey, there is significant problem in delivering emergency housing to the region and meeting the need for large-scale temporary housing. After the devastating earthquake, the temporary housing application process has encountered numerous challenges, exacerbating the difficulties faced by those affected. The primary issue lies in the overwhelming demand for limited resources, resulting in a severe shortage of available housing units. This scarcity has led to long waiting lists and delayed allocations, leaving many displaced individuals without a safe and stable shelter. The secondry problem is the lack of streamlined coordination between government agencies and relief organizations has further complicated the process, hindering the prompt delivery of assistance to those in urgent need. These collective problems highlight the urgent need for improved systems, increased resources and enhanced collaboration to ensure swift and equitable provision of temporary housing for earthquake survivors.

CHAPTER 3: GUIDELINES FOR TEMPORARY SHELTERS: PROVISION, DESIGN AND CONSTRUCTION

Temporary housing is a process that needs to be designed in advance from beginning to end, starting with the selection of a suitable place for temporary shelters and ending with how to ensure sustainability after use. Temporary shelters built for 1 or 2 years have to provide the minimum living standards of the users, although they do not require to fully meet the permanent housing standards as they are not permanent. Silvia (2016) claimed the objective of traditional shelter can be summarised as being; to provide adequate protection against the environment,to contribute to personal safety and security, dignity, health and wellbeing, to enable normal household duties and livelihood activities, to bridge the gap until durable housing is available (p. 3).

Baradan (2008) stated that "technology-based approach" and "community-based approach" are two main approaches in the post-disaster reconstruction process. The approach that depends on the import of habitation from improved donor nation, which is generally supported by the provider policy, is technology-based approaches.The community-based approach is based on promoting public participation in restructuring that helps build confidence in affected communities and seeks to leverage local resources. Practices made with a community-based approach are sensitive to the requires of the society and the social side of the process.

There are different guidelines in the literature as general targets for temporary housing planning. Silvia (2016) claimed "The Sphere standards is really the only reference which currently provides specific guidance and standards for post-disaster shelter" (p. 27). Sphere standards are a guide that sets out criteria including strategic planning, physical planning, covered living space, design and construction.

Abulnour (2013) points out that socio-cultural, economic, ecological and temporal recommendations for the design, construction and provision of temporary quality housing are as follows; "Rapid availability,dependence on local suppliers and/or local resources, compatibility with local living standards in terms of comfort, services and location, design for the length of time the dwelling is needed or an

efficient long-term plan for the units, easy and non polluting removal of temporary dwellings" (p. 22). Johnson (2007) states that topics are grouped under nine titles as general targets for temporary housing planning; "Timing: having temporary housing available quickly, the overall reconstruction strategy: consideration of all stages of reconstruction, unit design: adequate levels of comfort for the local conditions, location: provide convenient access to jobs and social networks, services: provide access to necessary services and amenities, social networks: enable occupants to maintain pre-disaster social ties or develop new ones, ınstitutional support: help families to secure permanent housing, long-term use or outcomes for units: consider what will happen to the temporary houses" (p. 50).

Félix et al. (n.d.) proposed 3 main principles for the principles of improving the temporary housing solution; pre-planning (preparing an area with infrastructures beforehand for temporary settlements), using local resources and providing more than just temporary housing units (making a wide and accurate characterization of the local context). In addition, they also presented 12 proposals for the design of temporary accommodation buildings solution. These 12 suggestions are as follows; design for people, locally focused design, simple construction systems, easy to transport, robustness, protection, adequate dimensions, comfort, flexibility, open space, long-term options, pollution-free solutions. Among these principles, the use of locally focused design and simple building systems are among the principles that should be underlined. In the first days of the earthquake, due to the difficulty of finding specialist workers in the earthquake area, the selection of building systems that are widely produced in the country and that will not have difficulty in reaching the earthquake area and that everyone can easily apply will shorten the rehabilitation period. In the last Kahramanmaraş earthquake, limited transportation due to damages and fault ruptures has been a factor supporting the importance of these principles. On the other hand, it is argued that the participation of the victims in the temporary housing construction process has a positive psychological effect. Abulnour (2013) points out that participation of the disaster-affected community in this process during the provision, design and construction of temporary homes can strengthen a sense of responsibility for the maintenance of housing, accelerate the construction period and help create a sense of interaction. Felix et al. (2013) points out that using the community's potential for home rebuilding aids in the recovery of a strong

community spirit, sense of pride and well-being. Therefore, the use of simple building systems has an effect beyond speeding up the construction process.

Torus and Şener (2015) also evaluated the principles mentioned above under different headings. Habitability, feasibility, sustainability, flexibility, rapid and mass implementation, lightness and usage of various / pre-fabricated materials is a set of criteria selected by Torus and Şener (2015) based on the literature to be evaluated in accordance with post-disaster shelter design.

Felix et al. also proposes five main principles that cover almost all of the above content;

1) Context understanding: To develop temporary housing solutions, it is essential to take into account various aspects of the affected community, including their culture, traditions, social structure, economic and political systems, religious beliefs, climate conditions and more. All these factors should be carefully considered and incorporated into the planning process to ensure that the temporary housing addresses the unique needs and circumstances of the community in question.

2) Community participation: Engaging users in the assessment of their needs ensures that the solutions developed align with their specific requirements, expectations and local living standards. By actively involving the affected individuals in this process, their input and perspectives can be integrated, leading to more effective and tailored temporary housing solutions. However, beyond their participation in the needs assessment, involving users in the actual construction works can bring additional benefits to community recovery. This hands-on involvement empowers the community members, fosters a sense of ownership, promotes skills development and self-sufficiency. Such engagement can enhance the overall recovery process and contribute to building a stronger and more resilient community in the aftermath of a crisis.

3) Local resources usage: Utilizing local resources, including materials, construction techniques, and the local workforce, offers several advantages that significantly contribute to cost reduction, encourage the local economy, and enhance cultural / community integration. By leveraging locally available resources, the

overall expenses associated with temporary housing projects can be minimized. This cost-effectiveness not only benefits the implementing organizations but also ensures that resources can be allocated to other crucial aspects of the recovery process. Additionally, employing local materials and techniques promotes a sense of familiarity and belonging for the affected population, facilitating their integration into the temporary housing structures. Moreover, these solutions are better suited to withstand the local climate conditions, ensuring their durability and reducing maintenance requirements. The use of local resources also facilitates easier maintenance and allows for modifications to be made according to the evolving needs and possibilities of the users over time. This flexibility empowers the community to adapt the housing units to their changing circumstances, promoting a sense of ownership and resilience in the long term.

4) Planning ahead: During the design phase, it is of utmost importance to create flexible solutions that facilitate the necessary adaptations for reusability. Enabling users to customize and personalize their housing units, making additions or modifications based on their needs and capabilities, is essential. In the context of disaster scenarios, housing often serves as a multipurpose space for families, and flexibility plays a critical role in accommodating these multifunctional needs. Many authors have emphasized the significance of flexibility in temporary housing, advocating for its inclusion (Arslan and Coşgun, 2008; Barakat, 2003; Bedoya, 2004; El-Masri and Kellett, 2001; Kellett and Tipple, 2000; Lizarralde and Davidson, 2006; Lizarralde and Root, 2007; Sener and Altum, 2009; UNDRO, 1982). Additionally, it is advisable to prioritize simple construction systems that are easy to assemble and dismantle, utilizing small elements that are more manageable (Arslan, 2007). This approach streamlines the construction process, making it more efficient and facilitating future adjustments as needed.

5) Design beyond the unit: The design of the housing units is just one aspect to consider in the overall success of the plan. The surrounding space plays a crucial role in ensuring the effectiveness of the temporary housing project. Careful consideration should be given to the location of the units to minimize the sense of displacement among the affected individuals. Placing the units in proximity to their work, services, and amenities helps maintain a sense of familiarity and convenience for the residents.

Moreover, the design of public spaces such as squares, parks, gardens and other communal areas is vital. These spaces provide opportunities for social interaction, fostering a sense of community spirit and helping to maintain existing social ties while also creating opportunities for new connections to form. Rebuilding a sense of community is essential in post-disaster situations, and this is best achieved through rich social relationships (Kellett and Moore, 2003).

Additionally, providing essential services within the temporary settlement is crucial. These services may include schools, medical assistance points, community centers, shops, coffee shops, religious buildings, and other facilities that support normal daily life. Having these amenities readily available ensures that the residents have access to necessary resources and can carry out their daily activities in a more comfortable and convenient manner.

Overall, the holistic approach of considering both the housing units' design and the surrounding environment, including public spaces and essential services, is vital for the successful establishment of a temporary settlement. This approach promotes community integration, social well-being, and a sense of normalcy, facilitating the recovery process for those affected by the disaster (Felix et al., 2013).

In conclusion, the process of designing temporary housing requires careful consideration and planning, encompassing various stages from the selection of suitable locations to ensuring long-term sustainability. Temporary shelters should provide the minimum living standards for their occupants, focusing on protection, safety, dignity, and psychological need while bridging the gap until permanent housing is available. Guidelines such as Sphere standards and recommendations from researchers highlight the importance of rapid availability, compatibility with local living standards, and easy removal of temporary dwellings. Key principles for improving temporary housing solutions include context understanding, community participation, local resource usage, planning for flexibility, and designing beyond the individual units. By integrating these principles, addressing cultural and social aspects, involving users in the process, utilizing local resources, and considering the surrounding environment and necessary services, temporary housing projects can

effectively promote community integration, resilience, and a sense of normalcy in post-disaster recovery efforts. In terms of design, physical features, materials used, and structural elements should be designed as a part of a whole, as well as the context, layout and labor force sharing during the construction process of the temporary residence.

Silvia (2016) highlights the urgent need for rapid shelter provision following a disaster, acknowledging that planning, designing, and constructing specific local solutions immediately may not be feasible. In such cases, portable family shelter solutions that can be readily stocked in the country or transported by air become essential, addressing the limitations of tents in terms of weight, distortion, and adaptability. Similarly, Abulnour (2013) claimed "In 1991, Khalili's California Institute of 'Earth Art and Architecture' tested the architect's dome prototypes and found them to pass seismic tests to meet California's stringent building codes. The streamlined shape of the dome also adds to its ability to resist wind turbulences. The choice of the streamlined shape is also successful with respect to minimization of exposure to environmental conditions (especially solar radiation). The dome shape has the extra benefit of enclosing a large volume while reducing the amounts of construction materials" (p. 17). Moreover, Mojahedi et al. (2021) conducted research in Yazd, a region experiencing cold winters and hot, dry summers, and found that transitioning from a cube-shaped to a B-shaped temporary housing design (hemisphere with a post like a Kapar used by houses of Baluchistan nomads) resulted in a remarkable 61 Kwh/m2 reduction in energy demand. In regions like Bandar Abbas, characterized by moderate winters and hot, humid summers, modifying the shape of temporary housing from a cube to a C-shaped (tab. 3) structure (a barrel vaulted cuboid like a mudhif used in Khoozestan) resulted in a significant reduction of energy demand by 33 Kwh/m2. Similarly, in Tabriz, Shahrood, and Yazd, transitioning from cube-shaped (tab. 3) housing to a hemisphere design led to a notable decrease in CO2 emissions by 27%, 24%, and 30% respectively. When considering indoor thermal comfort in Tabriz, cube-shaped housing emitted 125.61 tons of CO2 annually, while the hemisphere-shaped alternative emitted 91.29 tons of CO2 in the same timeframe. Changing the shape of the temporary housing from cuboid into shape A showed the best results. These findings highlight the impact of shape modification on energy efficiency and environmental sustainability in

temporary housing solutions.

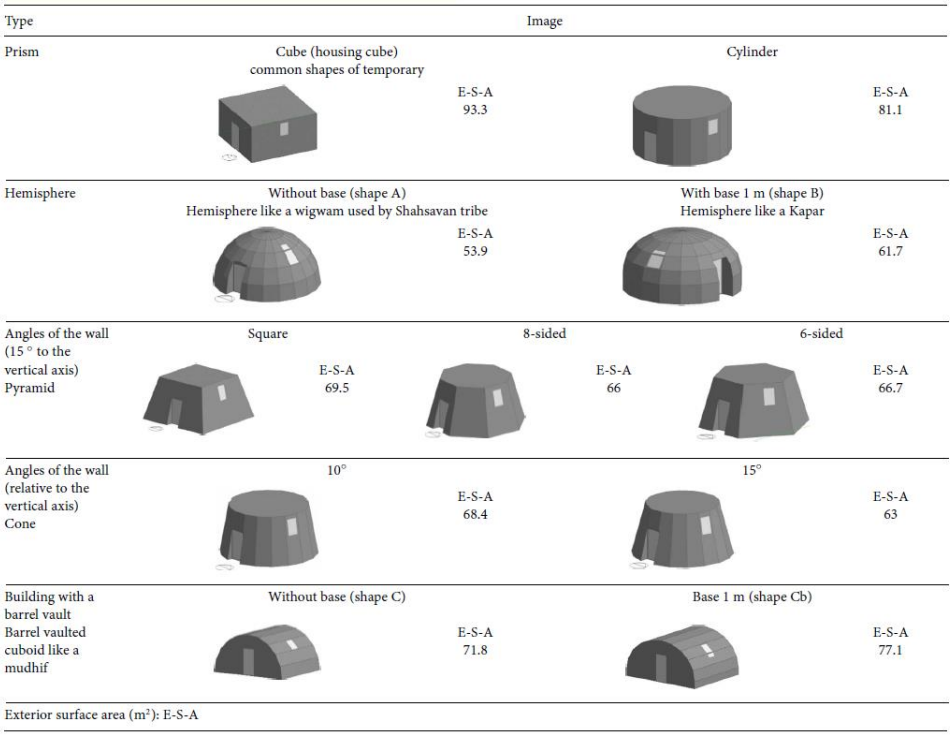


Figure 6. Introducing modeled shapes (according to nomads housing) (Source: Mojahedi et al., 2020, p. 441)

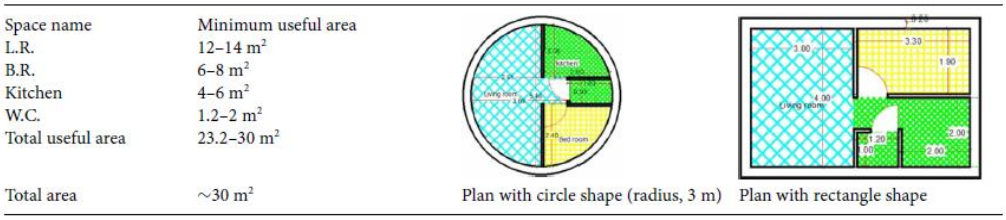


Figure 7. Proposed area of temporary housing (Source: Mojahedi et al., 2020, p. 440)

Mojahedi et al. (2021) propose the use of hemisphere and barrel vaulted ceilings in post-disaster temporary housing. These shapes can be constructed using various materials such as brick, sandbags (inspired by Nader Khalili), cement, and even lightweight materials like construction foams. The aim is to provide thermal comfort, reduce fossil fuel consumption, save energy, and promote sustainability while protecting the environment. Mojahedi et al. (2021) emphasize the importance of indoor thermal comfort in the design and construction of temporary housing.

Mojahedi et al. (2020) proposed area (minimum space) for temporary housing is shown in Figure 6. The minimum area per person in a dwelling for both developed and developing countries is determined as follows: 24 m²-36 m² for a family of three, 32 m²-48 m² for a family of four, 40 m²-60 m² for a family of five (Savaşır, 2008). Ünal and Akın (2017) suggest that implementing a folding bed system, folding table system, and under-bed drawer design can increase the usable space while reducing the feeling of crowding and tightness. Göler (2009) points out that the proportions of windows can influence the perceived volume of a space. Small windows with proportions close to square, thin and long volumes, and continuous windows on the wall provide the greatest sense of spatial spaciousness. Additionally, semi-indirect or indirect ceiling lighting can contribute to a more spacious perception of the space by creating a pool of light on the ceiling and incorporating transparencies to allow daylight in. Torus and Şener (2015) emphasize that labor is limited during the rehabilitation phase, so temporary shelters should be lightweight, easily transportable, and constructed by a small number of people. They also note that since the number of survivors after a disaster is unpredictable, offering flexible alternatives that can accommodate varying numbers of survivors is a primary goal.

3.1.Design in terms of construction

Albadra et al. (2018) stated that the results of Escamilla and Habertin's work showed that when used efficiently, both local (such as timber and bamboo) and global (such as concrete and steel) materials can offer sustainable answers in shelter design. On the other hand, local materials showed a stronger potential for low environmental effect and cost, but global materials performed better structurally. Eren (2012) proposed that a light steel system should be used as the support system of the modular system. Because such systems are easy to build, lightweight and suitable for mass production. P´erez-Valc´arcel et al. (2020) stated that one of the most important parts of deployable structures is linkage design. Such links must be able to make the appropriate rotations during deployment and folding, ensuring that forces are transmitted with the least amount of eccentricity as feasible. P´erez-Valc´arcel et al. (2020) claimed that many studies have also been undertaken in recent years of reciprocal systems, defined as: "The reciprocal frame is a three-dimensional grillage

structure mainly used as a roof structure, consisting of mutually supporting sloping beams placed in a closed circuit. The inner end of each beam rests on and is supported by the adjacent beam. At the outer end the beams are supported by an external wall, ring beam or columns".

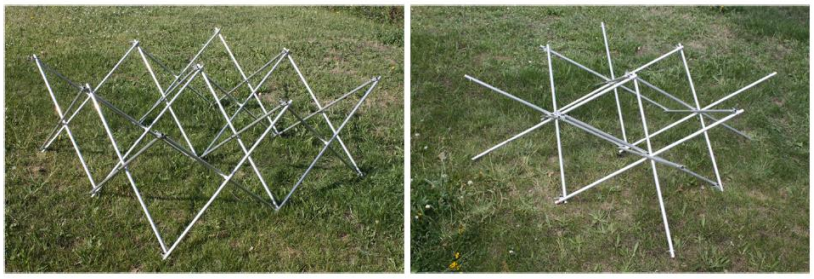


Figure 8. Flat meshes of SLE and Bundles with reciprocal linkages (Source: P´erez-Valc´arcel et al., 2020, p. 2025)

3.2. Design in terms of a psychological point of view

Apart from sheltering, temporary residences should be designed as units that save people from external dependency, bring them closer to their lives before the disaster, and provide the necessary environment and comfort where they can continue their daily work. Silvia (2016) claimed "Independent sustainable recovery begins with a home and job, and shelter has been shown to act as a catalyst to enable families to make a step change from dependency on external assistance, to self management and self help, enabling and empowering communities to understand and meet their own needs" (p.3). Şengül et al. (2012) points out that failure to create opportunities to enable disaster victims to return to their daily activities after the provision of emergency vital services such as disaster recovery and first aid, can lead to the continuation of the post-disaster crisis situation, and new disasters caused by chaos. Therefore, these areas, on the one hand, allow the masses of disaster victims to return to their daily individual life practices, and on the other hand, allow the social system to repair itself, protect itself from new disasters, and return to the possible social and economic functioning of the city. Mojahedi et al. (2021) states that housing should provide security, comfort, and a sense of belonging to the family.

CHAPTER 4: METHODOLOGY

4.1. Case Study: Bayraklı Container City

The temporary accommodation center established in Bayraklı after the earthquake on October 30, 2020 in Izmir is currently hosting disaster victims affected by the February 6 earthquakes based in Kahramanmaraş. The accommodation center established on an area of 43 thousand square meters in Bayraklı district under the coordination of İzmir Governorship, served 1000 people after the 6.6 magnitude earthquake, the epicenter of which was Seferihisar district. After the Kahramanmaraş-based earthquakes, 286 containers in the center were sent to Nurdağı and Islahiye districts of Gaziantep. The remaining containers were prepared for the accommodation of disaster victims from the earthquake zone. Şuayip Üner, Deputy Manager of the Bayraklı Temporary Accommodation Center, said that there are currently 207 containers in the temporary accommodation center that was put into service after the earthquake in İzmir, 176 of which 482 people are living.

Figure 9. Bayraklı Container City Site Map (Source: Google Maps)

Figure 10. Bayraklı Container City temporary housing units (Source: Izmir Disaster and Emergency Management Center Improvement Branch Directorate, 2023)

Figure 11. Bayraklı Container City temporary housing units top view (Source: Izmir Disaster and Emergency Management Center Improvement Branch Directorate, 2023)

The standard container in the Bayraklı container city is 7 meters by 3 meters and provides users with 21 square meters of space. It is designed as a single room, with 6.31 m2 for the bedroom, 11.99 m2 for the living room and 2.7 m2 for the bathroom. The temporary residence with a height of 2.60 m has 2 windows.

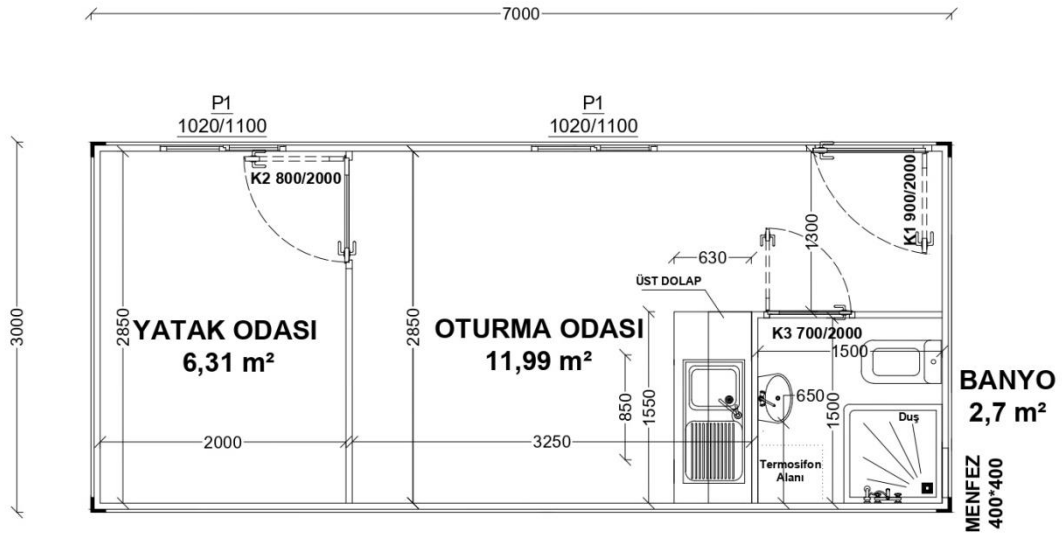


Figure 12. Bayraklı container city plan (Source: Izmir Disaster and Emergency Management Center Improvement Branch Directorate, 2023)

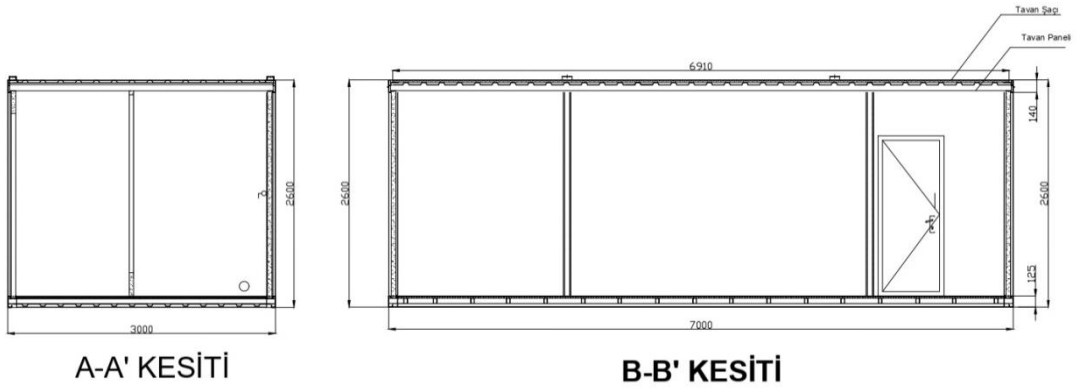
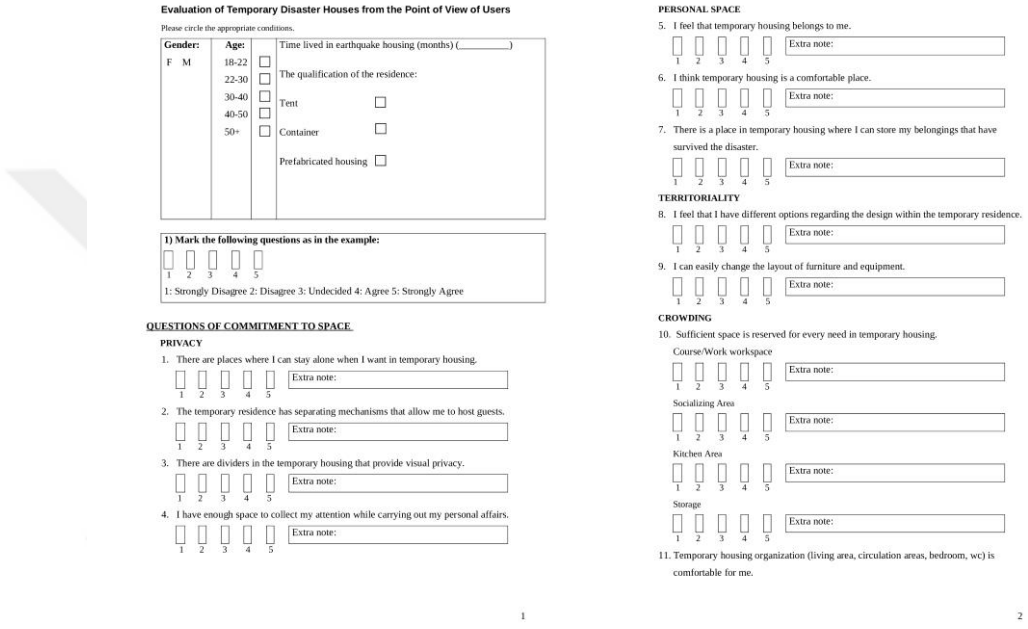


Figure 13. Bayraklı container city A-A’ and B-B’section (Source: Izmir Disaster and Emergency Management Center Improvement Branch Directorate, 2023)

4.2. Instruments

The survey is based on the "Evaluation of Temporary Disaster Housing from the Point of View of Users". The survey applied to the disaster victims over the age of 18 in the "İzmir-Bayraklı container city". The survey consists of 43 questions in total. The first 2 questions of the survey consist of demographic questions to get general information about the person. The remaining questions of the survey were collected under three headings as "commitment to space, spatial requirements and general

satisfaction questions". The questions of commitment to space cover a total of 13 questions under the headings of privacy, personal space, territoriality and crowding. Under the heading of spatial requirements, 26 questions were asked to the disaster victims, including the topics of thermal, visual, auditory, social requirements and safety requirements. The survey study was completed by asking 2 general satisfaction questions.



Evaluation of Temporary Disaster Houses from the Point of View of Users

Please circle the appropriate conditions.

Gender:	Age:		
F M	18-22	☐	Time lived in earthquake housing (months) (_____)
	22-30	☐	The qualification of the residence:
	30-40	☐	Tent ☐
	40-50	☐	Container ☐
	50+	☐	Prefabricated housing ☐

1) Mark the following questions as in the example:

☐ ☐ ☐ ☐ ☐
1 2 3 4 5

1: Strongly Disagree 2: Disagree 3: Undecided 4: Agree 5: Strongly Agree

QUESTIONS OF COMMITMENT TO SPACE

PRIVACY

1. There are places where I can stay alone when I want in temporary housing.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
2. The temporary residence has separating mechanisms that allow me to host guests.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
3. There are dividers in the temporary housing that provide visual privacy.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
4. I have enough space to collect my attention while carrying out my personal affairs.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5

1

PERSONAL SPACE

5. I feel that temporary housing belongs to me.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
6. I think temporary housing is a comfortable place.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
7. There is a place in temporary housing where I can store my belongings that have survived the disaster.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5

TERRITORIALITY

8. I feel that I have different options regarding the design within the temporary residence.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
9. I can easily change the layout of furniture and equipment.
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5

CROWDING

10. Sufficient space is reserved for every need in temporary housing.
Course/Work workspace
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
Socializing Area
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
Kitchen Area
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
Storage
☐ ☐ ☐ ☐ ☐ Extra note:
1 2 3 4 5
11. Temporary housing organization (living area, circulation areas, bedroom, wc) is comfortable for me.

2

Figure 14. A Layout of Bayraklı container city survey questions

After the survey questions were created, a petition was written to İzmir deputy governor Ünal Çakıcı and İzmir Provincial Disaster and Emergency Management (AFAD) for the necessary permission. According to the feedback, the survey was created in the google documents in the digital environment and the survey work was completed.

18/05/2023

"Afet Sonrası Geçici Konutlar" Konulu
Yüksek Lisans Tez Çalışması Anketi

Ben Buse Ada. İzmir Ekonomi Üniversitesi Tasarım Çalışmaları Yüksek Lisans Programı öğrencisiyim.
Yüksek Lisans programı kapsamında yürütmekte olduğum "Afet Sonrası Geçici Konutlar" konulu yüksek lisans tezimin tez aşamasını tamamlamak üzere, Bayraklı Konteyner Kent'te yaşayan katılımcılarla ekteki anketi uygulamak istemekteyim.
Anket toplam 40 sorudan oluşmaktadır. Soru setleri, konteyner kent sakinlerinin içindeki yaşadıkları mekanın tasarımıyla ilgili konu içeriğini kapsamaktadır. Bu çalışma için seçilecek katılımcıların yaş aralığı 18 yaş üzeri olacaktır. Anket uygulama süresi kişi başı 10 dakikayı geçmeyecektir ve kesinlikle isim bilgisi alınmayacaktır.
Ayrıca, anket sonucunda toplanacak veriler sadece yüksek lisans tez sunumunda bilimsel veri için kullanılacaktır.

Konuyla ilgili desteğinizi beklemekteyiz.

Saygılarımla,
Buse Ada

Kişisel Bilgilerim:
T.C. Kimlik No: 32758861954
Adres: Hıdırlık mahallesi 61/1 sk. No:5-7/A Daire:2 Seferihisar/İZMİR
Tel No: 05548648848

Referans Bilgisi:
Doç. Dr. Didem Kan Kılıç (Yüksek Lisans Tez Danışmanı)
Adres: İzmir Ekonomi Üniversitesi Sakarya Cad. No: 156 Balçova/İZMİR
Tel: 0505 783 94 38

Figure 15. Permission petition for the thesis study on temporary housing after the disaster

This study was a study that focused on İzmir disaster survivors at first. Security measures have been increased due to the disaster victims who came from outside and settled in container cities with the Kahramanmaraş earthquake that occurredin 2023. This also led to limitations in the study. Although it was requested to access the data such as audio, images, interviews that support the survey while this study was being conducted, it was not possible to perform it due to permissions. For this reason, the study remained a survey-focused study.

4.3. Participants

This survey was conducted with a total of 44 participants. 28 are women and 16 are men of the 44 people surveyed. 13 people are between the ages of 22-30, 12 people are between 30-40 of the participants in the survey. The minimum participation in the survey was provided at the age of 50 and over. As a housing qualification, 39 people stated that they were housed in a container. 61.4% of the disaster victims stated that they had been staying in temporary housing in the Bayraklı temporary accommodation center for 3-5 months. The remaining 38.6% stated that they had been living in temporary housing for 12 months or more.

CHAPTER 5: FINDING AND DISCUSSIONS

Finding 1: The first question asked about "privacy", 86% (38 participant) of the respondents answered that there was no place to be alone in temporary housing when they requested and stated that there was no privacy in temporary housing. 61% (27 participant) of the participants supported the lack of privacy by stating that there are no separating mechanisms that will allow hosting guests in the temporary housing. It was found that there is not enough space to collect their attention while performing their personal tasks.

1. Q: There are places where I can stay alone when I want in temporary housing.

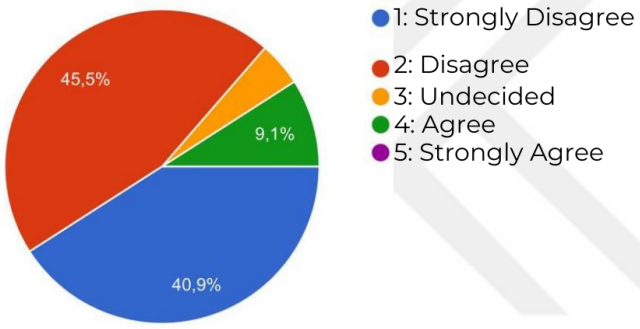


Figure 16. Chart of answer distribution of question 1 in the field of privacy

The only positive conclusion about privacy in temporary housing is that there are dividers that provide visual privacy. 72% (32 participant) of the participants stated that the areas were divided with separators.

2. Q: The temporary residence has separating mechanisms that allow me to host guests.

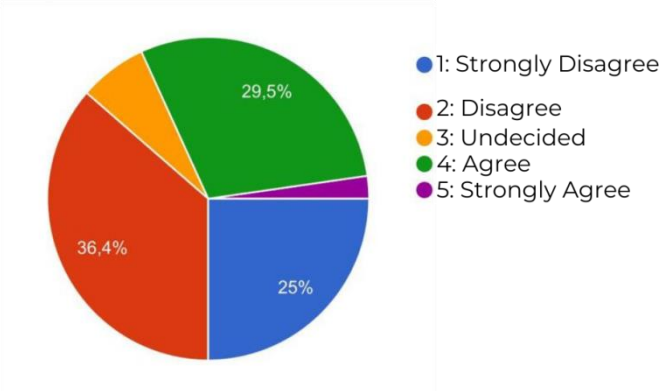


Figure 17. Chart of answer distribution of question 2 in the field of privacy

3. Q: There are dividers in the temporary housing that provide visual privacy.

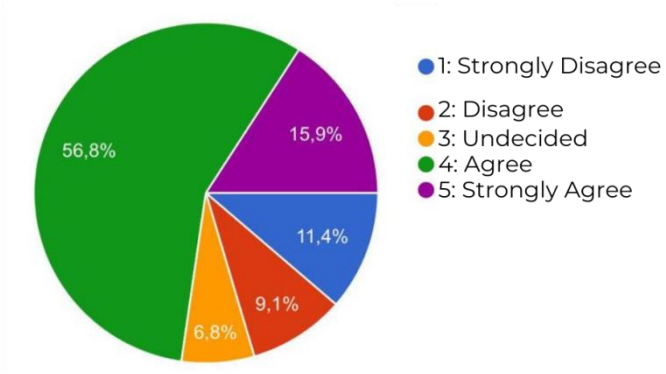


Figure 18. Chart of answer distribution of question 3 in the field of privacy

4. Q: I have enough space to collect my attention while carrying out my personal affairs.

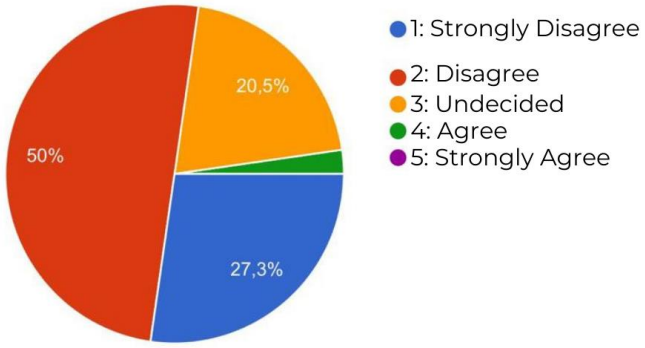


Figure 19. Chart of answer distribution of question 4 in the field of privacy

The lack of privacy in temporary housing can pose serious problems and have an effect on residents' wellbeing. Without special areas, individuals are deprived of personal boundaries and the ability to engage in independent activities. The lack of privacy can lead to increased stress levels, anxiety and a feeling of vulnerability, especially for people who have been traumatized or displaced. When the Bayraklı temporary housing is evaluated in the context of privacy, although it is divided into areas and provides visual privacy, designs that are lacking in terms of privacy are used when looking at the whole. In previous studies, lack of privacy has also been mentioned as the most important problem. Hasırcı and Yüksel (2012) conducted a study aimed at a deeper understanding of the issue of "privacy" in temporary housing. Within the scope of this study, interviews were conducted with earthquake

victims in Kocaeli province of Turkey and the needs were determined. As a result of the findings obtained from the interviews, the most important problems were lack of privacy; lack of space, all family members sleeping in the same room.

Although temporary housing solutions often prioritize efficiency and communal living, it is very important to recognize and address the negative consequences that a lack of privacy can have on the psychological need and dignity of those who live there. Efforts should be made to incorporate elements of privacy, even within communal spaces, to ensure a more supportive and respectful environment for those seeking temporary shelter.

Finding 2: 84% (37 participant) of the participants responded that they felt that temporary housing did not belong to them and indicated a lack of "personal space". However, 89% (39 participant) of the participants stated that they do not consider temporary housing to be a comfortable place. It was determined with a result of 80% (35 participant) in this survey that there was no place to store the belongings of the survivors of the disaster.

5. Q: I feel that temporary housing belongs to me.

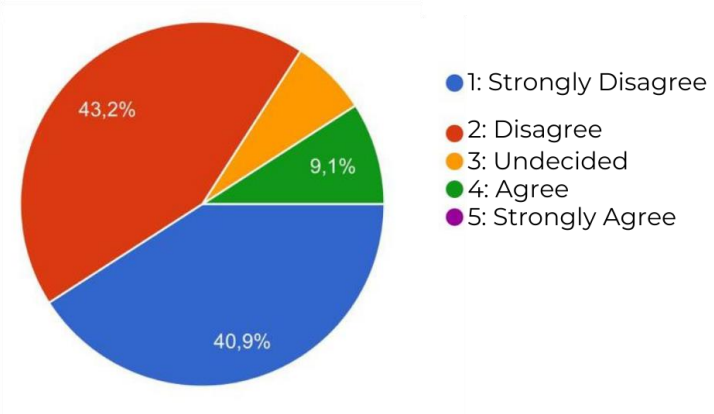


Figure 20. Chart of answer distribution of question 5 in the field of personal space

6. Q: I think temporary housing is a comfortable place.

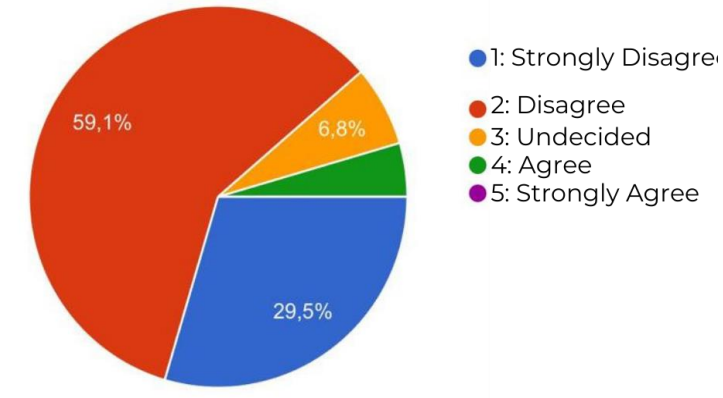


Figure 21. Chart of answer distribution of question 6 in the field of personal space

7. Q: There is a place in temporary housing where I can store my belongings that have survived the disaster.

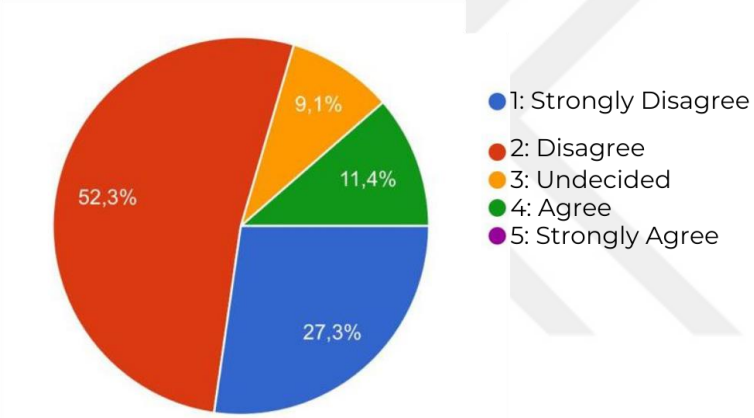


Figure 22. Chart of answer distribution of question 7 in the field of personal space

Disaster victims endure additional difficulties when faced with a lack of personal space in temporary housing containers. Due to the lack of personal space, it becomes difficult for them to adopt the space they live in during the passing time and they cannot feel a sense of belonging. With limited dimensions and minimal amenities, individuals and families find themselves stuck in these confined spaces, struggling to maintain a sense of normalcy. The lack of separate rooms or designated areas for personal space poses difficulties for basic activities such as sleeping, studying or spending quality time with loved ones. This deficiency may result in disaster victims solving the areas that are insufficient in the long term by making their own efforts and irregular additions. After the Kocaeli earthquake, Baradan (2002) conducted research on the victims residing in temporary housing about their general housing concerns, as well as their satisfaction with the size, heating, safety and neighborhood

quality of the houses. The findings showed that due to the lack of privacy and the demand for different rooms, more than 60% (26 participant) of the participants reported that they added to their home after moving. There is no addition observed in the Bayraklı container city, but it is predicted that plug-ins may occur in the long term. The lack of personal space in these temporary housing containers negatively impacts the recovery process, further complicating the difficult rescue journey for disaster victims.

Finding 3: The answer given to the questions titled territoriality related to the use of space is that 68% (30 participant) and 75% (33 participant) do not have different options related to the design in temporary housing. 30 Of the participants stated that they could not easily change the layout of furniture and accessories.

8. Q: I feel that I have different options regarding the design within the temporary residence.

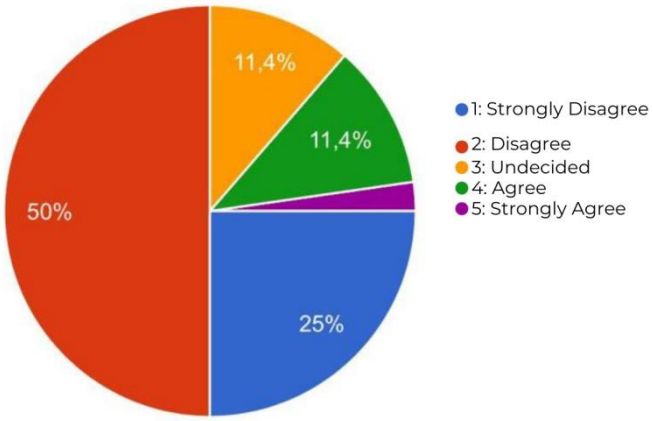


Figure 23. Chart of answer distribution of question 8 in the field of territoriality

9. Q: I can easily change the layout of furniture and equipment.

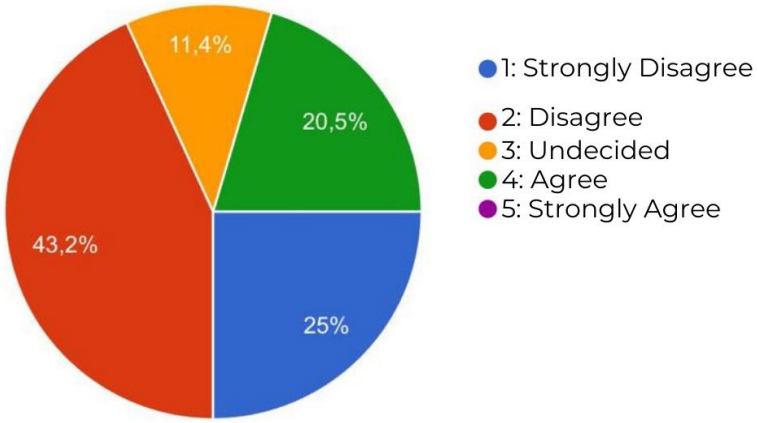


Figure 24. Chart of answer distribution of question 9 in the field of territoriality

The interior design of temporary housing after a disaster should usually revolve around functionality, practicality and efficient use of limited space. In these harsh conditions, the focus should be on providing basic needs while creating an environment that promotes a sense of comfort and normalcy. Although temporary, the interior design of these residential units should try to present a home look, recognizing the importance of a supportive and welcoming environment for individuals and families as they move along the path of recovery. Hasırcı and Yüksel (2012) was suggested that earthquake dwellings should be more like homes, have areas to help victims recover from the effects of earthquakes, and generally be more enjoyable with more colorful and better-chosen materials. Temporary housing is the first place for individuals to overcome the trauma of disaster, cope with the psychological effects and establish home relationships again. Therefore, the fact that users have decisions about housing will support them to feel belonging.

Finding 4: When the questions titled "crowding and density" were evaluated, it was determined that there was not enough space allocated for every need in the temporary housing. 84% (37 participant) of the participants reported that there was insufficient study space for classes or work. However, 59% (26 participant) of the participants stated that the socialization area, 59% (26 participant) of the kitchen area and 84% (37 participant) of the storage area were insufficient. 77% (34 participant) of the participants also stated that the temporary housing organization was not comfortable (fig. 28). With this result,it was concluded that the use of the living area,circulation

areas, bedrooms and toilets was not comfortable. Nevertheless, 36% (16 participant) considered temporary housing to be an adequate place after the disaster, while 20% (9 participant) remained undecided. 39% (17 participant) of the participants stated that temporary housing was insufficient even at the initial stage (fig. 29). 86% (38 participant) stated that there were not enough rooms according to the number of family members.

10. Q: Sufficient space has been reserved for a course / work study area in the temporary residence.

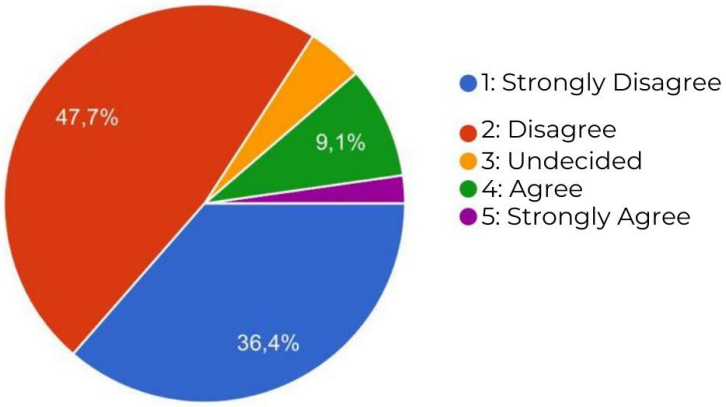


Figure 25. Chart of answer distribution of question 10.1 in the field of crowding

11. Q: Sufficient space has been reserved for socializing space in the temporary housing.

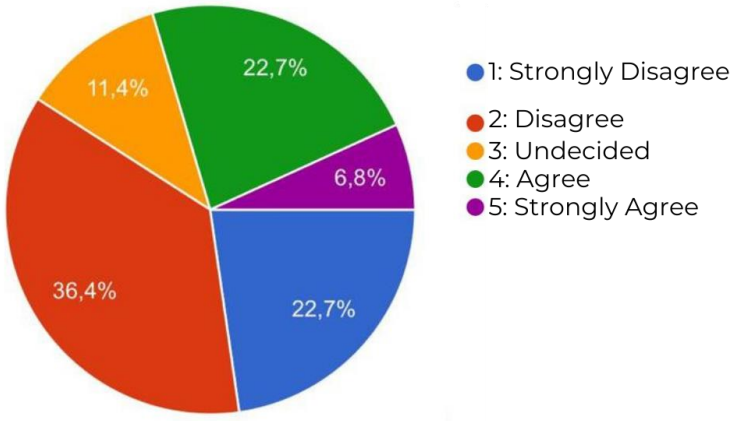


Figure 26. Chart of answer distribution of question 10.2 in the field of crowding

12. Q: In the temporary housing, enough space has been reserved for a kitchen area.

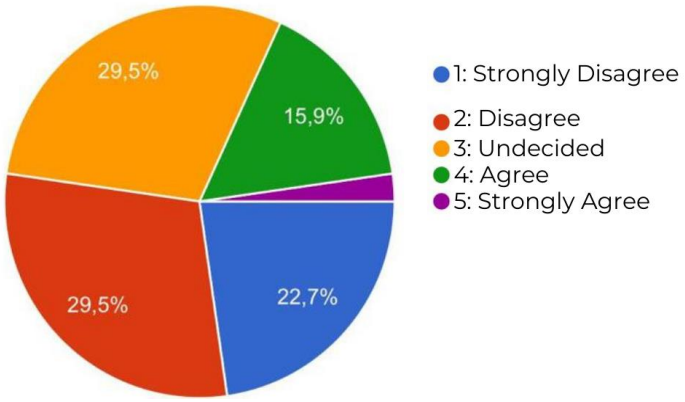


Figure 27. Chart of answer distribution of question 10.3 in the field of crowding

13. Q: Sufficient space has been allocated for storage space in the temporary residence.

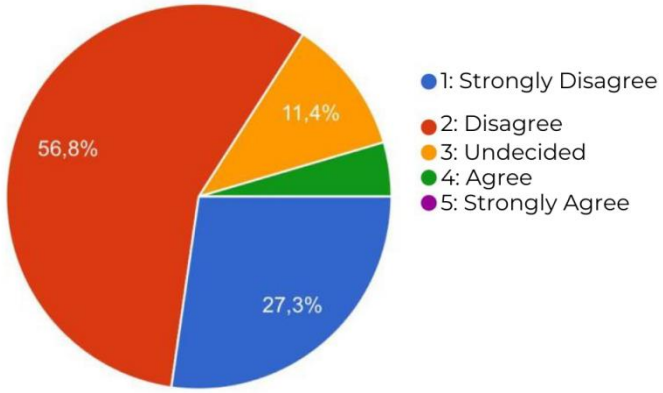


Figure 28. Chart of answer distribution of question 10.4 in the field of crowding

14. Q: The organization of temporary housing (living area, circulation areas, bedroom,toilet) is comfortable for me.

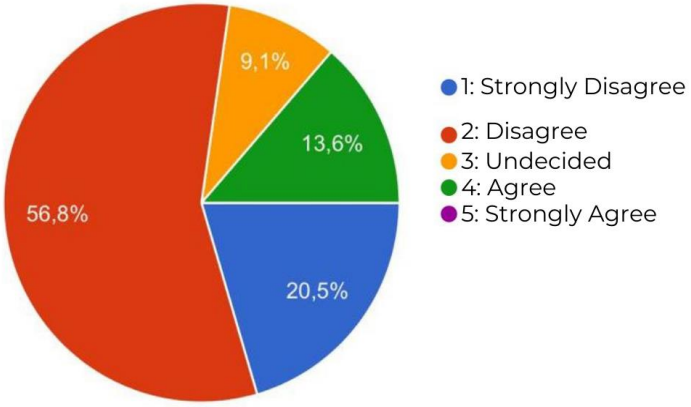


Figure 29. Chart of answer distribution of question 11 in the field of crowding

15. Q: Temporary housing is a sufficient place for me in the first phase after the disaster.

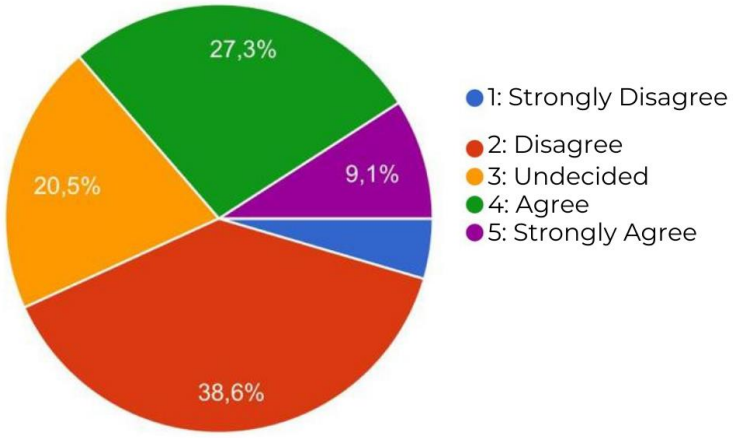


Figure 30. Chart of answer distribution of question 12 in the field of crowding

16. Q: There are enough rooms for the number of family members.

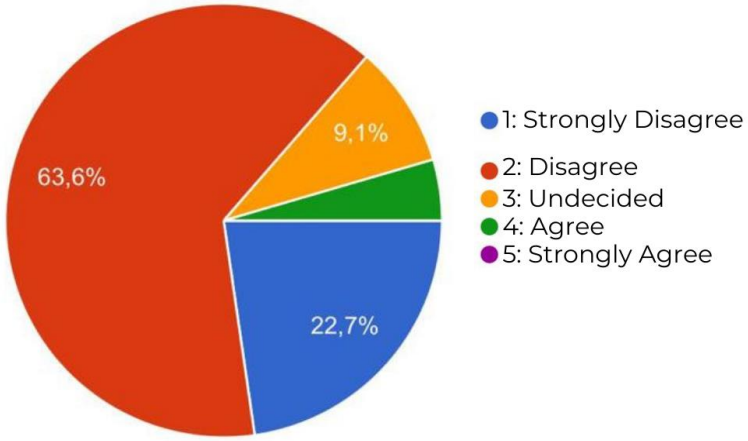


Figure 31. Chart of answer distribution of question 13 in the field of crowding

All of the housing types used in the Bayraklı temporary accommodation center are 21 m2 and consist of 1 bedroom and 1 living room. Separate bedroom areas should be provided for children of different ages and gender to ensure healthy development, and to decrease possibility of trauma and increase the sense of belonging (Baradan, 2002; Özmen, 2003, 2008). In the study of Şengül and Turan (2012), it was pointed out that although temporary housing units are built according to a certain plan, the construction process can continue through families who make additions over time, as they are not suitable for the needs of families with different sizes and lifestyles due to

the long settlement period and the standard of houses. This research conducted on Bayraklı temporary houses established after the İzmir earthquake confirms this finding. The construction of all living units of the same size, regardless of the different family numbers, may create insufficient areas according to the number of people in the coming period. It is not expected that a family of 2 and 5 people will use the same m2 area and provide sufficient space individually. Therefore, systems that can be adapted according to physical and psychological needs should be developed and changes should be made according to the number of people without the need for people to make irregular additions.

Finding 5: The participants stated that the heating, cooling, ventilation questions asked about spatial requirements were insufficient with an average rate of more than 60% (26 participant). 28 people out of 44 people stated the insufficiency of heat-humidity insulation (fig. 31). According to the answer given by the vast majority of the participants with 50% (22 participant), it was found that air flow was not provided through the windows.

17. Q: The heat-moisture insulation was sufficient during the stay in the temporary residences.

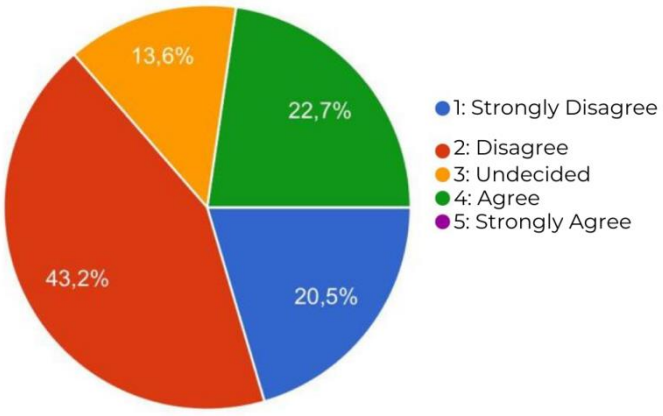


Figure 32. Chart of answer distribution of question 14 in the field of thermal requirements

18. Q: Heating was sufficient during the stay in temporary housing.

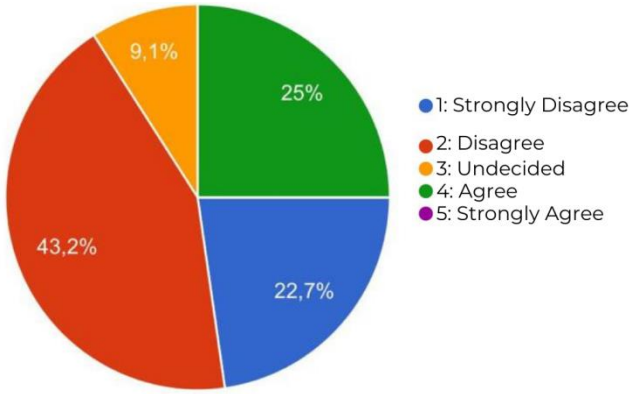


Figure 33. Chart of answer distribution of question 14.1 in the field of thermal requirements

19. Q: Cooling was sufficient during the stay in temporary housing.

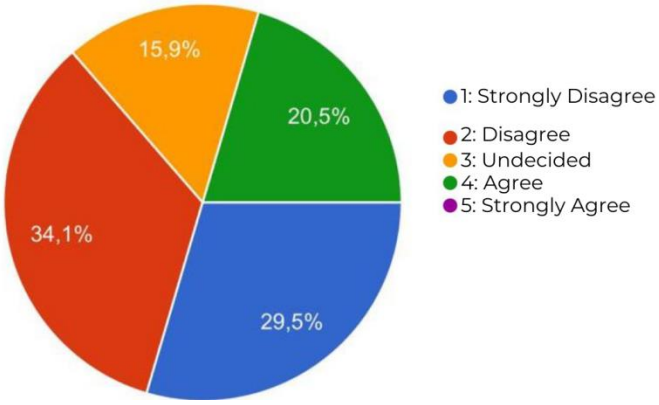


Figure 34. Chart of answer distribution of question 14.2 in the field of thermal requirements

20. Q: Ventilation was sufficient during the stay in temporary housing.

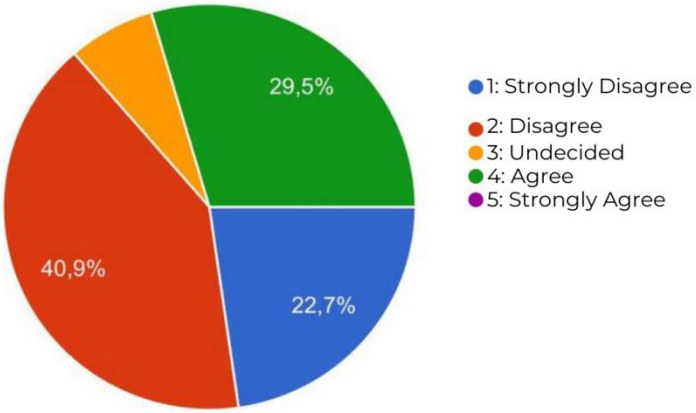


Figure 35. Chart of answer distribution of question 14.3 in the field of thermal requirements

21. Q: Humidity was sufficient during the stay in temporary housing.

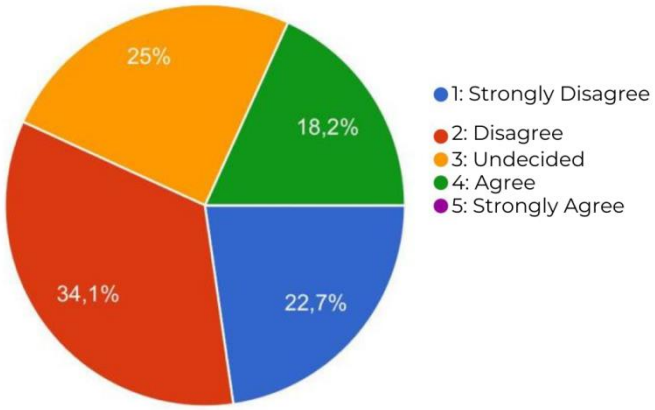


Figure 36. Chart of answer distribution of question 14.4 in the field of thermal requirements

22. Q: Air flow is provided through windows.

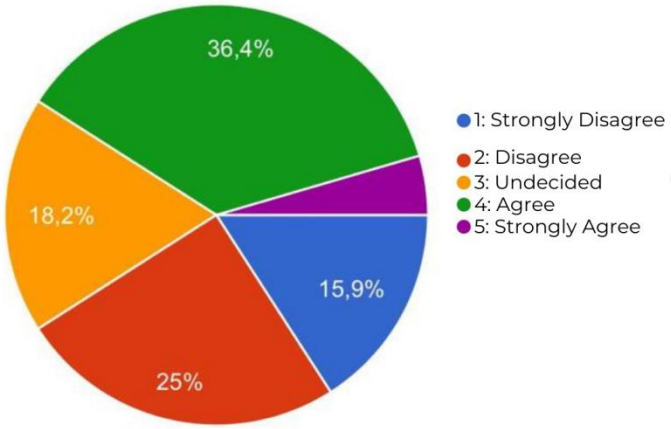


Figure 37. Chart of answer distribution of question 15 in the field of thermal requirements

The use of containers as temporary housing for disaster victims often reveals a glaring problem: The lack of proper heating, cooling and ventilation systems. According to the findings of Baradan (2002) after the Kocaeli earthquake, it states that there are weather and climate related problems in temporary housing and that 68% of those living in temporary housing need to make significant repairs. Additionally, Ünal and Akın (2017) also draw attention to the fact that one of the biggest dissatisfaction of the users of temporary housing after the previous disaster is related to the heating problem of the spaces in the containers. The answers to the

questions entitled "spatial requirements" indicate that the same ratio has been maintained as in past studies in the literature on the lack of heating, cooling and ventilation. This revealed that the necessary studies were not carried out and temporary housings were not developed in this regard. Inadequacies in heating and ventilation in the temporary housing project can lead to potential health risks with leaving disaster victims vulnerable to cold climatic conditions. Similarly, the lack of cooling mechanisms in hot climates can lead to sweltering conditions, leading to risks of dehydration and heat-related diseases. The combination of these deficiencies can have severe consequences on the physical needs and overall comfort of disaster victims, highlighting the pressing need for improved temporary housing solutions that prioritize heating, cooling and ventilation to ensure the safety of those affected by disasters.

Finding 6: In the first question on visual requirements, 57% (25 participant) of the participants stated that the lighting elements were insufficient (fig. 37), and 61% (27 participant) stated that there was no appropriate light intensity (fig. 38) in temporary housing. In this regard, only 20% (9 participant) of the participants stated that sufficient daylight was entering the room. The participants stated that the view they saw from the window did not make them happy with a significant difference of 98% (43 participant). It was found that with a result of 77% (34 participant) that it was insufficient to meet the auditory requirements (fig. 41) as well as the visual requirements.

23. Q: Lighting elements were sufficient.

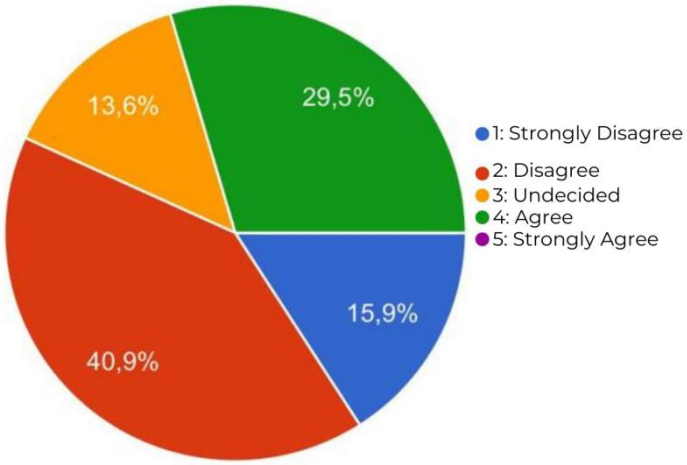


Figure 38. Chart of answer distribution of question 16 in the field of visual

requirements

24. Q: The place had suitable light intensity.

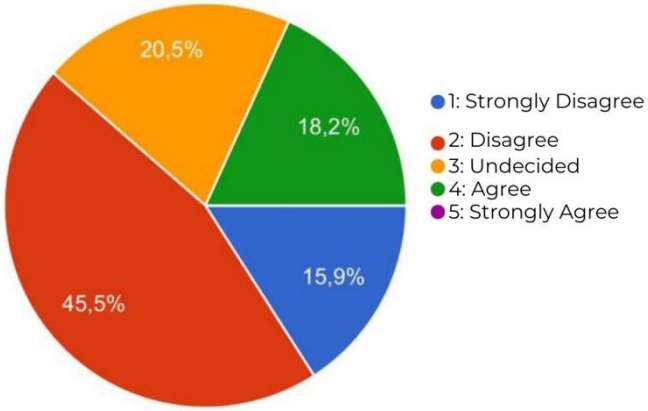


Figure 39. Chart of answer distribution of question 17 in the field of visual requirements

25. Q: The view I saw from the window made me happy.

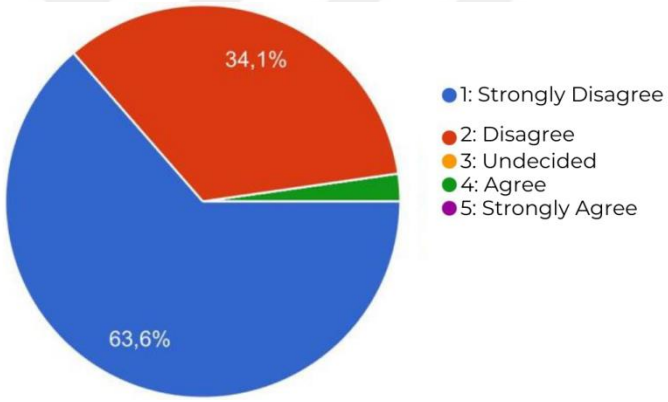


Figure 40. Chart of answer distribution of question 18 in the field of visual requirements

26. Q: Sufficient daylight was getting in.

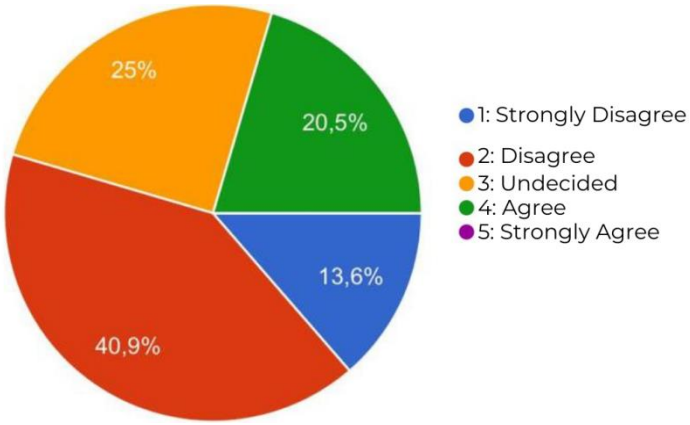


Figure 41. Chart of answer distribution of question 19 in the field of visual

requirements

27. Q: Sound insulation was sufficient during the stay in temporary housing.

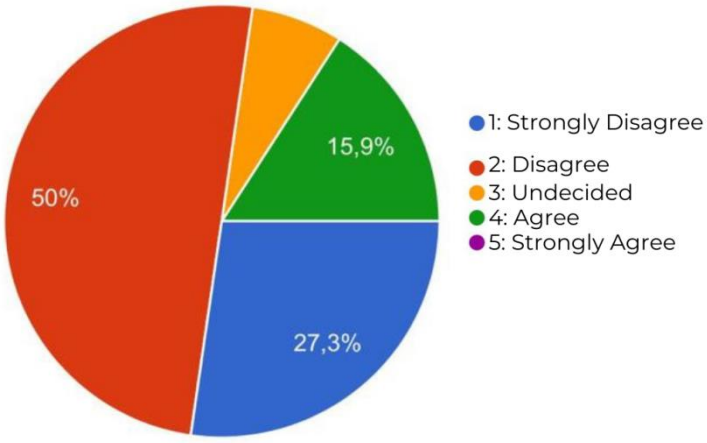


Figure 42. Chart of answer distribution of question 20 in the field of audıtory requirements

These temporary housing structures, which are usually installed quickly and designed with basic functions in mind, tend to overlook the importance of sound insulation. As a result, disaster victims are subjected to a barrage of noise that makes an already difficult situation even worse. At the same time, it makes a huge and negative contribution to the privacy of temporary housing residents. Hasırcı and Yüksel (2012) stated in their study that the sounds of people crying after an earthquake can cause depression in others in neighboring houses. And they underlined that one participant mentioned common psychological problems after earthquakes due to the noise problem with the following words: "We have panic attacks when there is no way to experience peace and quiet. This is a violation of privacy!". These findings indicate that constant exposure to noise can lead to increased stress levels, sleep disturbances, and difficulties in finding moments of focus or solace. However, the lack of proper sound insulation allows external disturbances, such as traffic, construction or nearby activities, to infiltrate the living space. The difficulties experienced by disaster victims are get worse by the lack of sound insulation in temporary housing. This highlights the need for better housing standards and acoustic solutions to create a calm and encouraging atmosphere during the recovery process.

Finding 7: In the questions asked about the "safety requirements", almost 80% (35 participant) of the participants stated that temporary housing is not protected against accidents, thieves and disasters.

28. Q: The temporary housing was protected against disasters such as fire.

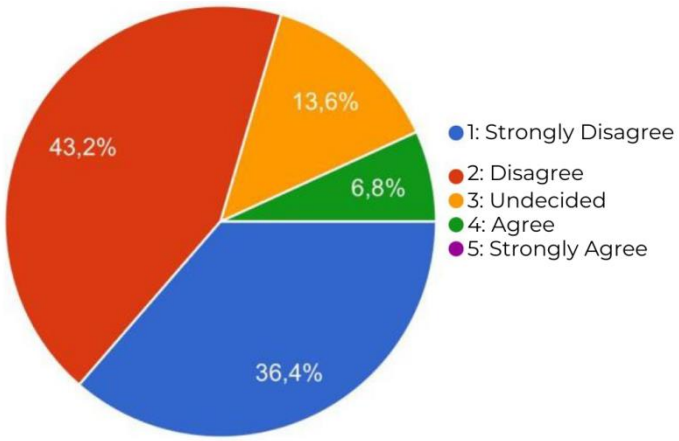


Figure 43. Chart of answer distribution of question 21 in the field of safety requirements

29. Q: The temporary housing was protected against thieves.

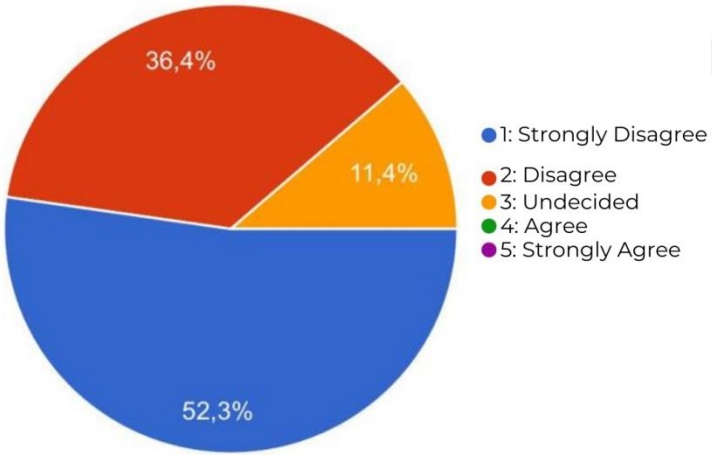


Figure 44. Chart of answer distribution of question 22 in the field of safety requirements

30. Q: Temporary housing was protected against accidents in the area of action.

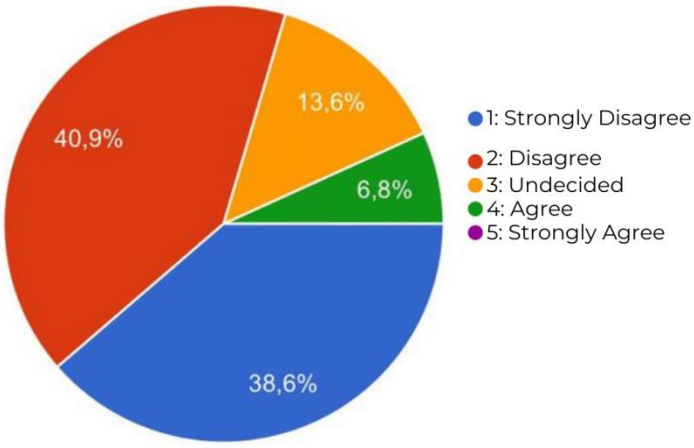


Figure 45. Chart of answer distribution of question 23 in the field of safety requirements

Inadequate safety measures increase the likelihood of accidents like fire or electrical risks, which puts victims of disasters who are already vulnerable at greater risk. The lack of strong security measures can increase the stress and fear feelings of disaster victims by making temporary shelters an attractive target for thieves or opportunistic people. Additionally, these containers were not durable enough to withstand subsequent disasters or harsh weather conditions, putting people at additional risk of harm and inconvenience. The need for improved safety measures, including reliable fire suppression systems, secure locks and flexible construction, is crucial in providing a safe and protected environment for disaster victims as they move forward on the difficult recovery path.

Finding 8: When the questions asked about the subject of "social requirements" were evaluated, positive results were found about the temporary housing life. 64% (28 participant) of the participants stated that social-cultural and commercial life are considered when providing temporary housing. The fact that transportation is provided easily from temporary housing supported this result with a slice of 57% (25 participant). It was stated with a rate of over 60% (26 participant) that the placement of temporary housing units was planned. This result is an indication that the distance of the temporary housing unit to the center is suitable, the ease of transportation and

the needs of the disaster victims are easily met. Moreover, 52% (23 participant) of the participants found the distance between the temporary housing units appropriate. The majority of the participants (57%) stated that there are social facilities (green areas, sitting areas, children's playgrounds, etc.). At the same time, Bayraklı municipality improvement branch directorate stated that there are living units with laundry, toilet and shower units, children's playground, infirmary unit, vocational workshop and tablet supported education unit in Bayraklı container city. It has been determined that temporary residences as disaster victims do not contribute to the construction phase. In this context, another finding is that temporary housing is not accessible to individuals with orthopedic disabilities.

31. Q: Temporary housing was accessible for individuals with orthopedic disabilities.

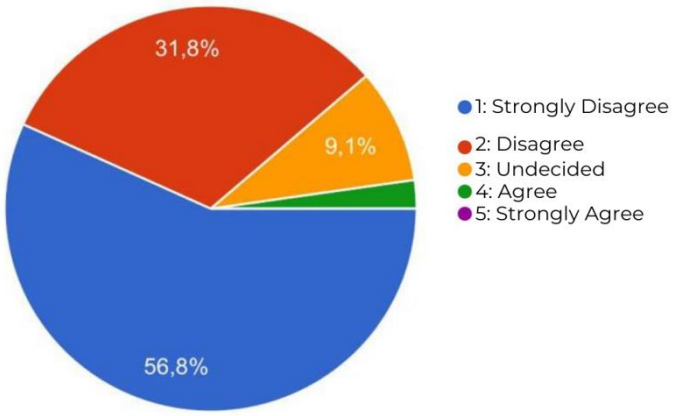


Figure 46. Chart of answer distribution of question 24 in the field of communal requirements

32. Q: While providing temporary housing, social-cultural and commercial life were considered.

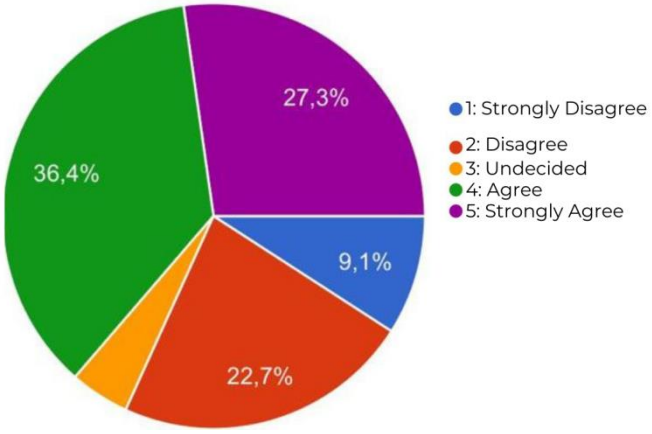


Figure 47. Chart of answer distribution of question 25 in the field of communal

requirements

33. Q: Transportation was easily provided from temporary housing

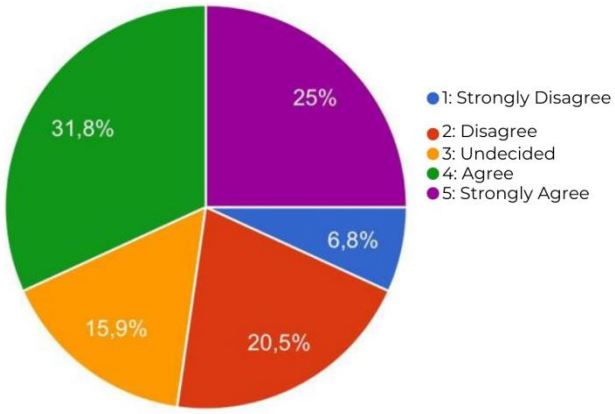


Figure 48. Chart of answer distribution of question 26 in the field of communal requirements

34. Q: The distance of the temporary residences to each other was appropriate.

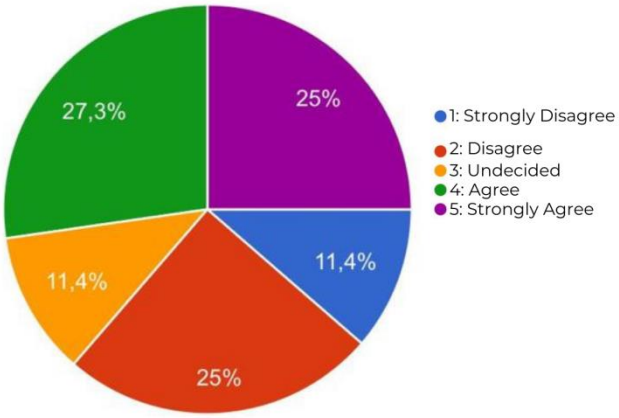


Figure 49. Chart of answer distribution of question 27 in the field of communal requirements

35. Q: The placement of temporary housing units was planned (distance to the center, ease of transportation, easy provision of needs).

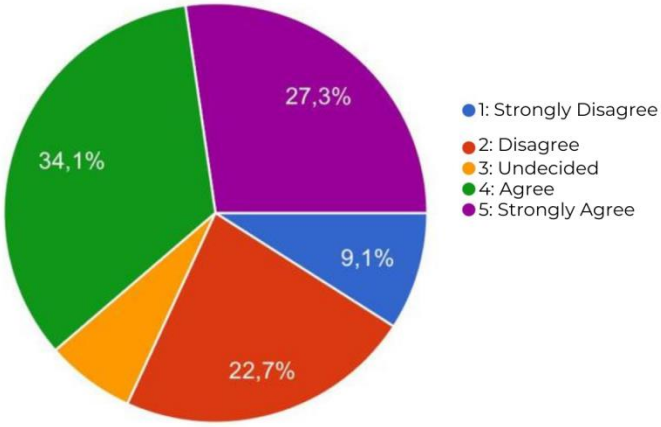


Figure 50. Chart of answer distribution of question 28 in the field of communal requirements

36. Q: There were social equipment areas (green area, sitting areas, children's playgrounds, etc.).

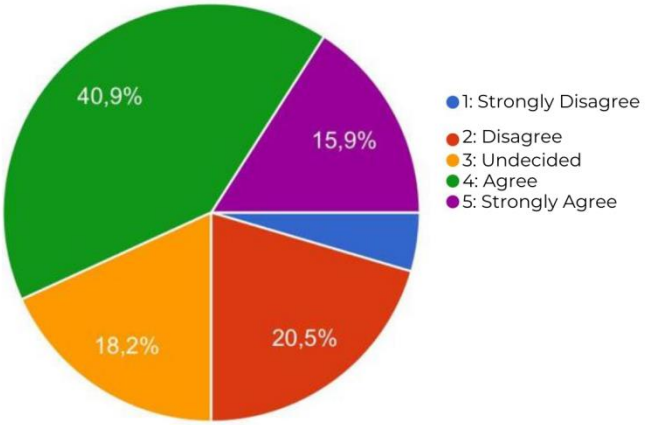


Figure 51. Chart of answer distribution of question 29 in the field of communal requirements

37. Q: As a disaster survivor, I contributed to the construction phase of temporary residences.

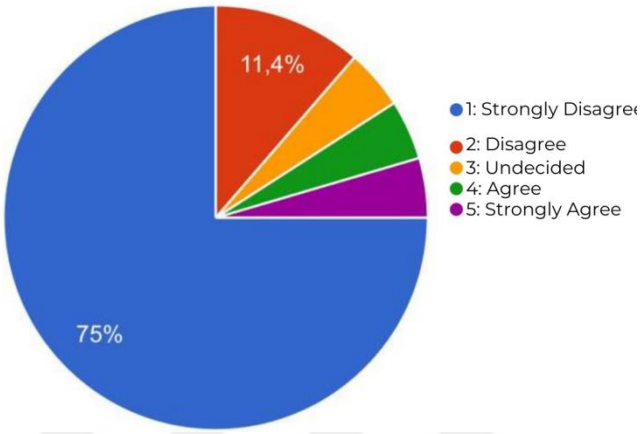


Figure 52. Chart of answer distribution of question 30 in the field of communal requirements

The Bayraklı container city is in a positive and advantageous position for social life, transportation and commercial life. The fact that its location is close to bus and Izban stops makes transportation significantly easier. This is a situation that will positively affect the involvement of disaster victims in social and commercial life. When temporary housing is conveniently situated, it fosters stronger community bonds and social interactions among the displaced individuals. Proximity enables residents to easily connect, support one another, and rebuild a sense of belonging. It encourages the formation of new relationships, allowing for the sharing of experiences, resources, and emotional support. Additionally, being located in close proximity to their temporary housing facilitates engagement with local cultural and community activities, enabling disaster victims to participate in events, festivals, and traditions. This integration contributes to the preservation and celebration of diverse cultural identities, promoting a sense of unity and resilience within the community. From a commercial standpoint, accessible temporary housing promotes economic recovery by stimulating local businesses. Displaced individuals, with easy access to their housing, can contribute to the local economy through increased consumption, employment opportunities, and the establishment of small businesses, injecting

vitality into the commercial fabric of the area. Overall, strategic placement of temporary housing strengthens social ties, enriches cultural diversity, and invigorates local commerce, fostering a thriving and resilient community.

Finding 9: More than half of the participants stated that they had no "general satisfaction" with temporary housing and reported their impressions of the place to be bad (fig. 52). The answer to the question asked about the suitability of aesthetic requirements for the living space was bad and very bad with 66% (29 participant).

38. Q: Your impressions of the place.

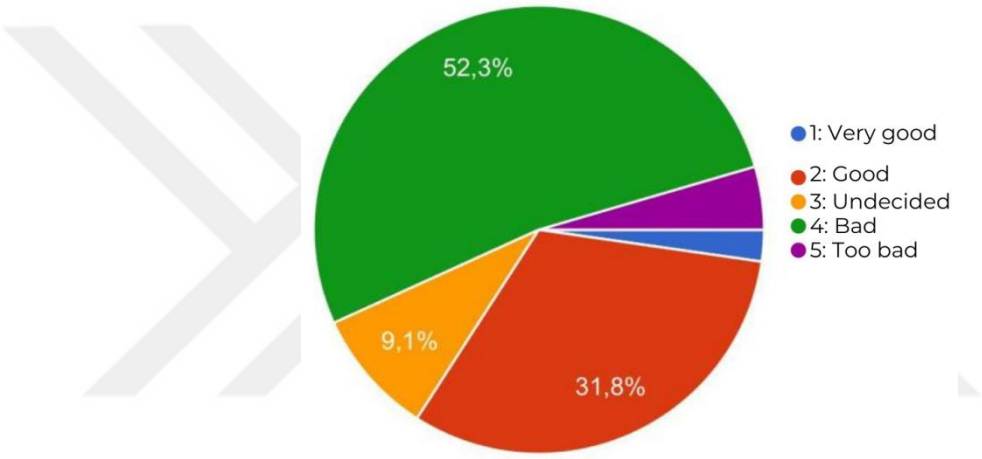


Figure 53. Chart of answer distribution of question 31 in the field of general satisfaction

39. Q: Are the aesthetic requirements (color-texture-material-form) suitable for the living space?

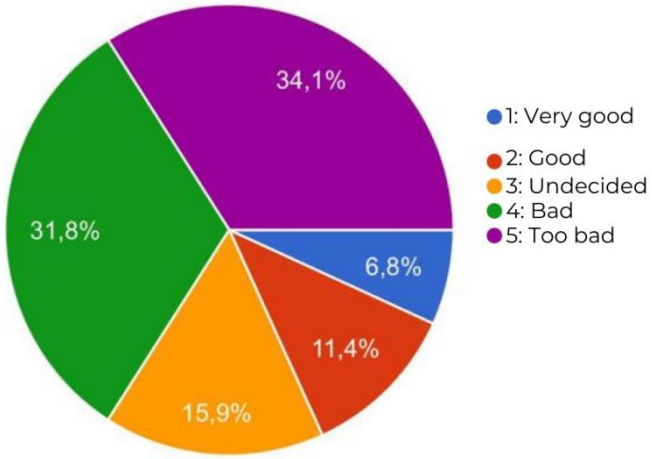


Figure 54. Chart of answer distribution of question 32 in the field of general satisfaction

If we evaluate the results of this survey according to Felix et al.'s 5 main principles for temporary housing, first of all, it is determined that the principle of "community participation" is missing in Bayraklı temporary housing. Felix et al. argues that their participation in construction works can have benefits for the recovery of society. In addition, the contribution of society to this process ensures that temporary housing solutions are compatible with their needs, expectations and local living standards. On the other hand, since those who settled in temporary housing after the Kahramanmaraş earthquake were placed in ready-made units, it was not possible for them to contribute to the temporary housing construction phase. But nevertheless, it has been stated that there were additions made after the Kahramanmaraş earthquake. During these additions, the participation of disaster victims in the construction phase could have been an element that would contribute in many ways. Another principle put forward is the principle of "planning ahead". Felix et al. argues that at the design stage, it is very important to produce solutions that are as flexible as possible in order to facilitate the reuse of the necessary adaptations. In Bayraklı container city, there is no area where users can customize their units or make additions according to their needs. As the survey results support, the area is insufficient for users. Temporary housing is also a workplace for disaster victims. Flexibility is very important to allow for simple and fast conversions, which allows the unit to accommodate these multifunctional areas. The principle of "design beyond the unit" has been taken into consideration and applied for Bayraklı temporary residences. This principle argues that the design of the units will be successful with the planning of the entire area surrounding them. The ease of transportation, proximity to workplaces and services of the context in which the units are located is important for the sense of belonging of the disaster victims. The Bayraklı container city also has the feature of being a container city designed taking into account the location. Moreover, it has been facilitated to create a community spirit and maintain social ties in this container city, which has proximity to public spaces that will provide an opportunity to socialize due to its location. Regaining a sense of community is crucial in post-disaster situations. On the other hand, the fact that the survivors are placed opposite the

folkart tower can be considered as a reason why the survivors are not happy with the view they see when they open the window. The fact that the understanding of housing at a minimum and the understanding of luxury housing are side by side can lead disaster victims away from a sense of belonging. The association of this element, which will evoke a feeling of comparison and class distinction, can adversely affect the healing process. In order to develop temporary housing solutions, it is stated in principle under the title of "context understanding" that all the characteristics such as culture, traditions, social organization, economic and political systems, religious beliefs, climate should be known and designed within the framework of these characteristics. According to this principle, the Bayraklı container city reveals the conclusion that heating and cooling are insufficient according to the survey results, the climate feature is not taken into account, and a failed application has taken place in this direction. On the other hand, it was stated that the placement of a mosque in the living units was considered in terms of religious beliefs. Containers in the Bayraklı container city are standard containers produced in the region by reaching local resources. This allowed the necessary container additions to be made for the disaster victims who will come to the region after the Kahramanmaraş earthquake easily. The living units in the Bayraklı container city has been an application that complies with the principle of Felix et al.'s "use of local resources". But regardless of the fact that it was done using local resources, the second earthquake that occurred in the country and increased the need for housing occurred in Kahramanmaraş, caused the displacement of some of the disaster victims who still reside in the Bayraklı container city after the İzmir earthquake. Some of the containers were emptied and sent to Kahramanmaraş, and then disaster victims from Kahramanmaraş were placed in the added containers. Due to the magnitude and severity of the earthquake, the emergence of emergency housing needs on a large scale has led to insufficient unit production. Therefore, there is a need for unit designs that are produced faster and can be adapted.

As the Bayraklı container city is evaluated within the framework of these 5 principles, it results in not meeting all of these principles. From this point of view, Bayraklı temporary housing lacks the necessary items to maintain comfortable and healthy living conditions.

CHAPTER 6: CONCLUSION

This chapter contains the conclusion part of the thesis. It also discusses future research proposals for researchers and guides the deficiencies and improvements of temporary housing design for designers. This study was based on the main question of "What are the design criteria in order to create temporary housing units to meet the users' need after disaster?". However, the sub-questions of my thesis cover of "What are the stages of temporary housing?, What are the fundamentals temporary units?, What are the types of plan layout,materials,technical systems and furniture used in temporary units?, How should temporary housing users feel the sense of belonging?". For this purpose, the Bayraklı container city, which is a temporary shelter center after the disaster, was examined and a survey study was conducted. The deficiencies and inadequate features of Bayraklı temporary residences were determined.

The survey entitled "Evaluation of Temporary Disaster Housing from the User's Point of View", which is collected under three headings as "commitment to space, spatial requirements and general satisfaction questions" and includes thermal, visual, auditory, social requirements and safety requirements, was applied to 44 disaster victims over the age of 18 in "İzmir-Bayraklı container city". According to the findings of this study, it has been determined that the greatest dissatisfaction of users is related to the lack of space, aesthetic requirements, sense of belonging, heating and cooling. It has been determined that there is no going forward from the containers used as temporary housing during the 1999 earthquake. There was a lack of a sense of design that would relieve the victims of the feeling of living in a narrow and boring space, and that would give them a sense of belonging during their time in adaptable and temporary housing.

The limited floor space limits the ability to freely participate in everyday activities such as cooking, socializing or pursuing a hobby. This lack of spatial requirements leads to a constant feeling of being cramped and limited, negatively affecting the mental and emotional needs of residents in these temporary housing units. The absence of spatial requirements not only hinders practical functioning, but also

negatively affects the psychological needs of disaster victims, deprives them of a sense of normalcy and hinders their recovery processes. Overall, addressing these shortcomings requires comprehensive planning, community engagement, and coordination between relevant stakeholders. By prioritizing safety measures, considering social requirements, and striving for context-specific designs, temporary housing solutions can better meet the needs of disaster victims, facilitate their recovery process, and contribute to the overall resilience and psychological needs of affected communities.

The survey study planned for the victims of the İzmir earthquake at the beginning of the study faced intense security measures and a long permit process due to the Kahramanmaraş earthquake in 2023 and the new disaster victims placed in the Bayraklı container city. With this, due to the privacy and psychological processes of the victims, the study was limited to the survey, as the governorship did not allow video and audio recordings from inside. Future studies can expand this research in terms of media such as image and sound. Based on the results of this research, future researchers can develop various design proposals as prototypes. Moreover, solutions that can be easily added to existing containers can be produced. The study can be extended by comparing it with examples of temporary housing abroad. In conclusion, the guidelines for provision, design, and construction of temporary housing in post-disaster scenarios offer a comprehensive framework for addressing the complex challenges faced by affected communities. The research and findings discussed throughout this thesis provide valuable insights that can shape the development of innovative and sustainable solutions, ultimately contributing to more effective disaster recovery efforts.

The guidelines presented in this study cover a multidimensional approach to temporary housing design. By integrating principles such as energy efficiency, space optimization, material selection and psychological needs, we can create flexible and sustainable shelter solutions that go beyond meeting basic needs. These guidelines provide a roadmap for architects, designers and policy makers to develop practical, dignified and context-sensitive temporary housing solutions that support affected communities in their journey towards recovery and self-sufficiency after a disaster.

The importance of this study is that it contributes to creating temporary housing solutions that not only meet emergency shelter needs, but also contribute to long-term recovery and sustainable development, taking into account the urgency of shelter provision, structural design, climate-specific considerations and psychological needs. However, it is to emphasize the development of a design that will make it easier for disaster victims to deal with difficult processes.

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APPENDICES

Appendix A. Evaluation of Temporary Disaster Houses from the Point of View of Users

Please circle the appropriate conditions..

Gender:	**Age:**		Time lived in earthquake housing (months)
F M	18-22	☐	(_____)
	22-30	☐	The qualification of the residence:
	30-40	☐	Tent ☐
	40-50	☐	Container ☐
	50+	☐	Prefabricated housing ☐

1) Mark the following questions as in the example:

☒ ☐ ☐ ☐ ☐

1 2 3 4 5

1: Strongly Disagree 2: Disagree 3: Undecided 4: Agree 5: Strongly Agree

QUESTIONS OF COMMITMENT TO SPACE

PRIVACY

1. There are places where I can stay alone when I want in temporary housing.

   ☐ ☐ ☐ ☐ ☐ Extra note:

   1 2 3 4 5

2. The temporary residence has separating mechanisms that allow me to host guests.

   ☐ ☐ ☐ ☐ ☐ Extra note:

   1 2 3 4 5

3. There are dividers in the temporary housing that provide visual privacy.

   ☐ ☐ ☐ ☐ ☐ Extra note:

   1 2 3 4 5

4. I have enough space to collect my attention while carrying out my personal affairs.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

PERSONAL SPACE

5. I feel that temporary housing belongs to me.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

6. I think temporary housing is a comfortable place.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

7. There is a place in temporary housing where I can store my belongings that have survived the disaster.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

TERRITORIALITY

8. I feel that I have different options regarding the design within the temporary residence.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

9. I can easily change the layout of furniture and equipment.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

CROWDING

10. Sufficient space is reserved for every need in temporary housing.

10.1. Course/Work workspace

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

10.2. Socializing Area

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

10.3. Kitchen Area

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

10.4. Storage

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

11. Temporary housing organization (living area, circulation areas, bedroom, wc) is comfortable for me.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

12. Temporary housing is a sufficient place for me in the first phase after the disaster.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

13. There are enough rooms for the number of family members.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

SPATIAL REQUIREMENTS

THERMAL REQUIREMENTS

14. The heat-moisture insulation was sufficient during the stay in the temporary residences.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

14.1. Heating

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

14.2. Cooling

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

14.3. Ventilation

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

14.4. Humidity

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

15. Air flow is provided through windows.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

VISUAL REQUIREMENTS

16. Lighting elements were sufficient.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

17. The place had suitable light intensity.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

18. The view I saw from the window made me happy.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

19. Sufficient daylight was getting in.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

AUDITORY REQUIREMENTS

20. Sound insulation was sufficient during the stay in temporary housing.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

SAFETY REQUIREMENTS

21. The temporary housing was protected against disasters such as fire.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

22. The temporary housing was protected against thieves.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

23. Temporary housing was protected against accidents in the area of action.

☐	☐	☐	☐	☐	Extra note:
1	2	3	4	5	

COMMUNAL REQUIREMENTS

24. Temporary housing was accessible for individuals with orthopedic disabilities.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

25. While providing temporary housing, social-cultural and commercial life were considered.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

26.Transportation was easily provided from temporary housing

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

27. The distance of the temporary residences to each other was appropriate.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

28. The placement of temporary housing units was planned (distance to the center, ease of transportation, easy provision of needs).

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

29. There were social equipment areas (green area, sitting areas, children's playgrounds, etc.).

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

30. As a disaster survivor, I contributed to the construction phase of temporary residences.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Extra note:

GENERAL SATISFACTION QUESTIONS

31. Your impressions of the place.

Too bad 1 2 3 4 5 Very good

32. Are the aesthetic requirements (color-texture-material-form) suitable for the living space?

Too bad 1 2 3 4 5 Very good