

A NEW APPROACH TO THE POST-DISASTER SHELTERING PROBLEM: TEMPORARY SHELTERING PROCESS MODEL PROPOSAL IN DISASTER MANAGEMENT (1)

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INTRODUCTION

The concept of disaster is defined by the United Nations as a set of events that seriously disrupt the ongoing functioning of a society (United Nations International Strategy for Disaster Reduction, 2009; Mayner and Arbon, 2015). The World Health Organization (WHO), on the other hand, defines a disaster as a situation that causes damage, destruction, and ecological degradation after any event, causing loss of life and requiring external assistance for humanitarian services to the area where the disaster occurred (Öztaş, 2019). After a disaster in a region, it is important to divide the process into periods in order to re-establish a new order or a habitual standard of living. In studies on disasters, there are two main processes: pre-disaster and post-disaster. In addition, the post-disaster process includes "emergency aid", "rehabilitation" and "reconstruction" stages (Savaşır, 2008). In this context, the disaster process consists of four stages: pre-disaster, emergency relief, rehabilitation and reconstruction, which have their own specific work plans (Xiang et al., 2018). These processes constitute the disaster cycle under the main headings of before and after the disaster.

The pre-disaster phase is considered as the most important period of the disaster process (Baradan, 2007). Authorities need to take precautions by predicting the damage that the disaster will cause. This stage is psychologically and materially more comfortable than the other stages since the disaster has not occurred and there is no urgent need. In the pre-disaster stage, a policy combining technical, social, and economic factors should be determined (Baradan, 2007; Davis, 1978; Alexander, 2000; Barakat, 2003; Lewis, 2003). For the sustainability of the post-disaster process and the reduction of loss of life and property, it is important to apply necessary planning approaches in the pre-disaster stage.

The emergency relief phase is a short-term phase that starts with the occurrence of a disaster. The main objective in this phase is to identify

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and minimize the physical and social destruction caused by the disaster, to take the living beings exposed to the disaster to the safe zones and to meet their urgent needs (Savaşır, 2008; Baradan, 2007). At this stage, emergency shelters are used to meet the sheltering needs of disaster victims. Depending on the magnitude of the damage caused by the disaster, individuals can return to their routine life order after the damage assessment is completed. However, in the aftermath of a severe disaster, the emergency relief phase may be longer than the foreseen period. The duration of this phase is directly related to the completion of search and rescue processes, removal of debris from the disaster area and the start of the temporary sheltering process (Shearer, 2011).

The rehabilitation phase is the period starting from the second week after the disaster and lasting until the completion of the construction of permanent housing (Savaşır, 2008). In this process, it is important to develop detailed design approaches according to the damage caused by the disaster and to meet the social, economic and psychological needs of individuals. In this context, temporary shelter, transitional shelter and temporary housing types are preferred (Bashawri et al., 2014; Rohwerder, 2016).

The reconstruction phase is the phase that lasts the longest compared to other post-disaster processes and where planning approaches are comprehensive. At this stage, planning experts carry out the construction of permanent dwellings necessary for the shelter needs of the disaster victims. Experts are defined as employees from different disciplines who take part in, evaluate and coordinate the post-disaster shelter needs (Nath et al., 2017). In addition to shelter, more effective, efficient and user-oriented design decisions for the region are handled in the reconstruction process in order to turn the damage caused by the disaster into an opportunity. With the reconstruction phase, the disaster cycle is completed and individuals are able to continue their life order.

Disaster Management and Shelter Processes

Shelter corresponds to different terms in the literature. Shelter is a building that provides safe use in the context of the family, protection from all elements, individual safety, physical accessibility, and proximity to the places demanded by individuals (workplace, education center, health facility, etc.). Shelter is a human settlement that includes the interior and exterior spaces of buildings that undertake the task of shelter in the immediate physical environment where families and households live together (Hadafi and Fallahi, 2010). Shelter is a habitable space that provides a private, dignified, safe and healthy living environment for family members (Torus and Şener, 2015). Although the concepts of shelter correspond to different definitions, they can generally be explained as safe spaces that meet the physical needs of people to sustain their lives. Shelter plays an active role in human life. In this context, meeting post-disaster shelter needs for disaster victims is not only about structural needs, but also about the needs of the communities affected by the disaster and the settlements affecting the society (Hadafi and Fallahi, 2010). These needs can be broadly listed as physical, health, maintenance of privacy for disaster victims and the whole community, psychological support and provision of livelihoods (Leon et al., 2009). After disasters that cause disruption of the ongoing standard of living, shelter, which is one of the basic needs, should be considered as a process rather than an object (Davis, 1978; Leon et al.,

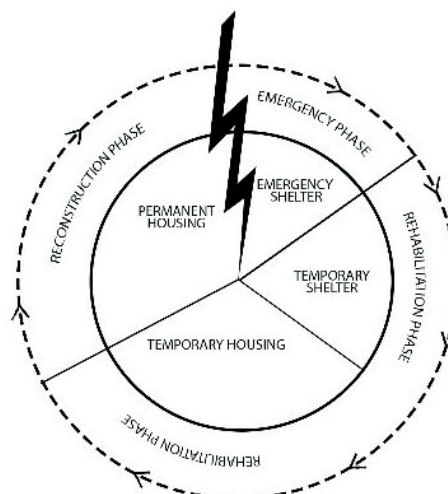


Figure 1. Types of shelter in disaster processes (Adapted from Xiang et al., 2018).

2009). Quarantelli (1995) defines the stages of disaster sheltering with the acceptance of post-disaster sheltering as a process:

- Emergency shelter: structures used for a short period of time when the emergency is at its peak (within hours)
- Temporary shelter: structures built in the first days after a disaster (within 1-2 weeks)
- Temporary housing: temporary places (within 6 months) where disaster victims can carry out their daily living routines,
- Permanent housing: post-disaster settlement becomes permanent (within 1-2 years) (Hadafi and Fallahi, 2010; Johnson, 2009) (Figure 1).

The Importance of Temporary Sheltering in Disaster Management

There are quite different definitions of the concept of temporary shelter in the literature. According to Johnson (2007), temporary shelter is one of the alternatives to shelter until the construction of permanent housing in disaster-affected societies and is accepted as a physical type of shelter as it is a process of reconstruction. Abulnour (2014) defines temporary shelter as structures to accommodate people affected by a conflict or disaster (Askar, 2018). According to Wagemann (2017), temporary shelter is a place where people affected by a disaster continue their lives for a short period of time before being provided with the most appropriate shelter after the disaster. Although Shearer (2011) states that temporary shelter is short-term because shelter is provided on a temporary basis, the important point is that it allows disaster victims to continue their daily home routines.

Although the concepts of short-term, shelter and transience come to the fore in the literature, the concept of temporary shelter needs to be addressed more comprehensively. Hadafi and Fallahi (2010) draw attention to the fact that temporary shelter should be considered not only as a living space but also with the people living in temporary shelter. In the aftermath of a disaster, individuals not only lose their homes that meet their shelter needs, but also lose their sociological, psychological and spiritual resources (Javadi and Khooshroo, 2016). Therefore, in order for temporary shelters to meet all the needs of disaster victims, a holistic planning approach should be brought to the issue at the design stage to support the reconstruction and development process (Hadafi and Fallahi, 2010). In this context,

temporary shelters are not only physical structures, but also a part of the social recovery process with all the functions they contain and are both physical and psychological spaces (Johnson, 2009).

Considering the uncertainty of the post-disaster period, the design of temporary shelter is expected to provide a better quality of life for individuals. While using temporary shelters, disaster victims have the opportunity to continue their normal routines and use these types of shelters during the settlement period in permanent housing to be built after the disaster (Rathansinghe et al., 2021). For example, temporary shelters built after the 2004 Indian Ocean tsunami in South Asia continued to be used as permanent housing. In this context, the potential for temporary shelters to turn into permanent housing is also important (Lizarralde, 2009). As a counter-argument, it is argued that temporary housing should be short-term due to its high cost and the need to meet the need for shelter quickly and practically (Wagemann, 2017). However, due to the dynamic nature of the post-disaster process and the inadequacy of societies' pre-disaster planning approaches, it is seen that temporary housing is used for longer rather than shorter periods. For example, in China, temporary housing was used for six months after the Wenchuan earthquake in 2008, while in South Korea, temporary housing built after Typhoon Ewinar in 2004 was used for five years (Hong, 2017). In addition to this, planning experts should consider temporary shelters built after disasters not only as temporary physical shelter, but also as structures that provide opportunities to meet the psychological, health, sociological, etc. needs of disaster victims and enable individuals to live the same standard of living as before the disaster in case of continuity of the sheltering process. In Turkey, the first earthquake with a magnitude of Mw 7.7 occurred at 04:17 on February 6, 2023 with the epicenter in the Pazarcık district of Kahramanmaraş province and the second earthquake with a magnitude of Mw 7.6 occurred at 13:24 on the same day with the epicenter in the Elbistan district (AFAD, 2023). In the aftermath of the two earthquakes, a total of 11 provinces including Kahramanmaraş, Hatay, Adıyaman, Gaziantep, Malatya, Kilis, Diyarbakır, Adana, Osmaniye, Şanlıurfa and Elazığ were severely affected and a total of 50,783 casualties and 36,932 building damages were recorded (TMMOB, 2023). The surface area affected by the earthquake was 108,812 km² (AFAD, 2023). Due to the magnitude of the earthquake's impact area and the high loss of life and building damage compared to other earthquakes, the February 6 Kahramanmaraş earthquake is considered to be the biggest disaster Turkey has experienced in the last 100 years (Dogan et al., 2024). In the aftermath of the earthquake, the central government, the local government, non-governmental organizations, local people and experts started to work on providing shelter, which is one of the basic needs. However, due to the devastation caused by the earthquake in eleven cities, it was determined in two field studies conducted in February 2023 and February 2024 that the need for shelter was not at the desired level. The main reason for this was seen as the lack of organizational solution to the shelter problem, the inadequacy of the relevant stakeholders in the context of post-disaster practices and the lack of managerial impact.

In countries where earthquakes occur, the multidisciplinary steps that need to be implemented to solve the problem of temporary shelter after earthquakes should be considered within the disaster cycle. In this context, the study has two main objectives: to identify the studies conducted on temporary shelter on an international scale and to identify the criteria

affecting temporary shelter on a national scale through experts. The study covers the process of presenting a model proposal to minimize the problems experienced in the temporary sheltering process after a disaster. The disaster management system is a cycle. Therefore, a common representation technique including the main and sub-criteria obtained by the Delphi method and the stakeholders responsible for these criteria was needed. In this context, as a result of the evaluation of the data obtained in the study, the shelter-specific disaster management model proposal is presented.

MATERIAL AND METHODS

Two main methods, quantitative and qualitative, were used in the study. These methods are meta-analysis and the Delphi technique. With meta-analysis, data on sheltering processes in disaster management studies were obtained through systematic literature research. The data obtained were used in the application of the Delphi technique in the second stage.

Stage I- Determination of sheltering criteria: Systematic examination of temporary sheltering studies in the literature and determination of criteria

Stage II- Analysis: Evaluating the potential of the criteria with high importance in disaster management and determining the criteria affecting the temporary sheltering process

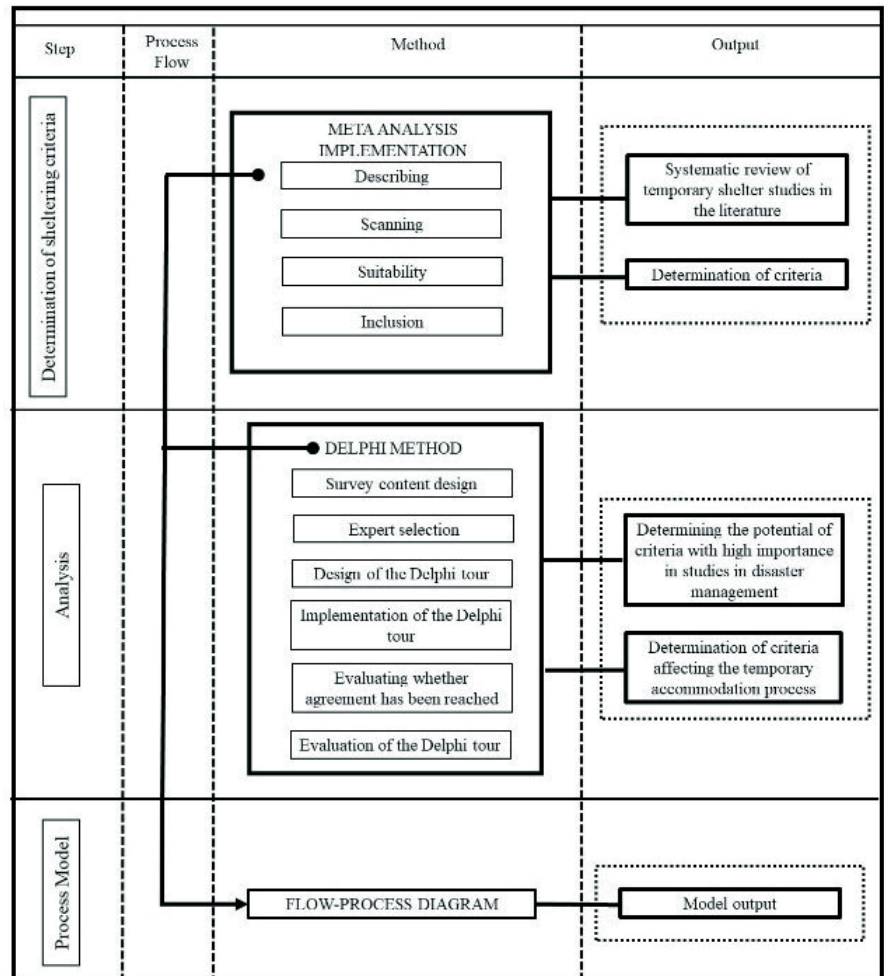


Table 1. Flowchart of research (created by authors).

Stage III- Process model: Design of the temporary shelter process model in disaster management (**Table 1**)

Meta Analysis

The word meta, which is of Greek origin, corresponds to the meanings of forward and exceeding the limit (Turgut, 2021). Over time, this concept has been defined as analysis of analyses. Meta-analysis is the combination and processing of data obtained from independent studies through statistical analysis (Turgut, 2021; Cooper et al., 2009; Cumming, 2012; Petticrew and Roberts, 2006; Umaroğlu, 2020). In 1976, Glass used the term meta-analysis for the first time in his study (Umaroğlu, 2020). After Glass's use of meta-analysis, this method was used in more than 800 studies in 1980-1991, and it has been a widely used method in literature reviews in the last 30 years (Bangert-Drowns and Rudner, 1991; Lyons, 2003; Schmidt, 2008; Balemen, 2016).

The primary purpose of the meta-analysis method is to obtain quantitatively more effective results by integrating the results of studies on a particular subject in specific date ranges within the framework of a systematic application (Haidich, 2010). The importance of this method is that it enables inconsistent information in the literature to be extracted and the solid scientific data obtained as a result of the selection are presented to the experts on the subject (Göktaş, 2017). The purposes of applying the meta-analysis method in the study can be listed as follows:

- To perform a general analysis of the studies obtained from the literature review.
- To obtain the effect size of the characteristics of temporary housing in the literature relative to each other.
- Emphasizing the scope of the work done in the context of temporary housing.

The first stage of the study includes determining the keywords required for meta-analysis. In this context, first of all, a search was carried out with the keywords post-disaster/temporary housing in the Web of Science search engine, and a total of 16,597 articles were reached. Due to the large number of studies, it was necessary to use the Vosviewer application in the determination and analysis of keywords. The Vosviewer application, which is defined as a text mining, provides clustering of relevant analyses, performs classification and creates visual data (Artsin, 2020). As a result of transferring the obtained results to the Vosviewer application, the total keywords were determined as 1559, the cluster 22, and the number of links as 23165 (**Figure 2**). As a result of the detailed analysis of the keywords, a total of seven keywords were determined to perform the meta-analysis: temporary shelter, disaster management, temporary housing, resettlement, temporary building, post-disaster design, and temporary dwelling (**Table 2**).

The Web of Science search engine was preferred to identify studies related to the subject. In the study, the Marmara earthquake that occurred in Turkey in 1999 was accepted as the beginning, and the studies until 2022 were analyzed. Keywords used in the database analysis and their results are shown in **Table 2**.

Systematic review and meta-analysis are essential practices that summarize the study accurately and reliably. The PRISMA system was preferred in

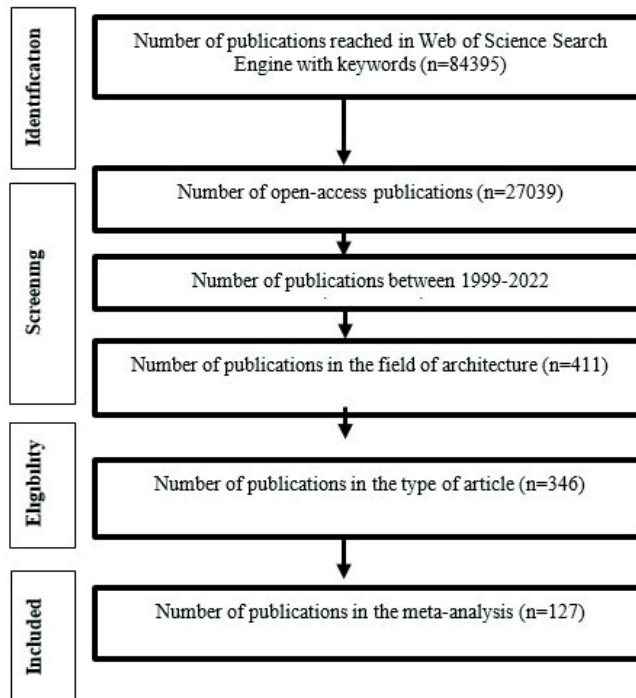


Table 3. PRISMA flowchart (created by authors).

127 studies from the analyzed full-text publications were used in the meta-analysis application (Table 3).

The publications obtained as a result of the systematic literature review were evaluated within the scope of the meta-analysis. As a result of the literature review, to determine the meta-analysis structure, a meta-analysis template was adapted according to the purpose of the study. In the meta-analysis template, there are a total of four main headings: author, content format-input/output and purpose-result. Sub-titles and definitions of these titles are shown in Table 4.

Delphi Technique

The word Delphi is associated with an ancient Greek myth of the Delphic Oracle, known as the chosen one on the island of Delphi, who was able to predict the future (Clayton, 1997). The Delphi method was invented in the 1950s by Helmer and Dalkey, who worked at the RAND company established for military planning. The method was developed for a project supported by the US Army (Dalkey and Helmer, 1963). The original name of the project is mentioned in the relevant sources as “obtaining the most reliable consensus by a group of experts using a series of intensive

Table 4. Meta-analysis classification system (Adapted from Ilter et al., 2008; Yaman and Ilhan, 2010; Ilhan, 2014; Kog, 2016; Aydın, 2021).

Category	Sub-Category	Category	Sub-Category
Author	Author	Form/ Relationship	Method
	Year		Contribution
	Country		Data type
	Keywords		
Content	Subject	Purpose-Outcome Relationship	Problem
	Study Level		Result
	Process		Tool

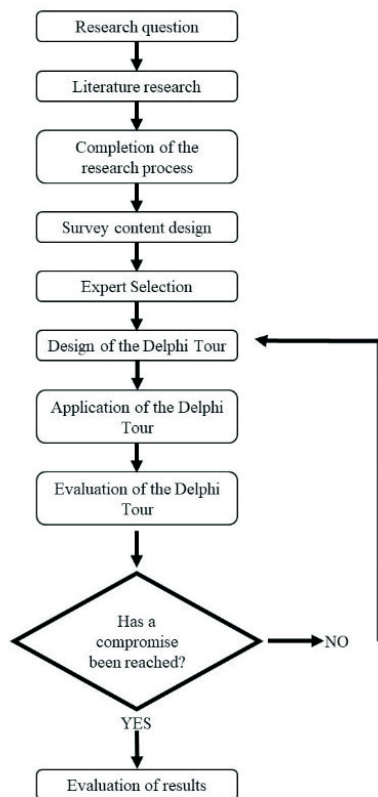


Table 5. Delphi method process flow chart (created by authors).

questionnaires interspersed with controlled opinion feedback” (Linstone and Turrof, 1975).

The implementation process of the Delphi method is presented in **Table 5**. First, the research problem is identified through a comprehensive literature review and the limitations of the study are clearly defined. Based on the literature review and focus group interviews with experts, the survey questions are prepared in a way that enables consensus analysis. Experts from different fields who are familiar with the subject are then selected. Following expert participation, the first round of the survey is conducted either face-to-face or online, ensuring that participants respond independently. The collected data are subsequently analyzed using appropriate statistical models to determine the level of consensus. Questions on which consensus is not achieved are revised and resent to the experts in subsequent rounds until consensus is reached. The final results are then reported for the relevant research topic.

Within the scope of the study, the stages of the application of the Delphi method are presented in detail under subheadings.

Survey content design: Answers to the following questions were sought in determining the survey questions:

- What will be the contribution of stakeholders responsible for disaster management to meet the need for temporary shelter in the disaster cycle?
- What is the degree of importance of the criteria that are effective in meeting the need for temporary shelter?
- What should be done in the pre-disaster and post-disaster process to meet the need for temporary shelter after a disaster?

In the preparation of the survey questions, the criteria obtained as a result of the meta-analysis were accepted as the main guide. The main objective of the survey is to manage the temporary sheltering process in disaster management in the most efficient and fastest way at the local scale. In this context, the survey questions were prepared to include the effective role of the relevant stakeholders in the temporary sheltering process before and after the disaster and their impact on the criteria.

Expert Selection: In the Delphi method, there are general principles in the expert selection process. These principles may vary according to the nature of the study. In their study, Rowe and Wright (2001) stated some general considerations about the experts who will apply the method. These are:

- Experts have appropriate domain knowledge related to the subject of study,
- Utilizing heterogeneous groups from different majors,
- Determining the number of experts ranging between 5-20 people,
- Sharing the average and median result of the panel for feedback at the end of each survey,
- Continuing the Delphi round count until consensus is reached.

Among the items mentioned above, it is usually the number of experts that varies in studies. Armstrong (1985) considers 5-20 experts sufficient for the application of the method (Armstrong, 1985). Ludwig (1997) argues that the Delphi method can vary between 15 to 20 experts (Aslan, 2016). Dimitrijević

Profession	Number
Architect	7
Disaster Expert	5
Engineer	3
City Planner	2
Age	Number
25-39	7
40-59	10
Experience	Number
0-5 years	6
6-10 years	4
11-20 years	4
20 years and above	3

Table 6. Demographic characteristics of the participants (created by authors).

et al. (2012) suggest that the number of experts should be between 10 and 18. In the study, it was decided that the sample size should be 17 in line with these propositions. The opinions of 17 experts were taken in the study. In terms of professional distribution, 7 of them are architects, 5 are disaster experts, 3 are engineers and 2 are urban planners (**Table 6**).

Design of the Delphi round: The questions were posed to the experts in the form of propositions, and they were asked to evaluate the questions on a 7-point Likert scale from "1 - very low importance" to "7 - very high importance". The questionnaire was administered to experts under 5 main headings (management planning, social performance, architectural performance, environmental performance and economic performance) and 14 sub-headings.

RESULTS

In the study, firstly, a meta-analysis application was carried out. Afterwards, the model proposal design was created by taking expert opinions with the Delphi method with the data obtained.

Meta Analysis Implementation

In the study, 127 articles were examined according to the main and sub-categories in **Table 3**. A detailed list of articles in the meta-analysis is included in the appendix. The author category includes sub-categories of the author, year, country, and keywords. An objective grouping was made according to the data obtained. In the sub-category of the author, the evaluation was carried out according to the number of authors who made the study. As a result of the assessment, it has been determined that the number of publications with one author is higher, while the number of publications with two authors and three or more authors is equal. Considering the publication year, although the analysis study was determined between 1999 and 2021, the data obtained started in 2005. When the graph is examined, there was a gradual increase between 2015 and 2018. In 2020, it reached the highest value with 22 publications. Voswiever application was used to determine the keywords in the studies. First, all keywords from 127 studies were collected in Voswiever, and then the most repeated words and their relationships with each other are shown in **Figure 3**.

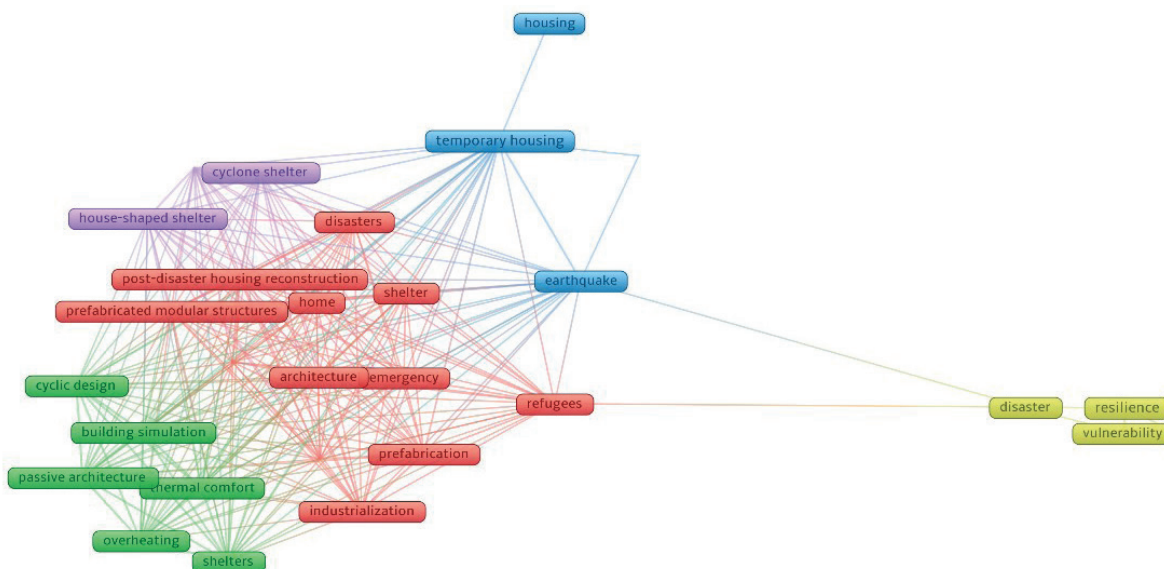


Figure 3. Distribution of keywords in studies (created by authors).

The content category, which is the second category of meta-analysis, was analyzed in three sub-categories: subject, study level and content (Figure 3). In order to better analyze the content category, the studies were examined in seven sub-categories: regional, shelter, case study, algorithm, industry, literature and material. As can be seen in Figure 3, it is seen that regional (62), shelter (37), case study (13), algorithm (6), sector (5), literature (4) and material (2) topics are included in the temporary housing studies, respectively. In the process sub-category, the studies were examined in the context of analysis, design, planning and production. It has been determined that some of the studies examined within the scope of meta-analysis have more than one sub-process. It was determined that most analysis processes (94) were included in the studies, followed by the design (55), planning (21) and production (2) processes, respectively.

The form and input-output category examined within the scope of meta-analysis consists of three sub-categories: contribution, method and data type. The contribution sub-category is an analysis study on how the studies contribute to temporary housing. In this section, studies are evaluated in the context of system development, model building and statistical results contributions. As a result of the analysis, it is seen that in the context of the contributions of the studies to the ongoing process, system development (77) was studied the most, followed by model building (42) and statistical results (11). When the methods adopted by the studies were examined, the analysis process was carried out in three sub-categories: case study, practice-oriented and mutual interview. As can be seen in Figure 4 as a method in the studies, case study (74) was used the most, followed by practice-oriented (47) and mutual interview (21) methods, respectively. It is seen that the case studies in the articles are generally aimed at analyzing the uses of temporary housing designs around a region. Examples of determining the energy performance of a temporary residence or solving existing problems are evaluated within the scope of the application. The face-to-face interview method is generally used in user, expert, or management-oriented studies. In the data type sub-category, it was determined that qualitative (92) data analysis was used the most, followed by qualitative-quantitative (18) and quantitative (17) analyses.

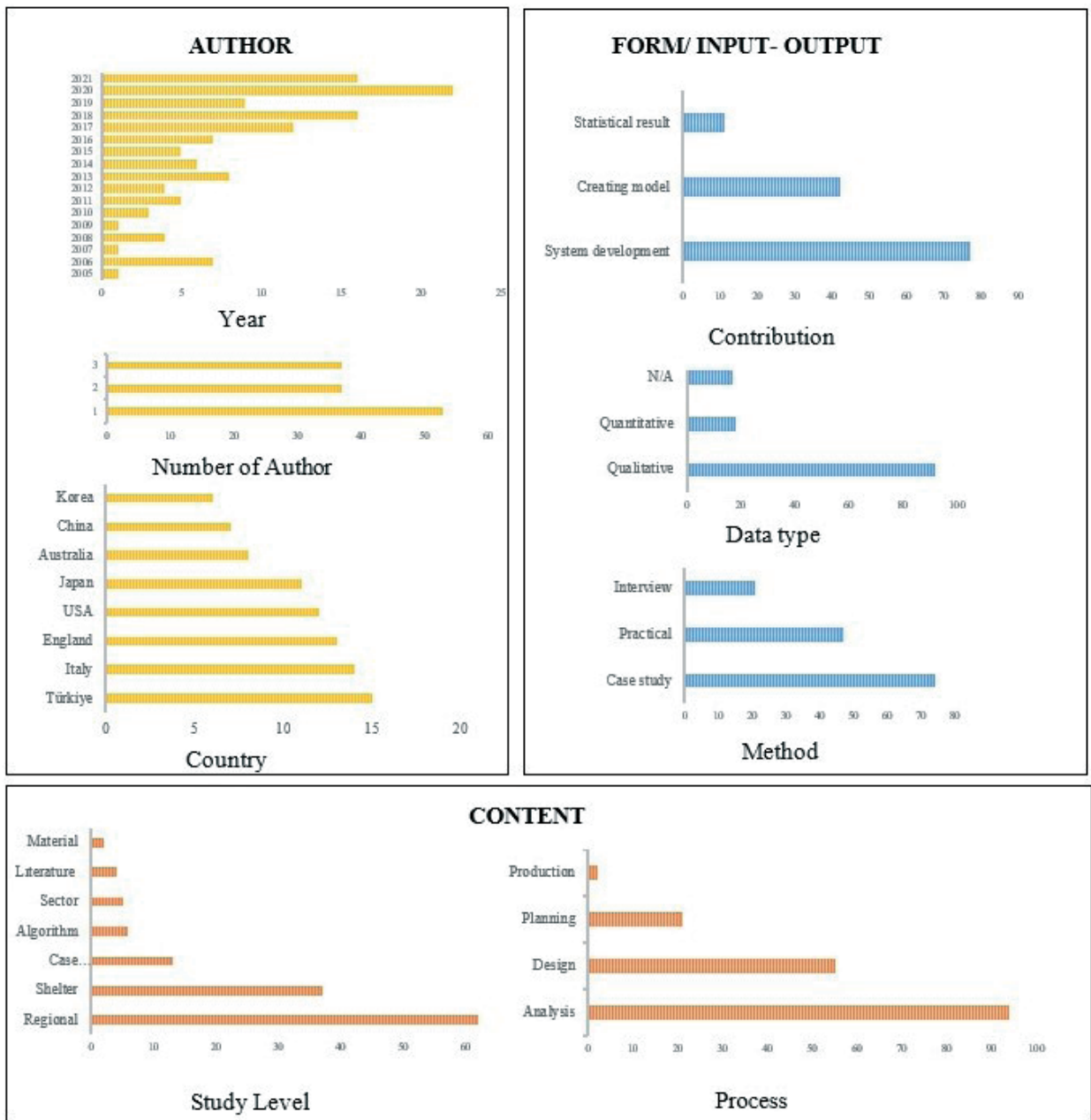


Figure 4. Meta-analysis classification data (created by authors).

The last part of the meta-analysis is the goal-result category, which is divided into three sub-categories: problem, conclusion, and evaluation. In this category, the criteria in the articles were determined and the frequency of use of these criteria was determined by meta-analysis. In the evaluation, criteria with similar meanings were combined under the same title and 39 criteria were determined. The studies in which these criteria are included and the frequency of their use are shown in Table 7.

Within the scope of meta-analysis, 39 criteria were obtained with the review of international literature. Since the study includes a model proposal for the post-disaster temporary shelter in Turkey, the focus group interview technique, one of the qualitative interview techniques,

Criterion	Number	Criterion	Number
Community Participation	19	Local Material	7
Locality	19	Affiliation	6
Flexibility	19	Regional Planning	6
Modularity	18	Natural Material	6
Sustainability	17	Durability	6
Management Plan	16	NGO	5
Adaptability	15	Landscape	5
Local Government	13	Thermal Performance	5
User profile	13	Prefabrication	5
Cost	13	Smart Material	3
Adequate Standard	13	Accessibility	3
Smart System Applications	12	Aesthetic	3
Persistence Potential	10	Contractor	2
Usage Time	9	Storable Material	2
Construction Techniques	9	Privacy	2
Time	9	Combinability	2
Land	8	Security	2
Material Cycle	8	Noisy	1
Expert	8	Logistics	1
Climate	7		

Table 7. The criteria obtained in the analysis (created by authors).

was applied in order to re-evaluate the meta-analysis criteria for Turkey. Focus group interviews are the process of experts with different technical characteristics independently presenting their opinions on different topics (Byers and Wilcox, 1988). For the focus group interview, it was ensured that the participants were experts on disaster and had field experience. After the interviews with the experts, the main criteria and sub-criteria are given in the table and taken as a basis for the propositions to be created for the Delphi method (Table 8).

Delphi Technique Implementation

The Delphi method was applied in two rounds online with experts on disaster and sheltering in Turkey. The first round survey was conducted in August-2023 and evaluated in September-2023. A second questionnaire content was designed in which the questions that could not be agreed upon were asked. The same experts were asked the second round of

Main criterion	Sub-criterion
Management Planning	Disaster Management Plan
	Local government
Social Performance	Expert Support
	Community Participation
	User profile
Architectural Performance	Flexibility
	Adaptability
	Modularity
Environmental Performance	Material
	Field Selection
	Climate
Economic Performance	Cost
	Construction Techniques
	Time

Table 8. Categorization of criteria (created by authors).

survey questions via Google Forms in October 2023. The data obtained as a result of the two rounds formed the basis for the model to be designed for temporary shelter.

Evaluation of the Delphi round: The data obtained from the first round of surveys was evaluated based on four main concepts: median, first quartile, third quartile and inter-quartile difference. To explain the related concepts, the scores given by all participants are ranked from smallest to largest,

- Median: Point with 50% of the answers to the left and 50% to the right,
- First quadrant: The point that takes 25% of the answers to the left and 75% to the right,
- Third quadrant: The point with 25% of the answers to the right and 75% to the left,
- Inter-quarter gap: The difference between the third quarter and the first quarter,

is defined as the difference between quartiles. The consensus decision of the questions is determined according to the difference between quartiles. If the difference between the quartiles is 1 on a 5-point Likert scale and if the difference between the quartiles is more than 1.2 on a 7-point Likert scale, it is accepted that no consensus has been reached and the questions should be asked to the participants again.

DISCUSSION

With the data obtained as a result of the meta-analysis and Delphi method, the stages of the model aiming to provide a solution to the housing problem with the disaster management system in Turkey are discussed in this section. In the model proposal, the items that were agreed upon among the propositions directed to the experts by the Delphi method were taken into consideration. The objectives in the creation of the model proposal can be listed as follows:

- The fact that the sheltering problem is a more comprehensive issue than just a design-oriented issue and needs a multidisciplinary perspective,
- The necessity to take steps specific to temporary shelter within the scope of pre-disaster risk management and post-disaster crisis management,
- Categorizing shelter problems and providing solutions in a fast and practical way,
- Identifying shelter problems, identifying responsible stakeholders and implementing the right collaborations.

The model proposal consists of two main stages: pre-disaster and post-disaster. In these stages, there are four main criteria as planning, design, implementation and training. Along with the main criteria, sub-criteria and responsible stakeholders are also included in the pre-disaster and post-disaster phases. These stakeholders consist of 5 different categories as central government, local government, experts, local people and non-governmental organizations (NGOs). Explanations of the criteria and stakeholders are given below:

Main criterion	Sub criterion	Question	Min	Max	Q1	Q3	Median	IQR	compromise
M.P	Disaster Management Plan	1.1.a	2	7	5	7	6	2	No
		1.1.b	3	7	6	7	7	1	Yes
		1.1.c	2	7	5	6	5	1	Yes
		1.1.d	4	7	6	7	7	1	Yes
		1.1.e	1	7	5	6	6	1	Yes
		1.1.f	2	7	4	5	4	1	Yes
		1.1.g	1	7	2	5	3	3	No
		1.1.h	2	7	4	7	5	3	No
	Local government	1.2.a	4	7	6	7	7	1	Yes
		1.2.b	2	7	3	6	4	3	No
		1.2.c	4	7	6	7	6	1	Yes
		1.2.d	4	7	4	7	5	3	No
		1.2.e	2	7	5	7	6	2	No
		1.2.f	4	7	4	7	6	3	No
S.P	Expert Support	2.1.a	2	7	6	7	7	1	Yes
		2.1.b	3	7	5	7	6	2	No
		2.1.c	1	7	2	4	3	2	No
		2.1.d	4	7	6	7	6	1	Yes
		2.1.e	1	7	2	5	3	3	No
	Community Participation	2.2.a	2	7	5	7	6	2	No
		2.2.b	4	7	6	7	6	1	Yes
		2.2.c	5	7	5	7	6	2	No
		2.2.d	3	7	5	7	6	2	No
		2.2.e	2	7	6	7	7	1	Yes
		2.2.f	5	7	6	7	6	1	Yes
		2.2.g	4	7	6	7	6	1	Yes
		2.2.h	6	7	7	7	7	0	Yes
		2.2.i	4	7	5	7	6	2	No
		2.2.j	1	6	3	5	5	2	No
	2.2.k	2	7	5	7	6	2	No	
	2.2.l	1	7	2	4	2	2	No	
	User profile	2.3.a	1	7	5	6	5	1	Yes
		2.3.b	1	7	6	7	7	1	Yes
		2.3.c	3	7	5	7	6	2	No
2.3.d		3	7	5	7	7	2	No	
2.3.e		1	7	5	6	6	1	Yes	
A.P	Flexibility	3.1.a	5	7	6	7	6	1	Yes
		3.1.b	3	7	5	6	6	1	Yes
		3.1.c	5	7	6	7	6	1	Yes
		3.1.d	4	7	6	7	7	1	Yes
		3.1.e	5	7	7	7	7	0	Yes
		3.1.f	6	7	7	7	7	0	Yes
		3.1.g	4	7	7	7	7	0	Yes
		3.1.h	2	7	6	7	6	1	Yes
		3.1.i	1	6	1	4	3	3	No
		3.1.j	2	7	4	6	4	2	No
		3.1.k	1	7	3	5	4	2	No
	Adaptability	3.2.a	1	7	5	6	6	1	Yes
		3.2.b	1	7	5	7	6	2	No
		3.2.c	1	6	3	6	4	3	No
		3.2.d	1	7	3	5	4	2	No
		3.2.e	4	7	6	7	7	1	Yes
		3.2.f	1	7	3	6	5	3	No
	Modularity	3.3.a	4	7	6	7	6	1	Yes
		3.3.b	2	7	4	6	4	2	No
		3.3.c	2	7	5	7	6	2	No
3.3.d		4	7	6	7	7	1	Yes	
3.3.e		1	7	6	7	6	1	Yes	
3.3.f		4	7	6	7	6	1	Yes	
3.3.g		2	7	6	7	6	1	Yes	
3.3.h		2	7	4	6	5	2	No	
3.3.i		4	7	6	7	6	1	Yes	
3.3.j	2	7	5	7	6	2	No		
Material	4.1.a	2	7	6	7	6	1	Yes	
	4.1.b	3	7	6	7	7	1	Yes	
	4.1.c	1	7	3	6	5	3	No	
	4.1.d	4	7	6	7	7	1	Yes	
	4.1.e	3	7	5	7	6	2	No	

Table 9. Round 1 results (created by authors).

Main criterion	Sub criterion	Question	Min	Max	Q1	Q3	Median	IQR	compromise
E.P		4.1.f	2	7	4	7	5	3	No
		4.1.g	1	7	4	6	5	2	No
		4.1.h	1	7	5	6	5	1	Yes
		4.1.i	1	7	3	6	5	3	No
		4.1.j	1	7	3	5	4	2	No
	Field Selection	4.2.a	5	7	7	7	7	0	Yes
		4.2.b	5	7	6	7	7	1	Yes
		4.2.c	6	7	7	7	7	0	Yes
		4.2.d	5	7	7	7	7	0	Yes
		4.2.e	6	7	7	7	7	0	Yes
		4.2.f	5	7	6	7	7	1	Yes
		4.2.g	5	7	7	7	7	0	Yes
	Climate	4.3.a	6	7	6	7	7	1	Yes
		4.3.b	5	7	6	7	7	1	Yes
		4.3.c	5	7	6	7	7	1	Yes
E.P	Cost	5.1.a	3	7	4	7	6	3	No
		5.1.b	3	7	6	7	7	1	Yes
		5.1.c	3	7	4	7	5	3	No
		5.1.d	1	7	4	7	5	3	No
	Construction Techniques	5.2.a	1	7	3	6	3	3	No
		5.2.b	5	7	6	7	6	1	Yes
		5.2.c	2	7	4	6	5	2	No
		5.2.d	1	6	3	5	3	2	No
		5.2.e	1	7	4	5	5	1	Yes
		5.2.f	4	7	6	7	6	1	Yes
		5.2.g	3	7	5	7	6	2	No
	Time	5.3.a	5	7	7	7	7	0	Yes
		5.3.b	4	7	6	7	6	1	Yes
		5.3.c	5	7	6	7	7	1	Yes
		5.3.d	5	7	6	7	7	1	Yes
5.3.e		2	7	6	7	7	1	Yes	
M.P : Management Planning			E.P : Enviromental Performance						
S.P : Social Performance			E.P : Economical Performance						
A.P : Architectural Performance									

Table 9 (continued). Round 1 results (created by authors).

- Education: This main criterion covers all the multidisciplinary information that may affect the solution of the sheltering problem before and after the disaster. The aim of this phase is to enable relevant stakeholders to exchange information and increase their competencies in specialized topics.
- Planning: This criterion is considered not only in the specific context of temporary shelter but also in the context of minor and major factors affecting shelter and the stakeholders involved in meeting the need for shelter.
- Design: In the main criterion of design, the points to be considered in the design of shelter and the necessity to categorize and examine the “design” perspective are emphasized. In particular, the changes in the pre-disaster and post-disaster design approach and the stakeholders who play an active role in this process are covered in detail.
- Implementation: This stage includes different perspectives before and after the disaster. While the pre-disaster implementation process covers technical support in general, the steps applied in the post-disaster housing phase play an active role in the formation of a city resilient against to possible disasters.

Stakeholders involved in the model study:

Main criterion	Sub criterion	Question	IQR round 1	Min	Max	Q1	Q3	Median	IQR	Compromise
M.P	Disaster Management Plan	1.1.a	2	2	7	5	7	6	2	No
		1.1.g	3	2	6	3	5	4	2	No
		1.1.h	3	2	7	4	7	5	3	No
		1.2.b	3	2	7	4	5.5	4	1.5	No
		1.2.d	3	3	7	5	7	5.5	2	No
		1.2.e	2	3	7	4	6	6.5	2	No
		1.2.f	3	4	7	5	7	6	2	No
		2.1.b	2	3	7	5	7	6	2	No
		2.1.c	2	1	6	2.5	5	4	2.5	No
	2.1.e	3	1	7	1	5	2.5	4	No	
	Local government	2.2.a	2	2	7	5	7	6	2	No
		2.2.c	2	4	7	5.5	7	6	1.5	No
		2.2.d	2	3	7	5	7	6	2	No
		2.2.a	2	3	7	4.5	7	6	2.5	No
		2.2.j	2	1	6	2.5	5	4	2.5	No
		2.2.k	2	3	7	5	7	6	2	No
		2.2.l	2	1	6	2	5.5	3.5	3.5	No
		2.3.c	2	3	7	5	6	5.5	1	Yes
		2.3.d	2	3	7	5.5	7	6	1.5	No
		3.1.a	3	1	6	2	4	4	2	No
		3.1.j	2	1	7	4	6	5	2	No
		3.1.k	2	1	7	3.5	6	5	2.5	No
		3.2.b	2	2	7	5	6	6	1	Yes
		3.2.c	3	1	6	3	5	4	2	No
		3.2.d	2	1	6	3	6	4	3	No
		3.2.f	3	1	7	3	6	4	3	No
		3.3.b	2	1	5	3.5	5	4	1.5	No
		3.3.c	2	5	7	5.5	7	6	1.5	No
		3.3.h	2	4	7	5	6	6	1	Yes
		3.3.j	2	1	7	4	6.5	5.5	2.5	No
		4.1.c	3	1	7	4	5.5	4	1.5	No
	4.1.e	2	4	7	5	6	5	1	Yes	
	4.1.f	3	3	7	5	6	5	1	Yes	
4.1.g	2	2	7	4	6	5.5	2	No		
4.1.a	3	3	7	4	6.5	5.5	2.5	No		
4.1.j	3	3	7	3.5	7	4	2.5	No		
E.P	Cost	5.1.a	2	3	7	6	7	7	1	Yes
		5.1.c	3	3	7	5	6.5	6	1.5	No
		5.1.d	3	2	7	4	6	5	2	No
		5.2.a	3	3	7	3.5	5	4	1.5	No
		5.2.c	2	4	7	4	5	5	1	Yes
		5.2.d	2	1	7	3	5	3.5	2	No
5.2.g	2	5	7	6	7	6	1	Yes		

Table 10. Round 2 results (created by authors).

- Central government: This stakeholder includes relevant ministries, official institutions and organizations such as AFAD, governorships and district governorships,
- Local government: Institutions such as municipalities and mukhtars responsible for the relevant region,
- Experts: Technical staff responsible for the education, planning, design and implementation of the shelter,
- Local residents: The community living in disaster-prone areas or the people residing in the area where the disaster occurs,
- Non-governmental Organizations (NGO): Organizations that operate independently within the borders of Turkey and whose main purpose is human-oriented service.

existing studies, only one issue-oriented approach is presented and the importance of stakeholders is not emphasized. In this context, the model proposal contributes as a guide for many stakeholders to work in harmony in the pre and post-disaster process in the context of different criteria.

The disaster cycle covers four main phases: pre-disaster phase, post-disaster emergency relief phase, post-disaster rehabilitation phase and post-disaster reconstruction phase. Since the model proposes a shelter-specific system, it consists of two main perspectives: pre-disaster and post-disaster. It is aimed to develop solutions for the temporary shelter problem in a multidisciplinary context before and after the disaster. It also aims to provide guidance on which stage and criteria the relevant stakeholders should play a role.

In both pre-disaster and post-disaster phases in the model, the main criteria of education, planning, design and implementation and related sub-criteria are included under these criteria. Around each sub-criterion, the stakeholders related to the criterion are marked. These stakeholders are listed under five main tabs: central government, local government, experts, local people and non-governmental organizations. The design of this model provides an opportunity to see the information presented graphically as a whole.

CONCLUSION

As a result of the study, several critical findings were obtained within the framework of the proposed model. In this context, the training criterion, which constitutes the primary stage of the pre-disaster process, emphasizes that the training on risk mitigation policies overseen by the central government is fundamental to minimizing potential disaster damages and fostering a resilient urban perspective among stakeholders. Beyond central coordination, the study further suggests that sheltering training should be conducted through a collaborative synergy involving local administrations, residents, experts, and non-governmental organizations. This multi-layered educational approach aims to cultivate specialized personnel within local governments, leverage community support to address sheltering challenges, and ensure a seamless transition into the post-disaster phase by integrating the capacities of non-governmental organizations relative to the disaster's scale.

In the main criterion of training addressed within the scope of postdisaster temporary sheltering processes, firstly damage assessment training and then shelter establishment training is recommended. It is important to classify and identify the structures affected by the disaster in order to clarify the number of temporary shelter units that should be in the region to meet the need for shelter after the disaster occurs. In this context, it is recommended that a team of experts in damage assessment should analyze the region immediately after the disaster. Prior to this process, training should be conducted with the central administration and relevant experts. In addition to this training, post-disaster shelter installation training is also important. Depending on the magnitude of the damage after the earthquake, it is thought that the temporary sheltering process will be completed quickly by supporting the sheltering of all stakeholders.

In the disaster management process, the concept of locality is a debatable issue for experts in Turkey. Within the scope of the study, while there is a consensus on the temporary sheltering process specific to the cultural

norms in the region, there is no consensus on more specialized issues. In this context, in the main criterion of training, it is recommended that training on local architecture and cultural values be conducted in line with the opinions of the relevant stakeholders.

One of the sub-criteria of the main criterion of planning is the process of developing risk reduction policies. This process takes place in pre-disaster and post-disaster phases and covers all planning studies for reevaluation and development of existing policies. Besides, the proposed disaster coordination plan includes a holistic approach in which all stakeholders will participate. It is suggested that the management plan studies conducted before the disaster should be continued in the post-disaster phase as well. This perspective is based on the fact that disaster management plans are a set of processes that need to be continuously monitored and improved.

Cost calculation is an issue that should be considered in all processes of temporary shelter. In this context, in the pre-disaster process, it is necessary to have a shelter-specific cost fund account and to determine the average costs of temporary shelter units to be used in disasters during the design, implementation, logistics storage, etc. stages. In addition, in the planning phase after the disaster occurs, the cost calculation of the temporary shelter units needed should be re-evaluated and support should be taken from the shelter-specific cost fund account established before the disaster. In the post-disaster planning phase, cost estimations should be updated and financial support should be allocated from the pre-established shelter-specific cost fund under the coordination of the central government and in cooperation with NGOs.

Within the scope of meeting the need for shelter after disasters, it was determined that the need for shelter was generally met in public buildings during the emergency phase after the February 6 Kahramanmaraş earthquakes in Turkey. In this context, it is suggested that public buildings should be specifically addressed in the temporary sheltering process. In the pre-disaster process, the resilience of public buildings in the region against earthquakes and secondary disasters should be analyzed and sheltering capacity should be calculated.

In order to meet the need for post-disaster shelter, temporary shelter site selection was determined before the disaster under the leadership of official institutions. As a result of the study, it is recommended to re-evaluate the suitability of the existing settlements for temporary shelter through field studies. Relevant areas should be classified according to disaster scenarios and care should be taken to ensure that they have the capacity to meet projected shelter needs. In addition to this, the property rights of temporary shelter settlements should be clarified in the predisaster process and implementations should be made in a way to prioritize state-owned lands. With the occurrence of the disaster, it is recommended that the lands planned before the disaster should be re-evaluated according to the magnitude of the disaster. In the planning phase, the settlement plan of the relevant land should take into account the settlement planning of the disaster victims, the creation of social facilities, and the addition of the necessary centers to meet basic needs such as education and health.

The process of solving the problem of temporary shelter is associated with the involvement of specialists in this process. The concept of shelter specialist is used throughout the study and this concept covers

the technical personnel needed in the temporary shelter process in the international literature. In Turkey, it is recommended that the concept of shelter specialist should be defined in an official context with acceptable scales and specific definitions. In this context, the duties and responsibilities of each technical personnel in the sheltering process should be clearly defined. In addition, stakeholders involved in the temporary shelter model proposal should plan to allocate shelter experts within their own organizations. These experts should represent the institutions in shelter-specific studies.

In the temporary sheltering process, the design perspective is evaluated in different scopes before and after the disaster. In the pre-disaster design process, it is recommended that the preferred materials should be accessible, modular, easy to assemble and at a level that can be quickly disassembled after the application. In the post-disaster process, waste recycling issues are important within the scope of evaluating the amount of waste by considering the life cycle of the materials. When an adaptable and flexible temporary shelter unit is preferred, shelter units should be given the opportunity to meet different needs in the permanent housing phase after the disaster. It is thought that this perspective will support a sustainable and effective temporary sheltering process.

In the design of temporary shelters, the housing and living culture specific to the region should be taken into consideration and a uniform design perspective should not be preferred. Another important point to be considered in the design process is the development of a user-specific design perspective. Designers should pay attention to the user-centeredness of the temporary sheltering process and it is recommended to produce design alternatives for the changing needs of the users according to the possibility of prolonging the process. Since the proposed region-oriented design process is shaped according to disaster scenarios, this perspective should be re-evaluated after the disaster occurs. In this context, it is thought that a more realistic perspective that will support crisis management will be obtained by considering the impact of the disaster.

It is foreseen that the temporary sheltering process will be completed and transition to permanent housing process will be made with the main steps of implementation after the disaster. In this context, as a result of the steps of the model proposal designed for temporary sheltering and the completion of the sheltering stages with the contribution of responsible stakeholders, it can be ensured that the disaster cycle continues in a sustainable manner.

As a result of the general evaluation of the analyses conducted within the scope of the study, the following results were obtained:

- The concept of shelter is not only the structures that meet the Disaster-specific earthquakes are a reality that should be accepted. In this context, precautions should be taken before the earthquake and pre-disaster risk management activities should be evaluated together with the central government and other relevant stakeholders.
- The concept of shelter is not only the structures that meet the The steps to be taken after the disaster occurs should not remain in the relevant report within the theoretical scope, earthquake drills and disaster scenarios should be implemented organizationally with all stakeholders.

- The concept of shelter is not only the structures that meet the basic needs of disaster victims, but also a specialized area that provides support for disaster victims in order to solve the physical, sociological and psychological damage caused by the disaster as soon as possible. In this context, the need for shelter should not be seen as a criterion to be met after a disaster, but should be included in every stage of the disaster management system.
- It is the sum of the data obtained as a result of the meta-analysis of the main criteria of education, design, planning and implementation in the disaster management model for temporary shelter. One of the main objectives of the study is to determine the criteria affecting temporary shelter at the international scale and to analyze their acceptability at the local scale. In this context, the model proposal designed specifically for Turkey is considered to have a scope applicable for disaster-prone cities.
- The massive destruction that occurred after the February 6 Kahramanmaraş earthquakes in Turkey made it difficult to implement the sheltering processes in the literature. In this context, instead of relying on the literature in disaster scenarios, it is recommended to create sheltering processes at local scale. The study is in a structure that will support future sheltering processes in the local context, and it is thought that the study will be a guide for the steps to be taken towards the problem of temporary sheltering in Turkey.
- The problem of temporary shelter is an issue that needs to be addressed in a multidisciplinary framework rather than a design-oriented solution in the context of an architectural perspective. In this context, the study includes main criteria for implementation, planning and education as well as design criteria. These criteria defined the general framework. The aim of the proposed model is to provide a basis for future studies.
- The disaster management model for temporary shelter is seen as a step towards solving the post-disaster shelter problem in Turkey. In this step, the cooperation of five main stakeholder groups, namely central government, local governments, experts, local people and non-governmental organizations, is recommended. Related stakeholder groups can be expanded by examining them in future studies focused on disaster and shelter.

This article covers the process of re-evaluation of the international criteria of temporary sheltering in the disaster management system by local experts in the context of the temporary sheltering process at the national scale. The model proposal obtained as a result of the study refers to the transitory stage in the sheltering process rather than a specific analysis of post-disaster sheltering types. It is thought that this study conducted in Turkey can provide a different perspective in solving the problems related to post-disaster sheltering and will be a guide for future studies on disaster and sheltering.

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AFET SONRASI BARINMA SORUNUNA YENİ BİR YAKLAŞIM: AFET YÖNETİMİNDE GEÇİCİ BARINMA SÜRECİ MODEL ÖNERİSİ

Yerel halkın temel gereksinimlerinin başında gelen barınma, bir afet durumunda hızlı ve organize bir şekilde sağlanmalıdır. Kahramanmaraş depremlerinden sonra, afetzedelerin geçici barınma ihtiyaçlarını karşılamak için ulusal ve uluslararası yardım süreçleri başlatılmıştır. Ancak, 6 Şubat 2023 depreminden bu yana geçici barınmada hala eksiklikler bulunmaktadır. Bu nedenle, idari organizasyonun yeniden değerlendirilmesi ihtiyacı ön plana çıkmıştır. Bu bağlamda, çalışma, Türkiye’de olası bir afet sonrasında geçici barınma sürecinin etkin bir şekilde yürütülmesini sağlayabilecek yeni bir yönetimsel süreç modeli sunmaktadır. Bu çalışma ile afet risk yönetimi bağlamında açıklığa kavuşturularak olası bir afet sonrasında geçici barınma sürecinin çözülmesi ve ilgili paydaşlarla çok disiplinli bir alanda barınma ihtiyacının karşılanması amaçlanmaktadır. Çalışmada öncelikle, geçici barınma kavramının uluslararası ölçütlerini belirlemek için meta-analiz uygulanmış ve toplam 39 ölçüt elde edilmiştir. Daha sonra, Delphi yöntemi uygulanmış ve tercihen saha deneyimine sahip, Türkiye’de afet ve barınma konularında

çalışan uzmanlarla görüşmeler yapılmıştır. İki aşamalı sürecin ardından, Türkiye’de yerel ölçekte geçici barınma ölçütleri elde edilmiştir. Elde edilen veriler ilgili paydaşlarla yeniden değerlendirilerek geçici barınma için bir model önerisi tasarlanmıştır. Bu çalışma, afet öncesi ve sonrası aşamalarda çok disiplinli bir bağlamda ve çok paydaşlı bir yaklaşımla geçici barınma sorununu çözme kavramını önermektedir. Çalışmada sunulan model önerisi, literatürdeki tasarım, uygulama vb. bireysel çözüm önerilerini birleştiren ve afet yönetiminin tüm paydaşlarla birlikte ele alınmasını sağlayan yenilikçi bir strateji sunmaktadır.

A NEW APPROACH TO THE POST-DISASTER SHELTERING PROBLEM: TEMPORARY SHELTERING PROCESS MODEL PROPOSAL IN DISASTER MANAGEMENT

Shelter, which is one of the basic needs of the people of the region, needs to be provided quickly and organizationally with the occurrence of a disaster. After the Kahramanmaraş earthquakes, national and international aid processes started to meet the temporary shelter needs of disaster victims. However, there are still deficiencies in temporary shelter since the earthquake on February 6, 2023. For this reason, the need to re-evaluate the administrative organization has come to the fore. In this context, the study presents a new managerial process model that can ensure the effective execution of the temporary sheltering process after a possible disaster in Turkey. With this study, it is aimed to solve the temporary sheltering process after a possible disaster by clarifying it in disaster risk management and to meet the sheltering need with the relevant stakeholders in a multidisciplinary field. In the study, firstly, meta-analysis was applied to determine the international criteria of the concept of temporary accommodation, and a total of 39 criteria were reached. Then, the Delphi method was applied and interviews were conducted with experts working on disaster and shelter issues in Turkey, preferably with field experience. After the two-stage process, the criteria for temporary shelter at the local scale in Turkey were obtained. The data obtained was re-evaluated with the relevant stakeholders and a model proposal was designed for temporary shelter. This study proposes the concept of solving the temporary shelter problem in a multidisciplinary context with multiple stakeholders in pre- and post-disaster steps. The model proposal presented in the study offers an innovative strategy that combines individual solution proposals such as design, implementation, etc. in the literature and enables disaster management to be addressed with all stakeholders.

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APPENDIX

	AUTHOR				Process	FORM/ INPUT-OUTPUT		
	Author	Year	Country	Study Level		Contribution	Method	Data Type
1	Guney and Koksak	2021	Türkiye	CS	D	SD	CS / I	QL
2	Young Il Seo	2021	UK	R	P	SD	CS / I	QL
3	Dabaieh	2020	Iceland	Sh	P/ An	SR	Pra	QN
4	Miyaji et al.	2020	Japan	Sh	D/ An	SD	CS/ Pra	QL
5	Karaođlan and Alaçam	2019	Türkiye	Al	D/P/Pro	CM	Pra	QN/ QL
6	Nekooie and Tofighi	2019	Iran	Al	D/P/Pro	CM	Pra	QN
7	Albadra et al.	2018	UK	Sh	P/An	SD/ SR	CS / I/ Pra	QN
8	Fosas et al	2018	UK	Sh	P/An	SD/ SR	CS/ Pra	QN
9	Nunez	2017	Italy	Sh	D/An	SD	CS/ Pra	QL
10	Nappi and Souza	2017	Brazil	Se	D/ P	SD	Pra	QL
11	Gunawardena et al.	2014	Australia	Se	An	SD	CS	QL
12	Kelly and Caldwell	2014	Australia	Sh	D/An	SD	CS / I	QL
13	Sapienza and Versaci	2014	Italy	Se/Al	D/P	CM	Pra	QL
14	Luciani	2013	Colombia	Se/Al	D/P	CM	CS/ Pra	QL
15	Yuksel and Hasırcı	2012	Türkiye	Sh	P/An	CM	CS / I	QL
16	Rian et al.	2008	Korea	Al	D/ P	CM	Pra	QL
17	Bektaş and Sakarya	2020	Türkiye	R	P/An	SD	CS/ Pra	QN
18	Esteban	2020	Netherlands	R	P/D/An	CM	CS/ Pra	QN/QL
19	Ledraa and Al-Ghamdi	2020	Saudi Arabia	R	An/P	SD	CS/ Pra	QL
20	Assem et al.	2020	Egypt	R	P/D/An	CM	Pra	QN
21	D'Amico and Currà	2018	Italy	R	An	SD	Pra	QN/QL
22	Sathyendrakajan et al.	2018	Sri Lanka	Se	An	SD/ SR	I	QN
23	Baumgardner et al.	2018	USA	R	An/ D	CM	Pra	QN/QL
24	Kang et al.	2018	Korea	R	An	SR	I	QN
25	Masuda	2018	Japan	Sh	An	SD	Pra	QN
26	Akiner	2016	Türkiye	L	An	SD	CS	QL
27	Orhan	2016	Türkiye	R	An	SR	CS	QL
28	Cartes	2016	Chile	R	An	SD	CS	QL
29	Brabec and Chilton	2015	Prague	R	An	SD	CS	QL
30	Rossano	2015	Switzerland	R	An	SD	CS	QL
31	Von Meding et al.	2014	USA	CS	An	SD	CS / I	QN/QL
32	Manakkara ve Wilkinson	2013	New Zealand	CS	An	SR	CS/ I	QN/QL
33	Wamsler	2010	Sweden	L	An	SR	CS	QL
34	Rotimi vd.	2009	New Zealand	L	An	SR	I	QN
35	Martirena and Olivia	2006	Cuba	CS	An/D	CM	CS	QN/ QL
36	Ferradas	2006	Peru	CS	An/P	SD	CS	QL
37	Benson and Twig	2006	UK	CS	An	SD	CS	QL
38	Gadivia and Crivellari	2006	Brazil	CS	An	SD	CS	QL
39	Pelling	2006	UK	R	An	SD	I	QN
40	Kessler	2006	Thailand	L	An	SD	Pra	QL
41	Zlanatova et al.	2005	Netherlands	Al	An/P	SD	Pra	QL
42	Phokaides et al.	2021	Greece	R	An/P	SD	Pra	QL
43	Occelli	2020	Italy	R	An	SD	CS	QL
44	O'Brien	2019	USA	R	An/P	SD	CS	QL
45	Jackson et al.	2019	UK	R	An/ D	CM	CS	QN /QL
46	Tenzon	2018	Belgium	R	An/ D	CM	CS	QL
47	Phokaides	2018	Greece	R	An	SD	CS	QL
48	Seike et al.	2018	Japan	R	An/P	SD	CS/I	QN/ QL
49	Maeda and Takada	2017	Japan	R	An	SR	CS	QN
50	Carasco et al.	2016	Japan	R	An	SD	CS	QL
51	Somma	2015	Africa	R	An	SD	CS	QL
52	Moravánszky	2012	Switzerland	R	An	SD	CS	QL
53	Amaireh	2011	Saudi Arabia	R	An/ D	CM	CS/ I	QL
54	Dan and Shiozaki	2011	Japan	R	An/ D	CM	CS/ I	QN/QL
55	Savaş	2010	Türkiye	R	An	CM	CS/ I	QL
56	Weerasinghe and Shigemura	2008	Japan	R	An	SD	CS	QN/QL
57	Herz	2008	Switzerland	R	An	SD	CS	QL
58	Pilav	2020	UK	R	An	SD	CS	QL
59	Pullan	2020	Australia	R	An	SD	CS	QL

	AUTHOR				Process	FORM/ INPUT-OUTPUT		
	Author	Year	Country	Study Level		Contribution	Method	Data Type
60	Chung Yan	2019	China	R	An	SD	CS	QL
61	Barton vd.	2018	USA	R	An	SD	CS	QL
62	Hirsh	2017	China	R	An	SD	CS	QL
63	Ingaramo	2012	Italy	R	An/ D	SD	CS	QL
64	Lee and Park	2010	USA	R	An/ D	CM	I	QN/ QL
65	Uğurlar and Ecelal	2021	Türkiye	R	An	SR	I	QN/ QL
65	Palumbo et al.	2020	Germany	Sh	D	CM	Pra	QL
67	O'Brien and Carrasco	2020	Australia	Sh	An/ D	SD	CS	QL
68	Nathansohn et al.	2020	USA	Sh	An/ D	SD	CS	QL
69	Bologna	2020	Italy	Sh	D	CM	Pra	QL
70	Trombadore and Paolini	2020	Italy	Sh	D	CM	Pra	QL
71	Daibeh	2020	Sweden	Sh	D	SD	Pra	QN
72	Camerin et al.	2020	Italy	Sh	D	CM	Pra	QL
73	Antonini et al.	2020	Italy	Sh	D	CM	Pra	QL
74	Meno	2019	Japan	R	An	SD	CS	QN
75	Oggioni et al.	2019	Spain	R	An	SD	CS/ I	QL
76	Kitahara and Otsuki	2018	Japan	R	An	SD	CS	QL
77	Hong	2017	China	Sh	An/ D	CM	Pra	QL
78	Seng	2017	China	CS	An	SD	CS	QL
79	Rebecchi et al.	2017	Italy	Sh	D	CM	Pra	QL
80	Acar and Mazlum	2016	Türkiye	Sh	An	SD	CS	QL
81	Kim and Kim	2016	Korea	Sh	An	SD	CS	QL
82	Thomson	2015	USA	R	An	SD	CS	QL
83	Yüksel and Limoncu	2013	Türkiye	Sh	D	CM	Pra	QL
84	Fayazi and Lizarralde	2013	Canada	Sh	D	CM	CS	QL
85	d'Arcy	2013	Australia	Sh	An	SD	CS	QL
86	Iwasa et al.	2012	Japan	Sh	An/ D	SD	CS	QL
87	Ireton et al.	2014	Australia	R	An	SD	CS	QL
88	Parutis	2011	UK	R	An	SD	I	QL
89	Moon and Lee	2007	Korea	Sh	An	SD	CS	QL
90	Saglamer et al.	2006	Türkiye	R	An	SD	I	QL
91	Chen et al.	2021	China	Sh	D	CM	Pra	QN/QL
92	Potur and Metin	2021	Türkiye	CS	P	SD	Pra	QN/QL
93	Rossini	2021	China	R	D	CM	Pra	QL
94	Paidakaki et al.	2021	Belgium	R	An/ D	SD	CS	QL
95	Castriotto et al.	2021	Brazil	Sh	D	CM	Pra	QL
96	Demirkaya and Yavru	2021	Türkiye	R	An	SD	CS	QL
97	Araguez	2021	Spain	CS	An/ D	CM	Pra	QL
98	Allik	2021	Sweden	R	An/ D	CM	Pra	QL
99	Ruggiero	2021	Italy	Sh	D	CM	Pra	QL
100	Guzman	2021	Spain	Sh	D	CM	Pra	QL
101	Yoon	2021	Korea	M	D	CM	CM	QL
102	Wanyue et al.	2020	China	R	D	CM	CM	QL
103	Fontes and Galarce	2020	Brazil	R	An	SD	CS	QL
104	Lavagna et al.	2020	Italy	Sh	An/ D	SD	CM	QL
105	Mihiel	2020	Italy	R	An	SD	CS	QL
106	Ottolini and Mastromattei	2020	Italy	R	An	SD	CS	QL
107	Matini et al.	2019	Japan	CS	An/ D	SD	CS	QL
108	Stanicic and Sijakovic	2019	USA	R	An/ D	CM	CS	QL
109	Tastan and Ciravoğlu	2018	Türkiye	R	An	SD	I/ CS	QN
110	Baylan et al.	2018	Türkiye	R	An	SD	I	QN
111	Wesener	2018	New Zeland	R	D	CM	Pra	QL
112	Scitaroci et al.	2017	Croatia	R	An	SD	CS	QL
113	Park	2017	Korea	Sh	D	CM	Pra	QL
114	Brewer et al.	2013	UK	R	An	SD	CS	QL
115	Yılmaz et al.	2013	UK	R	An	SD	I	QN/QL
116	Bruen et al.	2013	UK	R	An/ D	CM	I	QL
117	Yeung and Harkins	2011	Australia	Sh	D	CM	Pra	QL
118	Verderber et al.	2011	USA	Sh	D	CM	Pra	QL
119	Aubrey	2008	UK	Sh	An	SD	CS	QL
120	Rossini	2021		Sh	D	CM	Pra	QL
121	Stevens	2018	Australia	CS	An	SD	CS	QL
122	Katz	2017	UK	CS	An	SD	CS	QL

	AUTHOR				Process	FORM/ INPUT-OUTPUT		
	Author	Year	Country	Study Level		Contribution	Method	Data Type
123	Bieg and Odom	2017	USA	Sh	D	CM	Pra	QL
124	Laleicke et al.	2015	USA	M	An	SD	Pra	QN
125	Copley et al.	2015	New Zeland	R	D	SD	Pra	QN
126	Luciani	2014	Colombia	Sh	D	SD	Pra	QN/QL
127	Berlinger	2017	USA	R	An	SD	CS	QL
Study level : Algorithm (Al), Case Study (CS), Literature (L), Material (M), Regional (R), Sector (Se), Shelter (Sh) Process : Analysis (An), Design (D), Planning (P), Productin (Pro) Contribution : Creating Model (CM), Statistical Result (SR), System Development (SD) Method : Case Study (CS), Creating Model (CM), Interviews (I), Practical (Pra) Data Type : Qualitative (QL), Quantitative (QN)								

