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SOCIAL SUSTAINABLE MODEL FOR DESIGNING POST-DISASTER EMERGENCY SHELTERS

M.Sc. Thesis by

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M.Sc. THESIS EXAMINATION RESULT FORM

We have read the thesis entitled **"SOCIAL SUSTAINABLE MODEL FOR DESIGNING POST-DISASTER EMERGENCY SHELTERS"** completed by **ELİF ULU** under the supervision of **ASSOC. PROF. DR. ŞEYDA EMEKCİ** and we certify that in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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SOCIAL SUSTAINABLE MODEL FOR DESIGNING POST-DISASTER EMERGENCY SHELTERS

ABSTRACT

Shelter has been one of the most fundamental needs throughout human existence. This need has evolved and changed shape over the centuries, but the underlying truth that the space shapes the human as much as the human shapes the space has remained the same. The complex relationship between mankind and the art of building, incorporating the understanding of sustainability that includes future generations as users, has merged. Along with this ongoing understanding, the concept of social sustainability has begun to be discussed in the literature.

Disasters, a natural phenomenon, create adverse effects on humans and human settlements. In the aftermath of a disaster, along with significant issues such as health, clean water, and food, the problem of shelter also becomes critically important. It is known that the tent-type temporary shelters used by international aid organizations create major problems and are not sustainable. For post-disaster interventions and recovery efforts to be sustainable, it is essential to research the necessity of making this shelter need, which has a critical relationship with the user, socially sustainable. However, due to the qualitative nature of defining social sustainability and the relative nature of its measurability, it is observed that designers are unable to evaluate the social sustainability of their designs due to this gap in the literature. Based on this, the aim of this thesis is to present a model that facilitates the measurement of social sustainability in designs intended to meet the fundamental need for shelter in emergency shelters after disasters, and that provides guidance to designers. This thesis examines the integration of social sustainability into the design of post-disaster emergency shelters, addressing an urgent need for shelter solutions that go beyond mere physical safety to support the well-being and resilience of displaced populations. Given the inclusive and multifaceted nature of social sustainability, this thesis also aims to identify key indicators that should be incorporated into shelter design, propose a model for socially sustainable shelters, and develop a framework for measuring social sustainability effectively within this context. The study proposed a model for socially sustainable emergency shelters that emphasizes these key indicators and offers strategies to address them. To quantify social sustainability in shelter design, the research developed a measurement framework based

on the Social Sustainability Checklist, enhanced by the AHP method. The framework's effectiveness was demonstrated by applying it to the five shelter models, which underscored the variability in social sustainability performance across different designs. Furthermore, the thesis underscores the critical importance of social sustainability in emergency shelter design, offering a framework that can guide the development of more supportive and resilient shelter solutions. By addressing the key indicators identified and integrating measurable criteria, the proposed model provides a pathway for future research and practice. This approach not only meets the immediate physical needs of displaced populations but also fosters a supportive social environment, enhancing community resilience and quality of life in post-disaster contexts.

Keywords: Social sustainability, post-disaster, emergency shelter design.

AFET SONRASI ACİL DURUM BARINAKLARININ TASARIMINDA SOSYAL SÜRDÜRÜLEBİLİR MODEL

ÖZET

Barınma, insan varoluşu boyunca en temel ihtiyaçlardan biri olmuştur. Bu ihtiyaç yüzyıllar boyunca şekil değiştirerek evrilmiş olsa da, mekânın insanı şekillendirmesi kadar insanın da mekânı şekillendirdiği gerçeği değişmeden kalmıştır. İnsan ile yapı sanatı arasındaki bu karmaşık ilişki, gelecek nesilleri de kullanıcı olarak içeren sürdürülebilirlik anlayışıyla birleşmiştir. Bu anlayış doğrultusunda sosyal sürdürülebilirlik kavramı da literatürde tartışılmaya başlanmıştır.

Doğal bir olgu olan afetler, insan ve yerleşim alanları üzerinde olumsuz etkiler yaratır. Bir afet sonrasında sağlık, temiz su ve gıda gibi önemli sorunların yanı sıra barınma ihtiyacı da kritik bir önem kazanır. Uluslararası yardım kuruluşlarının kullandığı çadır tipi geçici barınakların büyük sorunlar yarattığı ve sürdürülebilir olmadığı bilinmektedir. Afet sonrası müdahalelerin ve iyileştirme çalışmalarının sürdürülebilir olabilmesi için kullanıcıyla doğrudan ilişkili bu barınma ihtiyacının sosyal olarak sürdürülebilir hale getirilmesi gerektiği üzerine araştırma yapılması zorunludur. Ancak, sosyal sürdürülebilirliğin tanımlanmasının nitelikselliği ve ölçülebilirliğinin göreceli olması nedeniyle tasarımcıların bu konudaki literatür eksikliği yüzünden sosyal sürdürülebilirliği tasarımlarında değerlendiremedikleri görülmektedir. Bu doğrultuda, bu tezin amacı, afet sonrası acil durum barınakları kapsmaında barınma ihtiyacını karşılamaya yönelik tasarımlarda sosyal sürdürülebilirliğin ölçülmesini kolaylaştıracak bir model sunmak ve tasarımcılara rehberlik sağlamaktır.

Bu tez, sosyal sürdürülebilirliğin afet sonrası acil barınak tasarımına entegrasyonunu inceleyerek, sadece fiziksel güvenlikten öteye geçerek yerinden edilmiş toplulukların refah ve hayat kalitelerini destekleyen barınak çözümlerine yönelik acil bir ihtiyaca yanıt vermektedir. Sosyal sürdürülebilirliğin kapsayıcı ve çok yönlü doğası göz önünde bulundurularak, bu tez aynı zamanda barınak tasarımında yer alması gereken anahtar göstergeleri belirlemeyi, sosyal olarak sürdürülebilir barınaklar için bir model önermeyi ve bu bağlamda sosyal sürdürülebilirliğin etkili bir şekilde ölçülmesi için bir çerçeve geliştirmeyi amaçlamaktadır. Çalışma, bu anahtar göstergelere vurgu yaparak ve bunları ele alma stratejileri sunarak, sosyal olarak sürdürülebilir acil barınaklar için bir model

önermiştir. Barınak tasarımında sosyal sürdürülebilirliği nicelendirmek için araştırma, Sosyal Sürdürülebilirlik Kontrol Listesi ve AHP yöntemi ile güçlendirilmiş bir ölçüm çerçevesi geliştirmiştir. Çerçevenin etkinliği beş barınak modeline uygulanarak gösterilmiş ve farklı tasarımlar arasında sosyal sürdürülebilirlik performansındaki değişkenlik vurgulanmıştır. Ayrıca, tez, acil durum barınağı tasarımında sosyal sürdürülebilirliğin kritik önemini vurgulayarak daha destekleyici ve dayanıklı barınma çözümlerinin geliştirilmesine rehberlik edebilecek bir çerçeve sunmaktadır. Önerilen model, belirlenen anahtar göstergeleri ele alarak ve ölçülebilir kriterleri entegre ederek gelecekteki araştırma ve uygulamalar için bir yol açmaktadır. Bu yaklaşım, afet sonrası toplulukların acil fiziksel ihtiyaçlarını karşılamanın ötesinde, destekleyici bir sosyal ortam oluşturarak afet sonrası bağlamlarda topluluğun sosyal sürdürülebiliriliğini ve yaşam kalitesini artırmaktadır.

Anahtar Kelimeler: Sosyal sürdürülebilirlik, afet sonrası, acil durum barınağı tasarımı.

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SOCIAL SUSTAINABLE MODEL FOR DESIGNING POST-DISASTER EMERGENCY SHELTERS

NOMENCLATURE

Acronyms

Acc	Accessibility
Aes	Aesthetics
AHP	Analytic Hierarchy Process
BEPAC	Building Environmental Performance Analysis Club
BRE	Building Research Establishment
BREEAM	Building Research Establishment's Environmental Assessment Method
CSTB	Centre Scientifique et Technique du Bâtiment
EU	European Union
FE	Functionality and Efficiency
Fle	Flexibility
HPS	Healthy and Productive Spaces
HQE	High Environmental Quality
ISO	International Organization for Standardization
LEED	Leadership in Energy and Environmental Design
NABERS	National Australian Building Environmental Rating System
OECD	Organization for Economic Co-operation and Development
PCA	Plan Construction et Architecture
QoL	Quality of Life
Sec	Security
SHEL	Shelter
SWOT	Strengths-Weakness-Opportunities- Threats Method
UK	United Kingdom
UN	United Nations
UNCHR	United Nations High Commissioner for Refugees
UNCSD	United Nations Commission on Sustainable Development
UNDRO	United Nations Disaster Relief Organization
WBCSD	World Business Council for Sustainable Development
WHO	World Health Organization
WWF	World Wide Fund

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CHAPTER 1

INTRODUCTION

Since the inception of humanity, architecture and humanity have been two factors that mutually influence each other. This interaction has occasionally led to changes in both. In ancient times, interactions with the environment were influenced by cultural and social changes over time. With the introduction of technology, the understanding of architectural form has reached different dimensions. Structures or architectural formations that were initially built for protection and privacy have evolved over time through observations and experiences to become functional entities [1].

Humanity and architecture, together, have brought about a shared evolution that has shaped and transformed the definition of architecture over time. Vitruvius, a Roman architect and author of "Ten Books on Architecture," defines architecture with three essential qualities: firmitas (firmness), utilitas (commodity), and venustas (delight) [2]. During the Renaissance period, the definition of architecture changed to "Comodita, Perpetuita, Bellezza," which translates to utility, durability, and beauty. In 1581, an English writer defined architecture as the science of building, while J. Ruskin, an English critic, described it in the 19th century as "nothing more than applied ornament." [3]. The renowned architect F.L. Wright defined architecture as "architecture is the crystallized expression of living." [4].

With the changing human needs in today's world, many new additions have been made to the definition of architecture, and the definition of architecture has evolved alongside humanity over the centuries [5]. One of the most significant additions gained by the act of building, which is inherently dependent on human users and deteriorates when left unmanned, throughout history is sustainability. The rapid technological and industrial development that emerged after World War II [6], coupled with uncontrolled population growth and consumption-focused development, led to a process where mass production and profit-oriented approaches disregarded the connections between the environment and development, resulting in the indiscriminate consumption of natural resources. As a result, environmental degradation, unhealthy urbanization,

climate change, water pollution, and loss of biodiversity have emerged as pressing issues.

Environmental and ecological movements began to gain wider recognition in the late 1960s and reached an international level in the 1970s. During this process, the United Nations (UN) established the World Commission on Environment and Development in 1983, and the concept of "sustainable development" was introduced in the Brundtland Report published in 1987 [7]. Sustainable development is an approach that encompasses economic, social, and environmental elements. This approach emphasizes the ability for future generations to utilize capital stocks in economic activities, the consideration of environmental factors, and the establishment of social justice. The development and implementation of the concept of sustainable development have been supported by various international platforms, meetings, and agreements. There are some important milestones in this process:

Table 1.1 Evaluation of Sustainability (Revised by the Author, Source: [8])

EVENT	YEAR	DESCRIPTION
United Nations Stockholm Conference	1972	This conference emphasized that most environmental issues stem from underdevelopment in developing countries and from industrialization in developed countries. It highlighted the need to focus on development efforts that do not neglect environmental protection and enhancement.
Our Common Future Report (Brundtland Report)	1987	This report officially defined the term 'sustainable development' for the first time. It highlighted global environmental and development issues and emphasized the necessity of acting in a way that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Rio Summit	1992	Also known as the United Nations Conference on Environment and Development, this summit was held after the Brundtland Report to address sustainable development. This summit adopted 'Agenda 21,' an international action plan addressing global environmental and social development issues. This plan provided directives for organizations to undertake environmentally sustainable practices in the areas of the environment, economy, and society.
Rio+5 Summit	1997	This meeting in New York emphasized the need for more concrete initiatives. It was agreed that all countries should develop their National Agenda 21s to pursue sustainable development and prepare sustainable development action plans.
Habitat II Summit	1996	This summit, held in Istanbul, focused on sustainable human settlements and the improvement of the quality of human life. It aimed to strengthen the importance of sustainable development in urban areas. It was inspired by the Rio Summit and worked in line with the United Nations Convention.
Johannesburg Summit	2002	This summit was the Rio Conference’s 10-year follow-up, aiming to further progress sustainable development actions. Governments, administrations, and civil society organizations participated in this conference with a participatory approach.

Efforts towards sustainable development are generally led by developed countries. The main international organizations involved in this field include the United Nations (UN) and its affiliated agencies, the OECD, the World Bank, the World Trade Organization, WWF, WBCSD, and the European Union. These organizations play roles such as policy-making, fostering collaboration, and supporting projects for sustainable development [9].

Sustainability practices and environmental awareness are slowly gaining traction in Türkiye. Interest in the environment dates back to the 1970s, and with the establishment of the Prime Ministry Undersecretariat for the Environment in 1978, national and international activities related to the environment were incorporated into state policy. Türkiye has numerous laws, regulations, and guidelines concerning the environment and its protection. The concept of environmental protection was officially recognized in the 1982 Constitution. However, it is noted that the ideal environment or the principle of sustainable development is not explicitly stated in the constitution [10].

The Environmental Law, which came into effect in 1983, aims to address the environment comprehensively, encompassing not only the prevention of environmental pollution but also the management of natural resources and land. Additionally, various regulations and international conventions contain provisions on environmental issues [8]. Five-year development plans prepared by the State Planning Organization demonstrate the changing nature of sustainable development policies in Türkiye over time. The emphasis on environmental issues, the development of environmental awareness, and the acceptance of principles of sustainable development began with these plans [11]. Türkiye actively participates in national and international environmental organizations. Efforts coordinated by the Ministry of Environment and the United Nations Development Programme (UNDP) facilitate the coordination of national preparations and the implementation of projects in the field of environment and development [8]. The Local Agenda 21 action plan is actively implemented in many provinces in Türkiye and has been praised by the United Nations Development Programme. The signing of the Customs Union Agreement between the European Union (EU) and Türkiye entailed the obligation to comply with EU legislation, which covers a wide range of areas, including customs, trade, competition, intellectual

property rights, and environmental policies [12]. Interest in environmental issues in Türkiye began in the 1970s, and separate consideration was given to them in development plans after the 1972 Stockholm Conference. With the establishment of the Prime Ministry Undersecretariat for the Environment in 1978, environmental issues were incorporated into state policy. However, the principle of "sustainable development" was not explicitly expressed in the 1982 Constitution [13]. Regulations concerning the environment in Türkiye were established through the Environmental Law, which came into effect in 1983, and subsequent regulations. Furthermore, many international and regional legal arrangements have been made in the context of compliance with the EU and other international agreements [8]. Türkiye's efforts towards sustainable development were evaluated in the National Report presented at the Johannesburg Summit in 2002. During this process, it was emphasized that sustainability is an objective that can be achieved through the collaboration of governments, businesses, civil society organizations, and individuals, rather than individual efforts [7]. Türkiye continues to participate in national and international environmental initiatives. Initiatives such as the Environmental Platform for Sustainable Development and Local Agenda 21 have been considered exemplary practices by the United Nations Development Programme due to their goals encompassing all areas of environmental issues. However, it is noted that Türkiye still has a long way to go in achieving its sustainable development goals. According to the United Nations Sustainable Development Solutions Network's report, Türkiye ranks 33rd out of 34 countries. Therefore, it is crucial to develop various strategies, determine costs, and establish appropriate financing models to achieve sustainable development goals [14].

The increasing importance of the concept of sustainable development on the global agenda has led to the inclusion of the "environment" as a "social structure" in sociological analyses, addressing many significant dimensions of the often neglected "physical environment" by sociologists [15]. As [16] states, in the transformative approach that analyzes the person-psychological processes and physical-social environmental components as a whole, behavior cannot be examined independently from the environment [17]. Despite criticisms of its deficiencies in terms of social sustainability, the use of the term "needs" in the Brundtland Report likely implies the

inclusion of not only physical needs but also cultural and social needs. The inclusion of social aspects in the definition of sustainability is important. However, social sustainability is considered to be the least prioritized among the other two aspects, ecological and economic. It is evident that the emphasis given to the three pillars of sustainability is always associated with a personal perspective and usually prioritizes ecological and economic aspects. There could be several reasons for this, one of which is the vague definition of social sustainability and its lack of concrete outcomes like the other aspects. While ecological sustainability can involve concrete operations in energy efficiency, the economic aspect can provide capital growth as a result. Environmental sustainability deals with the biophysical limits of social activities, while social sustainability is concerned with the internal structuring of individual societies and the global community as a whole [18]. It is stated that such a practical approach is challenging, at least in the short term, in terms of social sustainability. According to [19], it is uncertain whether social sustainability is perceived as the need to maintain certain structures of societies and communities or as a prerequisite for sustainable development. However, considering the long-term outcomes and the quality of society, it is evident that the social aspect is an important dimension. Social sustainability does not have a single definition, and existing definitions generally rely on discipline-specific criteria or perspectives [20]. Definitions often rest on values such as justice, democracy, social equity, or culture. Social sustainability values also include harmony and healthy relationships between society and nature. The concept of "environmental justice" defined by the EPA (2018) encompasses the fair treatment and meaningful participation of all individuals in the development, implementation, and enforcement of environmental laws, regulations, and policies, regardless of race, color, national origin, or income. It provides a specific framework for society-nature relationships. The definition of social sustainability proposed by [21] emphasizes the relationships between society, nature, and the economy by pointing to different significant relationships within society: "Social sustainability is a quality of societies [22]. It expresses nature-society relations, relations established through work, and relations within society [23]. Social sustainability is given when work and related institutional arrangements within society meet an extended set of human needs and shape the preservation of nature and reproductive capabilities over a long period of

time, as well as fulfill normative demands of social justice, human dignity, and participation" [20]. The question of what defines the "quality" of society may arise. Many studies have been conducted to determine the indicators or principles of a sustainable society [24], and these studies also provide indicators for the quality of society. These studies also acknowledge that social sustainability should not be treated separately from its relationship with other aspects.

Post-disaster emergency shelters, as emphasized by [25], hold paramount significance for humanity in the face of any natural disaster. Natural disasters have occurred throughout world history, in different places and at different times, and have attracted the attention of people due to their ordinary and extraordinary impacts, which have resulted in the loss of lives and property [26]. The main reason for this interest is the significant consequences of natural disasters such as loss of life and property for people. The word "afet" (disaster), which originated from Arabic, is used in the Ottoman Turkish Dictionary with meanings such as "calamity, evil, and things to be avoided" [27]. In English, the equivalent of "afet" is "disaster," which in the dictionary means catastrophe, calamity, natural disasters, misfortune, destruction, and crisis [28]. Based on this information, this study has been conducted with a user-centered model that prioritizes social sustainability principles while minimizing impacts on the environment and nature. The aim of this study is to fill the gap in the literature by developing a model that prioritizes social sustainability in the design of post-disaster emergency shelters, given the lack of such work in this direction.

1.1 Definition of the Problem

According to the definition provided by Ergünay, a disaster is

"the interruption of activities of human communities that cause physical, social, and economic destruction and result in consequences that the community cannot overcome within its own means, whether they are of human origin or not." [29].

Disasters are described as situations or events that require national or international assistance and limit local capacity [30-31]. Natural disasters also emerge as a concept that encompasses all the negatives both individually and socially. In general, earthquakes, floods, extreme temperatures, droughts, avalanches, and flash floods are

cited as examples of these negatives. Immediately after natural disasters, which are observed to disrupt the sheltering action, the issue of shelter, which is one of the fundamental needs of humankind according to Maslow's Hierarchy of Needs [32], comes to the forefront. At this point, the concept of "emergency shelter," which is defined as providing shelter needs in "emergency" situations, comes into play. The term "emergency" in the context of disasters is defined as follows: It refers to events that disrupt or interrupt the normal life and activities of the whole community or certain segments of it, requiring emergency intervention, and the crisis situation created by these events [2] The concepts of sustainability and sustainable development were first defined in the report "Our Common Future" prepared by the World Commission on Environment and Development in 1987 [33]. In this report, not only environmental issues were addressed, but also the promise of "environmentally sound economic development" was made. As we know, natural disasters pose a serious threat to all living beings, their habitats, and ultimately humanity. Human beings try to shape nature according to their desires and needs, within the framework of their own rules, using technology. However, in this effort, they tend to disregard nature and the environment. As a result, the urgent need for emergency shelter that arises from natural disasters and the need for this shelter to be socially sustainable become apparent. This two-way interaction gives rise to the definition of the problem. In the past century, especially with the advancement of technology, the natural balance has been disrupted. It is a known fact that due to the destructive human impact, particularly through unnecessary use and pollution of water resources, as well as the degradation of vital elements such as soil and water, everyday natural events are increasingly turning into natural disasters. This reality, which gives rise to the problem of shelter for people, highlights the necessity of designing emergency shelters after disasters to provide a high standard of living and meet the housing needs according to humanitarian criteria.

1.2 The Aim of the Study

One of the important factors that enable human integration and adaptation to natural systems is architecture. Architecture is not only the art of building construction; it is also the art of creating living standards that are integrated with nature and the environment. When creating living standards, designs that align with the main goals

of social sustainability, such as the continuity of housing needs and the quality of life in the designed shelter, highlight the significance of architects and architecture [34]. Nowadays, sustainability has become an important objective in the building sector. Many developed countries such as the United States, Canada, the United Kingdom, Germany, and Japan have been conducting studies to ensure the sustainability of buildings and implementing these efforts [35]. Regulations and guidelines are being developed to create environments for sustainable living, and measurement systems such as LEED, BREEAM, and BEPAC are used to evaluate these building practices. One notable deficiency in this context is that social sustainability is a social concept that cannot be adequately demonstrated through quantitative data, which results in the insufficiency of the model presented for evaluation within the scope of social sustainability. The objective of this master's thesis is to address the existing deficiency in modeling and evaluating social sustainable design systems for emergency shelters in the aftermath of disasters. The intention is to develop a novel and distinctive model for social sustainable emergency shelters, which will also contribute to the understanding of social sustainable building design.

1.3 Methodology

This study encompasses the examination of domestic and international research related to socially sustainable shelter design and the evaluation of social sustainability, leading to the development of a social sustainable model based on the data obtained. In line with this objective, the first section involves a literature analysis where sustainable development, sustainability, sustainable development models, sustainable architectural design, the emergence of the concept of social sustainability, social sustainability indicators, and shelter design concepts were investigated and examined in the literature. These keywords were accessed through data analysis, and the VOSviewer program was used for the data analysis. In the second chapter of the thesis, the scientific methodology chosen for the study was the AHP method, and the materials and evaluation results through experts were explained. In the third chapter, a socially sustainable post-disaster emergency shelter model was developed based on the definitions to address the existing gap in the literature; the Python program was used to convert AHP scores into ratings. In the fourth chapter, the created model was

tested with a case study, and the results and recommendations were provided. Subsequently, a SWOT analysis was conducted to identify the strengths and weaknesses of the model. In the final chapter, the data and findings obtained throughout the study were presented by conclusion part.

1.4 Disposition

This thesis is structured into five main sections in alignment with the study's objectives. The structure of the thesis is as follows:

1. CHAPTER 1- INTRODUCTION

The first chapter contains the study Definition of The Problem, The Aim of the Study, Methodology and Disposition sections. This chapter establishes the context and significance of integrating social sustainability in post-disaster emergency shelter design, setting the stage for an in-depth exploration of how socially sustainable criteria can enhance shelter functionality and community well-being.

2. CHAPTER 2- LITERATURE REVIEW

This section compiles and synthesizes existing knowledge on the topic according to the bibliographic maps. It explores prior studies on social sustainability and emergency shelter design, establishing the theoretical foundation for the research.

3. CHAPTER 3- MATERIAL AND METHOD

In third chapter, The Analytic Hierarchy Process (AHP) is employed to assess and prioritize indicators of social sustainability, providing a systematic analysis to ensure the reliability and validity of the research findings. In developing a new model, a socially sustainable emergency shelter model is created using Python software, based on data obtained from the literature review and the results of the AHP analysis. The proposed model is applied to a specific case study to evaluate its practical applicability, as material for this thesis. This section assesses the feasibility of the theoretical model in real-world scenarios.

4. CHAPTER 4- FINDINGS AND RESULTS

In fourth section, the results and recommendations are mentioned which are obtained from Case Study and its evaluation according to the Socially Sustainable Checklist. In

this section, also conducts a SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) of the developed model. The analysis aims to reveal the advantages and disadvantages of the model from a sustainability perspective.

5. CHAPTER 5- CONCLUSION AND FUTURE WORKS

The fifth chapter delves into the interpretation of results, highlighting key issues with significant potential in the existing literature. It also outlines directions for future research to further explore and address these critical areas.

CHAPTER 2

LITERATURE REVIEW

In this thesis, the subject of social sustainable architecture is discussed. At the core of this topic lies the concept of sustainability. Therefore, in this section, which constitutes the conceptual and theoretical part of the thesis, the origin and content of sustainable development and sustainability concepts are examined. The stages of the transformation of the concept of sustainable development and the understanding of sustainable development from an idea base to a social action plan within the historical process are addressed. These stages gained momentum through six international conferences, including the United Nations Stockholm Conference in the transformation of the term sustainable development, up to the Johannesburg Summit in 2002 [36].

In addition to this information, the sustainability model was explained and the sustainability indicators (social indicators, environmental indicators, economic indicators and institutional indicators) created by the United Nations Sustainable Development Commission and the principles of a sustainable society were clarified. In addition, in this section, efforts to achieve sustainable development in Türkiye are discussed within the historical process. Following the explanation of the concept of sustainability, the concept of social sustainability and the relationship of all concepts with the department of architecture were explained.

The aim of this thesis study is to create a new and original model for a post-disaster socially sustainable emergency shelter. In order for the systematic analysis to cover a sufficient number of articles, the research databases "Web of Science," "Scopus," and "EBSCOhost" were used. The aim was to contribute to the development of the concept of social sustainability and to provide a comprehensive sub-information source, so articles published between 1987 and 2020 were examined. The reason for choosing 1987 as the starting date is that the concept of sustainability and the subheading of this study, which is social sustainability, were first included in the Brundtland Report in 1987 [37] (Table 1).

Table 2.1 Literature Review Details (Revised by Author)

CATEGORY	YEAR	DETAILS
Time Boundaries	1987	The reason for choosing 1987 as the starting date is that the concept of sustainability and the understanding of this study, which is based on social sustainability, were first introduced in the Brundtland Report in 1987 (WCED, 1987).
Time Boundaries	2020	The reason for limiting the research end date to 2020 was to determine the number of contributions and citations of published articles and scientific writings, as well as their reliability.
Findings- Web of Science	2023	On January 25, 2023, a research study was conducted with the keyword 'social sustainability in architecture' and the selection of 'all fields,' resulting in 5,123 findings.
Findings- Scopus	2023	On January 25, 2023, a research study was conducted with the keyword 'social sustainability in architecture' and the selection of 'all fields,' resulting in 1,024 findings.
Findings- EBSCOhost	2023	On January 25, 2023, a research study was conducted with the keyword 'social sustainability in architecture' and the selection of 'all fields,' resulting in 1,669 findings.

The total of 7816 articles obtained on the topic of "social sustainability in architecture" has been excluded from the review for two reasons. Some of the articles do not belong to the main discipline of architecture, while others have been excluded due to low reliability and citation numbers. Accordingly, the data mentioned in the study were accessed through a literature review, considering 1987 as the starting point. As research terms, the keywords "social sustainability," "social sustainability indicators," "post-disaster," "emergency shelter," and "measurement criteria" were searched in the entire article, publication titles, and/or keywords. The research keywords were accessed using the Vosviewer program and bibliographic data. In this context, the literature review in the thesis study contributes to the existing literature.

2.1 Sustainable Development and Sustainability

The concept of sustainable development has multiple definitions and has evolved over time. The term has been continuously redefined, resulting in incomplete definitions that fail to encompass all possible meanings. The concept emerged in the 1970s after the publication of "The Limits to Growth" by the Club of Rome and gained significant momentum through the UN Conference on the Human Environment in 1972 [38]. The Brundtland Commission's definition in 1987 [39], stating that sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs, is the most famous definition. Sustainable development is characterized by its time dependence, spatial dependence, multiple dimensions, and

social dependencies. It requires a long-term perspective and adaptive flexibility [40]. It is locally specific and open to interpretation at different scales. It encompasses environmental, social, economic, cultural, and political dimensions, although the environmental dimension has often been prioritized. Sustainability is a decision-making process involving multiple possibilities and requires the participation of different stakeholders. The definition of sustainable building has also evolved over time. Initially, the focus was on environmental principles and resource efficiency. Energy efficiency and reduced environmental impacts became key parameters for assessing sustainability [41]. However, sustainable buildings go beyond environmental considerations and encompass economic and social dimensions [42]. There is a growing recognition of the long-term perspective, multi-scale impacts, and multi-domain criteria in evaluating the sustainability of buildings. The paradigm of sustainable buildings is shifting towards regenerative design, which integrates material and functional attributes in a systemic and nature-oriented approach. Overall, sustainability is a dynamic and context-dependent concept that requires ongoing revision and a pluralistic approach [43]. It involves balancing different dimensions, considering long-term perspectives, and engaging multiple stakeholders to achieve a common vision of sustainability. Sustainability is a concept used in various fields and in conjunction with many different values. While there may be differences in the use of this concept, the common point is to emphasize the prioritized actions necessary to ensure the continuity of the focus or subject at hand. However, it is correct to say that the concept of sustainability cannot be fully filled, regardless of the reason for its use. While it is understood that clarity cannot be achieved in the topic focused on sustainability, on the other hand, the possibility of commonality of purpose has a positive approach. This situation lies at the core of the challenges related to sustainability. In a survey conducted to define the different sub-concepts and principled headings of sustainability, twenty-three sub-concepts emerged. Based on these sub-concepts, it has been claimed that seven main concepts can form the basis for sustainability. These main concepts are identified as "Balance," "Responsibility," "Planning," "Participation," "Scientific Data," "Communication," and "Integration." These main and sub-concepts demonstrate the need to approach sustainability from a broad perspective. Sustainability should not be considered solely as an ecological,

natural, or environmental concept. It is also a sociocultural concept that includes development, planning, equality, and scientific integration. When evaluated in terms of human relationships, it also encompasses issues such as balanced communication and participation. Therefore, achieving the real goals of sustainability is seen as a highly challenging objective. In the field of architecture, considering the principles of sustainability is possible through making structural decisions during the design phase. It is also possible to make the building sustainable by intervening in the existing system. During the design phase, issues such as the reuse of structural waste or water can be addressed, and sustainability features can be added to the structure through subsequent systems used. The increasing demand for designing buildings according to the natural environment presents an opportunity for architecture. Customers wanting eco-friendly buildings and their strong decision-making power contribute to making structures more sustainable. However, sometimes customers' goals may be limited to tangible gains such as energy savings or cost reduction. Moreover, less tangible benefits such as promoting an environmentally friendly image may also be expected. This situation is an important factor in an era where appearance is often more important than reality, and people seek to alleviate their consciences while maintaining their consumption habits [44].

In conclusion, the concept of sustainability is addressed in many fields with its environmental, economic, and social dimensions. In the field of architecture as well, sustainability requires an approach that includes commitment to the natural environment, energy efficiency, user satisfaction, and ensuring structural continuity.

2.2 Architectural Sustainability

The architectural design process, which lies at the center of the interaction between nature and humans, is of great importance as it involves the creation and development of criteria that will determine the character of the built environment and, consequently, the quality of human life [45]. Architectural design is a phased process that involves problem definition, data collection, emergence of initial thoughts for the solution, generation of alternative designs, selection of the most optimal model/design, and evaluation of the result by comparing the final model with the initial data [47]. The architectural design process is defined by [47] as the importance of information flow

in feedback studies occurring between stages and expressed as a cycle. This indicates that the actions in the design process are closely interconnected. In relation to the architectural design process, [48] draws attention to the behaviors of the designer in the design action. [49] states that the designer shapes the situation based on their initial evaluation, and after the situation responds, the designer needs to direct their actions either towards problem structuring, action strategies, or actions on the conceptual model. At this point, it is also important to define the concept of sustainability in architecture. Cause the fundamental purpose of architectural design is to meet the initially targeted functional, technical, and aesthetic requirements. Nowadays, along with these requirements, many new concepts have become essential goals of architectural design due to various reasons such as technological advancements, the diversification/increase of human needs, and the adverse environmental impacts of globalization. In this regard, the most important concept that has become a fundamental goal of architectural design today is sustainability. The transformation of targeted requirements into architectural design definitions based on sustainability has paved the way for the emergence of the idea of sustainable architectural design. According to [50], there is no single and definitive definition for the concept of sustainability. It is emphasized that new meanings are constantly added, necessitating a multidimensional perspective. According to [51], sustainability is a measure of how people live in harmony with the environment. The concepts of ecosystem, economy, and society are interconnected, and the loss of any of these concepts creates instability. The measurement of sustainability requires improving the economy for environmental sustainability, meeting societal needs, and responding to individual and collective actions that enhance or disrupt the environment. [52] explains the concept of sustainability with the triple bottom line principle based on social, environmental, and economic performance. According to [52], social, environmental, and economic performance are directly linked to the goal of sustainable development and are interconnected. [52] emphasizes the evaluation of sustainability in a multidimensional manner by also focusing on environmental and social values. This idea forms the basis of the process of evaluating sustainability in a multidimensional way. According to [53], the construction, use, and demolition of buildings have significant impacts on the natural environment and the social structure of society. Sustainable architecture can

contribute to the implementation and support of a sustainable lifestyle within these processes. [53] states that the fundamental aim of sustainable architectural design is to consider how to design and construct buildings that minimize environmental impacts and contribute to economically strong, socially inclusive, and stable communities.

The primary purpose of sustainable buildings is twofold. Firstly, they demonstrate measured behavior on a global scale by minimizing the environmental impacts associated with the construction, use, and end of life of structures. Sustainable buildings should have a small ecological footprint [54]. Secondly, buildings should enhance the psychological and physical well-being of individuals by surrounding them with a positive and appropriate contribution to their social environment, meeting their objective needs. [55] defines three dimensions of sustainable buildings as follows:

- Ecological sustainability: It refers to the conservation of natural resources and ecosystems. This dimension is typically assessed through the analysis of energy and material flows in relation to time and space. Evaluation is conducted using qualitative frameworks such as life cycle analysis.
- Economic sustainability: It is examined in terms of investment and operational costs. It includes the evaluation of investment and operational costs of buildings and building stocks in terms of long-term resource efficiency. Solutions with high durability and reusability should be preferred. Solutions that have low energy consumption, are easy to clean, and maintain generally come with low environmental impacts and operating costs.
- Social and cultural sustainability: This dimension includes the preservation of user and occupant comfort, well-being, and health. The preservation of human health is often linked to the conservation of ecosystems and closely related to issues of comfort. Factors such as indoor air quality should be taken into consideration. [55] emphasizes that environments with high social and cultural quality do not deteriorate over time.

[3] draws attention to the different interpretations of the concept of sustainability. According to Berardi, the United Nations recognizes that the concepts of sustainability and sustainable development suffer from contradictory and ambiguous definitions. However, the diversity of definitions is often expressed as a strength of the concept.

In this context, Berardi identifies certain differences and uncertainties in the concept of sustainability:

1. Time dependence: The intergenerational approach of the Brundtland definition highlights the importance of considering a long-term perspective. However, since sustainability cannot be fixed to a specific purpose in a constantly changing world, it also requires adaptability to the available knowledge. Therefore, the focus should be on processes that move towards sustainability rather than determining outcomes that cannot be identified in the future.
2. Encompassing various scales and spaces: The concept of sustainability requires continuous evaluation at different scales. Sustainability is locally specific and more of a matter of local interpretation than a universal aim. This emphasizes that the effects of every action extend from local to global scales.
3. Multidimensionality: Berardi notes that while sustainability has traditionally been classified into environmental, social, and economic dimensions, there is an increasing pressure to recognize cultural and political dimensions. Despite practical categorizations, conceptualizations in different dimensions can lead to fragmented understandings of sustainability. Berardi believes that the content of sustainability cannot be solely defined by environmental scientists as a scientific model but is primarily a decision among various possibilities, including non-environmental aspects.
4. Social dependencies: The necessity to consider different perspectives on sustainability requires the acceptance of uncertainty and differences. Sustainability has demonstrated the need for a pluralistic approach that takes into account diverse actors. Consequently, sustainability interpretations are inevitably shaped by the participation of individuals and their diverse expectations [3].

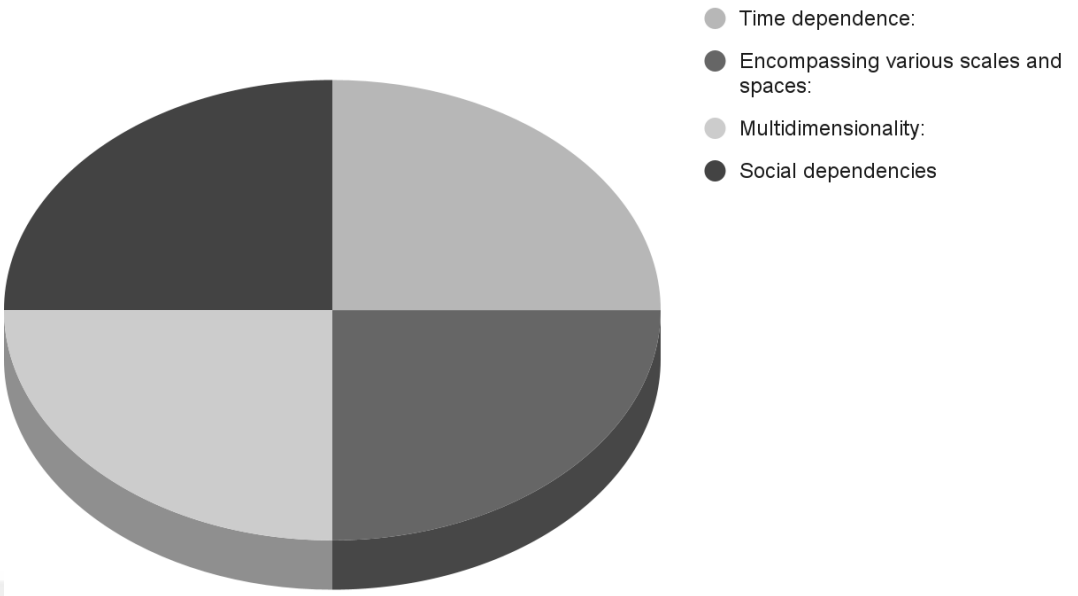


Figure 2.1 Identification of the Concept of Sustainability (Revised by Author, Source: [3])

The continuous revision of the meaning of sustainability is attributed to the confusion and uncertainty surrounding the concept. The International Organization for Standardization (ISO) has published an international document on the principles of sustainability in building construction with the reference number ISO 15392:2008. The document explains the importance of buildings and the construction sector for sustainable development. It states that buildings provide value and employment while consuming significant amounts of resources, with indirect impacts on economic, social, and environmental conditions. In terms of solutions, the document emphasizes that sustainable development is a global approach, but for the application of sustainability in the building sector, strategies need to be specific to the local context. In other words, these strategies should vary depending on the context and reflect the context-specific conditions, priorities, and needs of both the built environment and the social environment. The concept of the social environment in this context includes aspects such as social equity, cultural matters, traditions, historical-cultural heritage, human health and comfort, social infrastructure, and safe and healthy environments [56].

Based on the information obtained, it can be observed that similar principles emerge in sustainable planning and design. These principles include:

Table 2.2 Principles in Sustainable Design (Readapted by author, Source: [56])

PRINCIPLE	INFORMATION
Compact, efficient land use	Efficiently utilizing land, promoting density, and reducing open spaces.
Reduced car usage, increased accessibility	Promoting alternative transportation methods such as walking, cycling, and public transportation to reduce car usage and increase accessibility.
Efficient resource use, less pollution and waste	Using resources efficiently, promoting energy savings, and reducing pollution and waste.
Restoration of natural systems	Protecting and restoring natural ecosystems, increasing green spaces, and ensuring the sustainable use of natural resources such as water and soil.
Creating good housing and living environments	Considering human health and comfort when designing housing and living spaces, creating areas that meet social and physical needs.
Healthy social ecology	Strengthening social connections, promoting social participation, and creating a safe and equitable social structure.
Sustainable economy	Aligning economic activities with sustainability principles, promoting the green economy, and supporting the local economy
Public participation	Ensuring community participation in decision-making processes, considering the ideas and needs of the local population.
Preserving local culture	Respecting local cultural values, promoting traditional architecture, local crafts, and cultural activities

Sustainability is a complex term that affects many areas of interest. Therefore, it has been studied by many different researchers from various disciplines and perspectives. [57] define sustainability from an economic perspective, stating that sustainability is the relationship between dynamic human economic systems and broader, but generally slower-changing ecological systems. According to this definition, it is expressed that human life can continue indefinitely, individuals can develop, and cultures can evolve, but human activities should remain within limits that do not destroy the diversity, complexity, and functioning of the ecological life support system [57]. This definition encompasses a broad concept of sustainability that includes different aspects and focuses on the balance between economic growth and the ecological system. Maintaining the balance between rapidly changing economic systems and slower-changing ecological systems is a significant challenge for sustainability, and a third element needs to be taken into account to maintain this balance: people and society. The sustainability of a society depends on the healthy growth of the economy and the preservation of ecological systems, which in turn relies on the stable and secure structure of society. [58] states that sustainable development is based on three separate filters: ecological, economic, and social. [59] define sustainability as a holistic concept that encompasses environmental, social, and economic elements as three fundamental dimensions. [21] note that the sustainability debate gives priority to the "three-pillar model"; sustainable social development should strive to equally achieve ecological, economic, and social goals. The emphasis on which of the three elements of sustainability should be given more importance varies depending on the perspective and profession, but it is clear that each element should be given sufficient importance.

Since the beginning of the discussion on sustainable architecture practice, it has been attempted to be defined with various approaches and principles. While early texts emphasized the economic and environmental dimensions, it has been understood over time that equal importance should be given to all three dimensions. According to [53], who highlights that buildings shape society and society shapes buildings, sustainable architectural design can be said to have two fundamental purposes:

- Sustainable buildings should exhibit measured behavior on a global scale by minimizing the environmental impacts associated with their construction, use, and end of useful life. Sustainable buildings should have a small ecological footprint.

- While improving the psychological and physical well-being of individuals and considering their objective needs, buildings should make a positive and appropriate contribution to the social environment in which they exist, enveloping people.

Another approach is the sustainable architecture approach that includes the criticisms of [60] towards the International Style. According to [60], understanding and addressing all the negatives that have emerged in this period regarding human and environmental health are closely related to the process of reinterpreting the potentials that have existed in the past architecture. Through this process, the approach referred to as sustainable architectural design can contribute to the reunderstanding of the relationships between humans and the environment and the design of sustainable buildings that are in harmony with nature. [53] has brought different perspectives on how a sustainable building should be, considering the cultural expectations as well as the three fundamental aspects of economic, environmental, and social sustainability. [53] defines the three dimensions of a sustainable building as follows:

- Ecological sustainability refers to the preservation of natural resources and ecosystems. Common qualitative frameworks are often used to determine energy and material flows in relation to time and space through methods like life cycle analysis.
- Economic sustainability can be examined in terms of investment and operational costs. Investments and operational costs are evaluated as long-term resource efficiency issues for buildings and building stocks. Rather than minimizing investment costs through specialized and low-cost solutions, it is preferable to find solutions that have high durability and reusability for a particular investment. Solutions that can be repaired and used in various ways have long-term potential. On the other hand, solutions with low energy consumption, easy maintenance, and operation often have low environmental impacts as well as low operational costs.
- Social and cultural sustainability encompasses the preservation of comfort, well-being, and the health of users/occupants within the building. The preservation of human health, which is usually associated with the preservation of the ecosystem, is actually much closer to comfort issues (such as indoor air quality, etc.). [53]

emphasizes that environments with high cultural and social quality will not deteriorate over time.

The mutual interaction between architectural design and human behavior has resulted in sustainable architecture, which has also given rise to the concept of a sustainable society. The concept of a sustainable society is defined by [61] through four conditions:

1. Eliminating the excessive consumption of materials obtained from the Earth's crust: A sustainable society utilizes natural resources in a sustainable manner, avoiding excessive consumption.
2. Eliminating the increasing use of produced chemicals and compounds: Reducing the use of harmful chemicals and minimizing their impact on the environment is an important factor for a sustainable society.
3. Eliminating the increasing physical degradation and destruction of nature and natural processes: Preventing the destruction of the natural environment requires an approach that involves preserving and restoring ecosystems.
4. Eliminating conditions that weaken the capacity to meet people's basic needs: A sustainable society provides the necessary resources and infrastructure to meet people's basic needs. It reduces inequalities and enhances the quality of life for everyone.

These four conditions establish the fundamental goals and guidelines for a sustainable society [61].

Another important document that provides significant information about sustainable architecture and its principles is the "Earth Summit," also known as the United Nations Conference on Environment and Development (UNCED), held in 1992. One of the five international outputs of this summit is the global action plan titled "Agenda 21," which includes a section on achieving sustainability in architectural design.

In Agenda 21, the following key recommendations are made in relation to sustainable design [62]:

1. The use of local materials and region-specific structural resources.
2. Providing incentives to support the continuation of traditional techniques through regional resources and self-help strategies.

3. Recognizing the cost of natural disasters in developing countries due to unregulated construction activities, inappropriate material usage, lack of education programs, and the need for improvement in both material usage/production and construction techniques.
4. Regulation of energy-efficient design principles.
5. Setting standards to discourage construction in ecologically unsuitable areas.
6. Prioritizing labor-intensive techniques over energy-intensive techniques.
7. Restructuring credit institutions to facilitate the purchase of building materials and services by the poor.
8. International knowledge exchange on all aspects of construction related to the environment, particularly non-renewable resources, among architects and contractors.
9. Developing methods to support and facilitate the recycling and reuse of building materials, especially those requiring intensive energy use in production.
10. Imposing financial penalties to discourage the use of environmentally harmful materials.
11. Promoting the localization of the construction sector through support for small businesses.
12. Utilizing clean technologies.

These recommendations aim to guide the achievement of sustainability in architectural design and construction by addressing various aspects such as material selection, energy efficiency, local context, and environmental considerations. The architecture profession relies on various activities for the creation of an architectural product. These activities are primarily derived from two main sources: design and construction. Architectural design is defined as the production of a representation for the realization of something, and it is noted that this process typically progresses through complex relationships and trial and error. Prior to the creation of an architectural product, drawings need to be made, drafts need to be created, and technical support needs to be obtained from other professional disciplines. Architects and engineers should possess the necessary knowledge and experience in accordance with the needs of the program requirements, and they should carry out the design in alignment with factors such as budget and time constraints. Sustainable architecture is an approach that aims to enhance and preserve environmental values, improve quality of life, enhance comfort

conditions, conserve natural and energy resources, and transmit them to future generations. Architects have different approaches to achieve sustainable architectural design. These approaches aim to achieve sustainability goals by considering environmental, social, and economic factors. According to [44], some strategies employed by architects in the process of implementing sustainable architectural design are as follows:

Table 2.3 Strategies in Sustainable Architectural Design (Readapted by Author, Source: [44])

STRATEGY	INFORMATION
Energy Efficiency	Energy-efficient systems are used in designs to reduce energy consumption. Strategies such as well-insulated structures, passive solar energy utilization, energy-saving lighting, and heating/cooling systems increase energy efficiency.
Material Selection	The use of natural and recyclable materials reduces waste production and minimizes environmental impact. Preferred options include materials produced through sustainable forestry management, recyclable steel, and alternative concrete.
Water Management	Strategies such as rainwater harvesting systems, greywater recycling, and water-saving fixtures ensure efficient water use. Water-protective methods are employed in landscape design.
Green Spaces	Adding green spaces around buildings supports natural life, preserves natural resources, and reduces carbon emissions. Natural areas such as green roofs, courtyards, and gardens contribute to building sustainability.
System Integration	Architects optimize energy, water, and waste management by integrating building systems. This integration may include renewable energy sources such as solar panels, wind turbines, or geothermal heat pumps that can contribute to energy production in buildings.
User Health and Comfort	Architects support user health and comfort by improving indoor environmental quality. Factors such as good natural lighting, natural ventilation, and healthy indoor air quality are taken into consideration.

In the field of architecture, incorporating the principles of sustainability is possible through making structural decisions during the design phase. Additionally, it is possible to make existing structures sustainable by making interventions to the current system. The concept of sustainability is addressed in many fields with its environmental, economic, and social dimensions. In the field of architecture, sustainability requires an approach that includes elements such as commitment to the natural environment, energy conservation, user satisfaction, and structural continuity. From an architectural perspective, sustainability is a primary necessity in design [63]. In this profession responsible for the design of each building's environment, the absence of sustainability-based approaches will lead to disasters for the world. In fact, the need for a better understanding of sustainability arises parallel to the magnitude of buildings and construction activities worldwide [64]. However, the perspective of sustainability in architecture is often associated with ecological aspects, and sustainable architecture is generally considered equivalent to energy-efficient or ecological architecture. For example, [65] defines sustainable architecture as "the sum of activities related to the creation of buildings that prioritize the use of renewable energy sources, are environmentally sensitive, preserve the health and comfort of people in terms of energy, water, materials, and are effectively used in all stages of their existence." Although this definition is quite comprehensive, it almost completely excludes the economic and social aspects of sustainability. To create an effective sustainable approach in architecture, it is necessary to include elements of social and economic sustainability [66].

2.3 The Emergence of Social Sustainability

Today, the concept of sustainability has taken center stage in the agenda, particularly due to the climate crisis. Studies indicate that the concept of sustainability requires more than just environmental and economic strategies. The World Conservation Strategy, published in 1980, emphasized that poverty, population pressure, social inequality, and trade conditions were the main causes of habitat destruction and environmental degradation. The Brundtland Report, published in 1987, laid the foundations for social sustainability under the headings of Peace, Security, Development, and Environment. Sustainable development should meet the needs of future generations without compromising the needs of the present. Social sustainability

requires a holistic approach that integrates economic, social, and ecological knowledge. It is based on practical logic, taking into account the local context, and includes new sensitivities based on the characteristics of the field of work. Social sustainability encompasses variables such as equality, sufficiency, social sharing, and peace, aiming for healthy interactions and relationships among individuals, communities, and societies, as well as with the environment. Social sustainability is considered a desired goal as it is a process that requires ongoing continuity [63; 37; 21; 83].

Table 2.4 Social Sustainability Definitions from Literature (Revised by Author)

AUTHOR	SOCIAL SUSTAINABILITY DEFINITION
MCKENZİ	A life enhancing standards in society, and an affair within communities which can attain the condition.
MEHAN&SOFLAEI	The pride of simple human needs and succeeding maintenance for future generations
LITTING&GRIESSLER	A systematic concept, but its aspects are separated, leading to confusion in the sequence process.
AJMAL, KHAN, HUSSEIN & HELO	A quality of society especially for susceptible humans or groups.
BARRON&GAUNTLETT	In formal and informal ways, administrations, structures and connections busily support the magnitude of new generations to build healthy and quality living standards for the community.
PALICH&EDMONDS	A process aimed at designing sustainable and successful spaces to increase people's well-being by understanding what they need where they live.
ISO 21929-1:2011	The right of all mankind to benefit equally within the scope of health.
BERARDI	The keywords of social sustainability such as flexibility and adaptability
ANDERS	Human-centred quality of life, “human well-being", nature-cantered "environmental well-being" and it refers to the situation of “having a good place” based on space.
BRAMLEY&POWER	It is associated with the provision of social equity (social equity), social inclusion (social inclusion) and social benefits (social capital).
DEMPSEY	It is explained as “social interaction”, “participation in common groups-social networks in society”, “social stability”, “sense of pride/ commitment to the place”, “safety and security”.
MCKENZIE	To create healthy and livable communities, formal and informal processes, systems, structures and relationships, and actively supports social sustainability occurs when the capacity of future generations.
MAK VE PEACOCK	Social sustainability is to maintain and improve the well-being of present and future generations.
RAPOPORT	Spatial formations in different cultures are associated with cultural life.
HILLIER&HANSON	Space is not only the product of society, but society is also the product of space.
ASPINALL, CUKIER&DOBERSTEIN	The evaluations to be made about the quality of life form a sustainable society.
SANOFF	Spatial organizations, which are realized through the establishment and preservation of the balance between the human and the living environment, must contain values oriented to the wishes and needs of the user.
TRANCIK&MANEWA	It is the design and use of spaces to serve the desired purpose in social life
SACHS	It is based on the values of equality and democracy and is the effective distribution of all human rights (political, economic, social and cultural

Table 2.4 (continued): Social Sustainability Definitions from Literature (Revised by Author)

AUTHOR	SOCIAL SUSTAINABILITY DEFINITION
POLESE&STREN	Development in harmony with the development of society is an element that promotes an environment that helps the entire population to live together harmoniously with improvements in the quality of life of culturally and socially diverse groups.
DAVIDSON&WILSON	Maintaining and improving the well-being of current and future generations is a system of cultural relations in which the positive aspects of different cultures are valued and supported.
COLONTOINO	It covers all the actions in the main thematic areas covering the social sphere of individuals and societies, ranging from capacity building and skill development to environmental and spatial inequalities
CHAN&LEE	Urban developments are the creation of a harmonious living environment, reducing social inequality and division and improving the quality of life in general.
OMANN& SPANGENBERG	It is the right of every individual to actively participate in society.
CHIU	It is called improving people's well-being and equitable distribution of resources by reducing social exclusion and destructive conflict that depend on certain social relations, traditions, structures and values that represent the social limits and limitations of development, which must be evaluated on the axis of environmental sustainability
EMMELHANZ&ADAMS	It includes the concepts of "diversity, philanthropy, health and safety and human rights".
HUTCHINS& SUTHERLAND	A socially sustainable society is correct, fair, inclusive and democratic. A socially sustainable society ensures a good quality of life for current and future generations.
GOMAA&SAKR	It is the improvement of society and social development that meets its needs
JUAN	People should be able to feel comfortable, healthy and safe in their homes and in the built environment. This situation has been defined as "ensuring optimal conditions".
YUNG, CHAN, & XU	The concept is the desired goal because social sustainability is a process and the continuity of this process is in question in order to ensure it.
MOLDAN	Social sustainability requires the preservation of the integrity of society
VALLANCE	Related to how social/cultural preferences and characteristics and the environment are maintained over time
ÇAHANTİMUR	Aiming for people to live a quality life for today and tomorrow; It is the satisfaction of basic human needs.
BERKELEY	It is about the quality of life of individuals now and in the future
UNITED NATIONS	It can be achieved by eliminating poverty in the construction of sustainable societies and environments.

Table 2.4 (continued): Social Sustainability Definitions from Literature (Revised by Author)

AUTHOR	SOCIAL SUSTAINABILITY DEFINITION
WACOSS	Reflected in equality, diversity, interconnectedness, quality of life, democracy and governance.
PARTRIDGE	A quality of life, equality, inclusiveness, accessibility, future-orientation, and participatory process.
HANS&BOCKLER&STIFTUNG	Basic needs, Social security, Equal opportunities for participation in a democratic society, providing opportunities for social innovation.
THIN	It is social justice, solidarity, participation, security.
EGAN	It is stated that in the measurement of social sustainability, the preference is to use both qualitative and quantitative methods in addition to statistical methods.

To concretize the concept of social sustainability, it is important to define the criteria and principles that represent the concept. While the concept of sustainability is divided into different categories such as ecological, economic, and social, it does not provide sufficient criteria for social evaluation in particular. Therefore, literature studies focusing on categorization, indicators, or principles in the field of social sustainability have been examined. Categorization often leads to sub-categories such as physical and non-physical factors, tangible and intangible indicators, or context-based and user-based components. [83] define physical factors such as pedestrian-friendly neighborhoods, attractive public spaces, and decent housing, as well as non-physical factors such as participation and local democracy, security, employment, and settlement stability. [21] define three groups of indicators: the first group focuses on meeting basic needs and quality of life, the second group is related to the demand for social justice within the sustainability discourse, and the third group discusses aspects of social cohesion. [23] identify indicators that define cultural components based on content, context, history, function, and users. Many other studies define indicators or principles for social sustainability without using sub-categories. [24] define principles such as justice and human rights, settlement efficiency and quality of life, value of land and heritage, common good and hope and vision. [84] define indicators such as accessibility, health and well-being, security, employment, local democracy, cultural heritage, equal opportunities and justice, connectivity and mobility, social justice, and attractive public spaces when addressing social sustainability elements in an urban context.

2.3.1 Social Sustainability in Architectural Design

Architectural design is a problem-solving discipline. The essence of all architectural designs made to this day is based on this foundation. The most basic purpose of architectural design is to be able to put forward a project that meets the needs in the aesthetic, functional and technical contexts that were designed at first [85]. Since these requirements are close to being met with the development of technology, architects have entered into new searches and integrated the concept of sustainability, which they also consider future generations, into the architecture. As people shape spaces, spaces also influence their behavior and actions. Spaces possess a power that affects and

shapes people's social lives [86]. Therefore, spaces play a significant role in the sustainability of social life. The influence of spaces on human behavior includes aspects such as how people use spaces and how they establish interactions and social relationships. For example, the layout of a space can either encourage or hinder social interactions, and it can create spaces for social engagement or isolation. This interactive relationship is not solely limited to the physical characteristics of a space. The design of a space should also consider factors such as arrangements that promote social interactions, accessibility, social diversity, and user needs. In this way, spaces contribute to the creation of sustainable social life [86]. In the architectural design process, issues related to social sustainability associated with spaces hold great importance. Designers should consider these aspects to create spaces where people can live comfortably, promote interactions, and respond to societal needs. This is essential for enhancing people's social lives, strengthening social bonds, and constructing a sustainable society. Architectural design plays a crucial role in promoting and enhancing social sustainability, as highlighted by [88] in their research. They emphasize the significance of social interactions, architectural identity, social security, hierarchy, participatory design, and flexibility in this context:

1. **Social Interactions in Space:** Increasing and improving the quality of social interactions in buildings and the built environment is essential for enhancing social sustainability. The sociability of architectural spaces influences the nature and quantity of interactions between individuals, both at the scale of buildings and in public spaces. This factor plays a significant role in the development of social sustainability. The sociability of architectural spaces can be achieved through the presence of high-quality indoor, outdoor, and semi-open spaces that cater to people's needs and expectations, such as for work, gathering, meetings, socializing, and engaging in collective activities. Such built environments are of great importance in supporting users' social lives in all dimensions. For example, shared spaces like atriums, balconies, terraces, green roof arrangements, and versatile spaces in office buildings, residential complexes, and multi-unit housing that facilitate various uses (meetings, celebrations, receptions, etc.) are crucial in fostering interpersonal interactions.

2. **Architectural Identity:** The concept of identity can be explained by the presence of distinctive and differentiating elements in spaces. The collective set of unique features of a place forms its identity. Spatial identity refers to a space's ability to stand out and be easily distinguishable from others. Three components contribute to spatial identity: the physical structure of the space, the activities, conditions, and events within the space, and the individual and group meanings created through experiences and purposes associated with the space. The relationship between the physical structure, meanings, and activities is vital in shaping spatial identity. People experience and perceive each space differently. However, a shared perspective that defines the identity of a place is established based on how these relationships are formed. Spaces with distinct characteristics can enliven their locations and give them a unique identity. Common spaces, where traces of shared values are evident, serve as prominent sites for reading spatial identity. The presence of universally accepted values enhances social interaction and fosters a sense of social pride. Therefore, the concept of architectural identity, which is linked to social, cultural, and economic contexts, provides individuals with a sense of belonging and contributes significantly to supporting social sustainability in architectural design. Designing structures and built environments with a distinct identity in their respective contexts is an important approach to elevate the sense of social identity in society.
3. **Social Security:** Enhancing social security through architectural design and increasing the sense of safety in buildings are crucial aspects. Design should aim to enhance users' sense of control. Designing secure and defensible spaces is an important consideration in architectural design.
4. **Hierarchy:** The concept of hierarchy plays a role in the formation, development, and direction of spatial behaviors in social life, contributing to social sustainability. Sometimes referred to as formal hierarchy, functional hierarchy, visual hierarchy, or spatial hierarchy, this concept enhances the sense of social order in society, thus influencing the development of social sustainability. Spatial hierarchy involves the arrangement and positioning of primary and supporting spaces in an orderly manner. In this context, hierarchy involves the prioritization, order, scale, and other considerations of emphasizing a particular element in relation to others. To establish

a healthy architectural structure and spatial relationships, there needs to be a hierarchical order among spatial elements. The presence of hierarchical order in spatial arrangements is closely related to social order. Hierarchy fundamentally serves as a tool to explain human spatial behaviors. When people use spaces, they develop various spatial behaviors based on their social roles and lifestyles, such as claiming ownership, exerting control, ensuring privacy and security, socializing, and establishing personal distance. These behaviors represent people's presence in a space and are part of the overall spatial hierarchy. In a social order where needs such as education, health, work, relaxation, and social activities are fulfilled at the highest level, the existence of spatial hierarchy becomes inevitable. Disruption of hierarchical relationships creates ambiguity in space, inevitably affecting spatial behaviors.

5. **Participatory Design:** Participatory design is an approach in which all relevant stakeholders are involved in the architectural design process. At the core of participatory design is equal participation and mutual exchange of information among stakeholders. According to [89], citizens are an integral part of public participation in planning processes, and their active involvement is considered essential in significant decisions facing a community. Arnstein believes that public participation is a strategy that determines how information is shared, goals and policies are established, tax resources are allocated, programs are implemented, and benefits are distributed. She emphasizes the importance of input from all stakeholders. In this process, participation can take various forms, including direct involvement in decision-making processes or providing input through observations, interviews, surveys, and other means. [89] highlight the importance of public forums and increased access to information to facilitate public participation.

[90] emphasizes the interpretation of the relationship between the designer and the user as a means to understand the successful or unsuccessful harmony between the user and the space. This statement highlights the importance of interpreting the relationship between the designer and the user in order to understand the harmony or mismatch between the user and the space. Understanding how the user feels in a given space and how the space meets their needs is crucial. The designer must comprehend the users' requirements and preferences, adopt a user-centered approach in the design of the

space, and provide solutions that address their needs. The relationship between the user and the space is shaped by the physical features, layout, and functionality of the space. A well-designed space not only meets the users' needs and expectations but also enables them to adapt to the environment. If the user finds the space comfortable, safe, and functional, it indicates the success of the design. Conversely, if the user experiences a mismatch with the space, it suggests that there are deficiencies in the design or the space does not meet their requirements. Therefore, evaluating and interpreting the relationship between the user and the space is essential for successful spatial design. The designer's understanding of the user, accurate identification of their needs, and providing solutions that align with these requirements are crucial in achieving harmony between the user and the space.

[22] define social objectives such as protection of health and safety, liberation of education and personal development, maintenance of cultural and social values, legal equality and assurance, and intergenerational solidarity. [87] emphasize the importance of social interactions, architectural identity, social security, hierarchy, participatory design, and flexibility in promoting and enhancing social sustainability through architectural design. A summary of their key points are given below:

- **Social Interactions in Space:** Increasing and improving social interactions in buildings and the built environment is crucial for enhancing social sustainability. The sociability of architectural spaces influences the quality and quantity of interactions among people at both the building and public scales. A socially sustainable environment should provide high-quality indoor, outdoor, and semi-open spaces that meet people's needs and expectations for work, gathering, socializing, collective activities, and events. Common spaces such as atriums, balconies, terraces, green roof arrangements in office buildings, and shared spaces that support various uses (meetings, celebrations, receptions, etc.) in residential and multi-unit housing are significant elements that enhance social interaction among individuals.
- **Architectural Identity:** Identity refers to the distinctive and differentiating aspects of spaces. The identity of a place is formed by the combination of its unique characteristics. [91] defines spatial identity as the ability of a place to be recognized and distinguished from other places. [92] describes three components that

contribute to the formation of spatial identity: physical structure, activities/events/conditions within the space, and individual and group-generated meanings and experiences associated with the place. The relationship between physical structure, meanings, and activities plays a crucial role in shaping spatial identity. People experience and perceive each space differently, but a common perspective that defines the identity of a place is established based on how these relationships are formed. Creating spaces with a specific character can revitalize their locations and give them a unique identity. Architectural identity, which is linked to social, cultural, and economic contexts and fosters a sense of belonging in individuals, significantly supports social sustainability in architectural design. Designing structures/built environments to have an identity within their context is an important approach that enhances social identity in society.

- **Social Security:** Enhancing social security by increasing the sense of safety and security within buildings is another important aspect of promoting social sustainability through architectural design. Design should create a sense of control for users. Designing safe and defensible spaces is a critical consideration in architectural design. The defensible space theory, developed by [93], emphasizes the primary role of space in the development of crime. According to this theory, the physical and social structure of a space can either create opportunities for crime, prevent its occurrence, or facilitate its spread within that space. Fear of crime is associated with the perception of urban spaces as safe or dangerous, reflecting the feeling of insecurity in a place. Crime and the fear of crime can have negative impacts on all aspects of social life. Areas with crime and security concerns experience a decrease in property values and a reduction in the capacity to rebuild trust. Abandoned and deteriorated areas, socially segregated spaces, and places that attract gatherings throughout the day are significant in terms of crime and security issues. Ensuring social security in urban spaces is a fundamental aspect of making them livable. Factors such as outdoor lighting, visibility, and promoting neighborly relationships can significantly reduce the perception of insecurity related to space. In societies where social security is lacking, the quality of life decreases, and people become unhappy.

- **Hierarchy:** The concept of hierarchy has an impact on the formation, development, and direction of spatial behavior in social life, contributing to social sustainability. Hierarchy, sometimes referred to as formal hierarchy, functional hierarchy, visual hierarchy, or spatial hierarchy, enhances the sense of social order within a community and plays a role in the development of social sustainability.

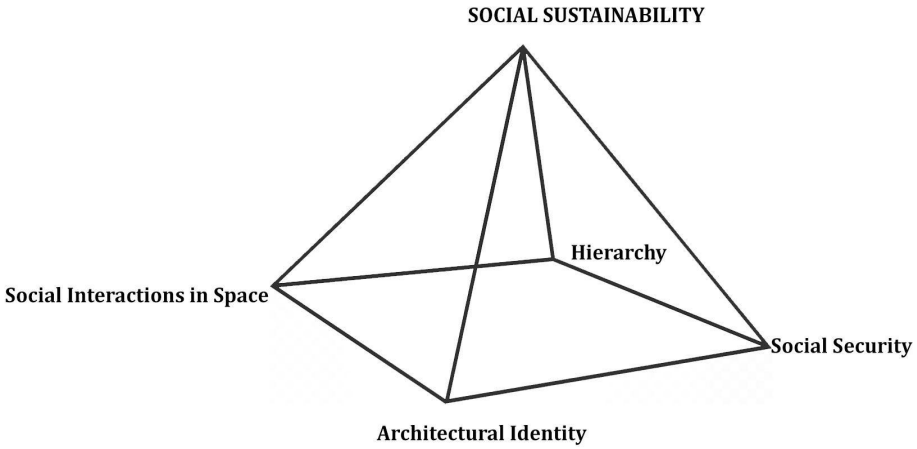


Figure 2.2 Hierarchy of Social Sustainability (Source: [87])

According to [94], social sustainability in architecture focuses on meeting needs, improving quality of life, and utilizing capabilities and skills for development. It encompasses criteria such as social justice, well-being, health and welfare, security, awareness and education, participation, and public relations. Responsive architecture that considers the basic needs and behavioral patterns of low-income and disabled individuals is crucial for enhancing spatial qualities and ensuring inclusivity. Architecture that reflects culture, beliefs, and behavioral patterns creates a sense of belonging and establishes a harmonious living environment with flexible spaces. The concept of social sustainability in architecture is rooted in socio-cultural approaches. The impact of community behaviors, beliefs, and culture on architecture is of primary importance. Architecture with a social sustainability approach aims to design spaces that align with the culture, behaviors, and ways of human life, and remain suitable for extended periods. It is connected to fundamental human needs such as happiness, security, freedom, dignity, and compassion. Sustainable architecture must be responsive to human needs and behaviors, establishing a relationship between individuals and the built environment for long-term sustainability.

The most neglected dimension of the sustainability concept is the social dimension. People perceive a building, its impact, and effects in different ways. This makes it challenging for sustainable buildings to proliferate because identifying common sustainable needs among individuals is difficult [95]. Differences among stakeholders require different perspectives on sustainability priorities, and as a result, the definition and characteristics of a sustainable building become subjective [96; 97]. Efforts to define the social aspects of a building have often addressed concepts such as quality of life or sustainable livelihoods [95]. These efforts have increased the ambiguity of social sustainability. According to [98], sustainability in the context of architecture is achieved through three fundamental principles:

1. Conservation of resources; reduction, reuse, and recycling
2. Life cycle
3. Human-centered design

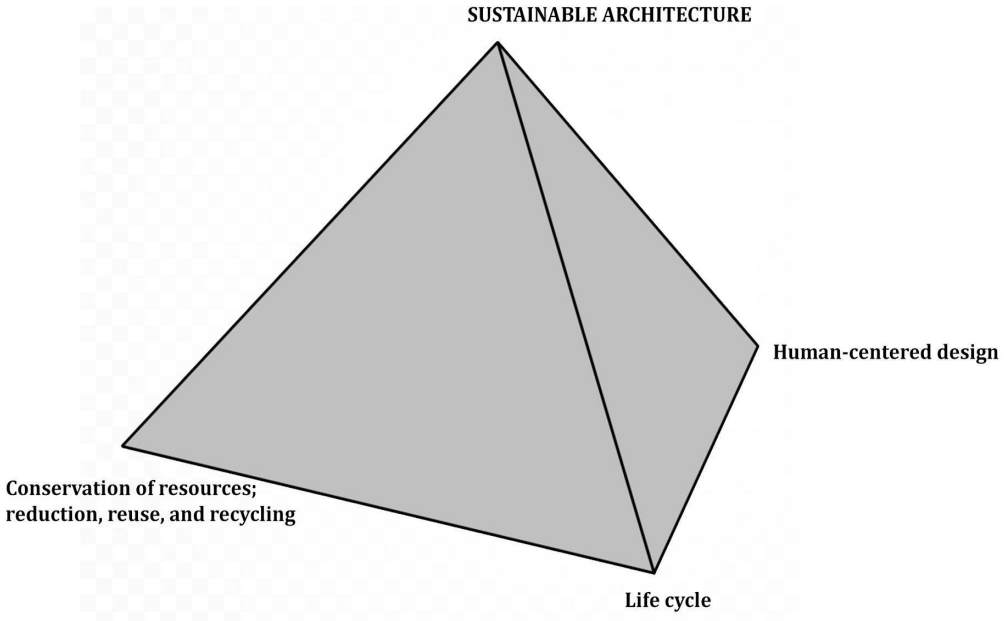


Figure 2.3 Architectural Sustainability's Fundamental Principles (Figured by the Author, Source: [98])

Conservation of resources focuses on minimizing the use of resources and promoting efficient consumption. This principle emphasizes the reduction of energy and water usage through efficient design and the selection of sustainable materials. It also encourages the reuse and recycling of materials to minimize waste generation. Life cycle assessment considers the entire life cycle of a building, including construction, operation, maintenance, and demolition. It aims to evaluate and optimize the environmental impact of a building throughout its lifespan. This principle emphasizes the importance of considering the long-term sustainability of a building and the associated environmental effects. Human-centered design places people at the center of the design process and aims to create spaces that enhance their well-being and quality of life. It considers human needs, behavior patterns, and comfort in the design of architectural spaces. This principle emphasizes the importance of creating inclusive and accessible environments that cater to the diverse needs of individuals. These three principles provide a framework for achieving sustainability in architecture. By conserving resources, considering the life cycle of buildings, and adopting human-centered design approaches, architects can contribute to the creation of sustainable built environments that are environmentally friendly, socially inclusive, and economically viable.

According to [99], social and cultural sustainability is one of the fundamental goals of sustainable buildings, aiming to consider the social-economic, cultural, and political requirements of communities. The key principles of this goal include understanding the social and economic realities of the community, preserving social and cultural diversity, understanding the needs and desires of the community, and ensuring effective participation of the community in the process of creating their living environments. A new concept that is included under the title of social sustainability in the literature is “participatory design”. This concept also introduces the concept of flexibility in design. According to [3], it is evident that contributing to the sense of community is an important requirement of a sustainable building. However, the practical implications and ways of proving these aspects remain uncertain. As discussed earlier, the relativity of the sustainability concept gives it a social character in terms of sustainability. The resulting conclusion is that the social dependence of sustainability in the building sector can be addressed through a participatory process,

where different stakeholders express their thoughts on sustainability and contribute to it [100]. This requirement of a social context with information sharing among individuals, where the concept of sustainability emerges through participatory decisions [101]. According to [102], in order to create participatory design, the following key issues about design strategies should be implemented:

1. **Developing Awareness:** Increase participants' awareness through methods such as exhibitions, media and communication tools, and discovery tours. This allows participants to actively engage in the design process.
2. **Indirect Information Gathering:** Obtain indirect information from participants through methods such as surveys and interviews. These techniques help reach a broader range of participants and gather different perspectives.
3. **Group Interactions:** Facilitate participants coming together through interactive methods such as face-to-face meetings, focus group meetings, and workshops. This enables participants to interact with each other, exchange ideas, and generate collaborative solutions.
4. **Open-Ended Applications:** Enable participants to share their ideas through methods such as collaborating with local television channels, voting, digital technologies, and social media applications. These types of applications allow participants to easily express their opinions.
5. **Brainstorming:** Encourage participants to freely share their ideas through activities like post-it exercises, nominal group technique, writing activities, and seeking expert opinions. These techniques support creative thinking and bring forth different perspectives.
6. **Interactive Brainstorming:** Bring participants together in interactive ways to generate ideas through methods such as group panels and interactive idea workshops. In these methods, participants can contribute to each other's ideas and develop collaborative solutions.
7. **Games:** Games allow participants to engage in the design process in a fun and interactive way. Through games, collaboration and creativity among participants can be fostered.

8. **Workshops:** Organize workshops to address relevant topics and actively involve participants in the design process. Workshops allow participants to come together, generate ideas, create prototypes, and develop solutions.
9. **Establishing Working Groups:** Form working groups to address specific topics, enabling participants to conduct in-depth studies. These groups allow participants to specialize in a particular area and contribute to the design process.
10. **Post-Occupancy Evaluation:** Utilize post-occupancy evaluation methods to gather feedback from participants at the end of the design process. This is important for evaluating the impact of the design and utilizing the lessons learned for future designs [102].

Social sustainability reflects the balancing of social norms that are dependent on religion, traditions, ethical rules, value systems, education, attitudes, and personal and group behaviors. Similarly, social sustainability includes goals such as allowing for development in human quality of life, supporting social justice, considering cultural and social integrity, and encouraging collaboration and participation at individual and societal levels. In this context, the concept of locality is included under the necessary subheadings for achieving social sustainability in architecture. [103] states that three elements should be mentioned in the initial stage of design:

- Connectivity: The design should strengthen the relationship between the project, site, community, and economy. Minimal changes should be made in the functioning of natural systems, and the site-specific natural characteristics should be enhanced.
- Indigenous: Design should be based on what is sustainable and specific to the region for centuries. It should consider the unique characteristics and requirements of the local context.
- Long life, Loose fit: Design should be done with future generations in mind, taking into account past generations. It should have a long lifespan and allow for flexibility and adaptation over time.

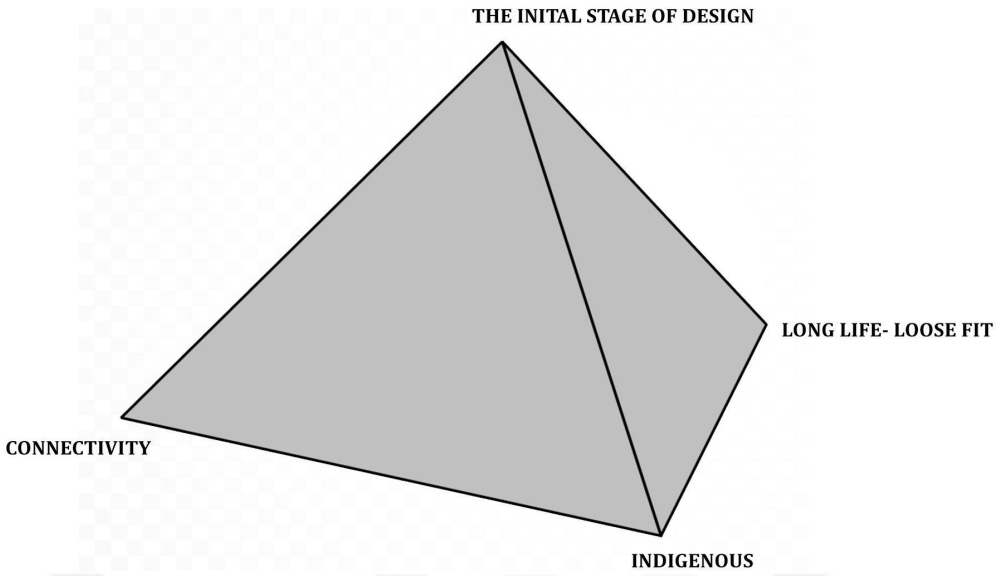


Figure 2.4 The Elements of Initial Stage of Design (Figured by Author, Source: [103])

The connections that individuals have with specific places are often described using different concepts such as place attachment, place identity, and sense of place. Place attachment refers to the emotional bond or connection that individuals develop with a particular place. It reflects their feelings of belonging, rootedness, and familiarity in that place. Place identity, on the other hand, refers to the perception and recognition of a place as distinct and meaningful, contributing to one's sense of self and identity [104]. It involves the identification with the values, symbols, and characteristics associated with a specific place. The sense of place encompasses the subjective and experiential aspects of how individuals perceive and interpret a place, including its physical, cultural, and social dimensions. It involves the feelings, meanings, and experiences that individuals associate with a place (105; 106; 107). According to Schulz's study "Genius Loci: Towards a Phenomenology of Architecture," the identity of a place is considered a fundamental precondition for human identity. This suggests that the characteristics, features, and overall identity of a place play a significant role in shaping the identities and experiences of the people who inhabit or interact with that place. According to above information, structures and buildings, through their physical form and design, have the potential to contribute to the creation and expression of a strong local identity. The way buildings are shaped and integrated within a specific place can influence how individuals perceive and connect with that place, fostering a sense of belonging and attachment. The International Organization for Standardization

(ISO) has published a global document, ISO 15392:2008, which outlines the principles of sustainability in building construction. This document highlights that while sustainability is a global concept, the approach to implementing sustainability in the building sector should be specific to the local context. This means that strategies and practices need to be tailored to reflect the unique characteristics, conditions, priorities, and needs of both the physical and social environments in a particular region. It is essential to acknowledge the reciprocal relationship between buildings and people, as buildings influence individuals, and individuals, in turn, shape the built environment. By recognizing the importance of local context and the interplay between buildings and people, sustainable practices can be effectively implemented to achieve long-term environmental, social, and economic benefits. When discussing the uncertainties of the sustainability concept, [3] addresses the topic of locality, stating that sustainability requires continuous evaluation at different scales. Sustainability is inherently tied to the local context and is more of a matter of local interpretation than a universal goal. This statement emphasizes that the impact of every action extends from a local scale to a global scale. Locality becomes a crucial consideration in the process of socially sustainable design, encompassing various aspects, from the materials used to the needs of the users. According to [108], a socially sustainable community is characterized by various factors. These factors include "social benefits," which refer to the positive outcomes and advantages that individuals and groups derived from living in a community. "Social interaction" emphasizes the importance of meaningful connections and relationships among community members. "Social behavior" focuses on promoting positive norms and practices that enhance social cohesion and well-being. The concept of "sense of place" highlights the emotional and psychological attachment individuals have towards their community, as well as their identification with the local environment and culture. "Pride and attachment" further emphasize the emotional connection and sense of belonging that individuals feel towards their community. "Safety and security" address the need for a secure and protective environment where individuals feel safe and free from harm. "Sense of comfort" relates to the physical and psychological well-being experienced in the community, including access to basic amenities, comfortable living conditions, and a supportive social environment. Lastly, "level of interest" reflects the engagement and

participation of community members in local activities, events, and decision-making processes. It signifies the level of enthusiasm, involvement, and investment individuals have in shaping the community's future. Taken together, these concepts highlight the multifaceted nature of social sustainability in a community, encompassing factors related to social well-being, interaction, attachment, safety, comfort, and active participation. Designers need to take into account the concept of locality at multiple points throughout the design process to ensure social sustainability [109]. As structures are designed for human users, buildings can be defined as both physical forms and a network of human relationships. [110] emphasize the substantial and influential role of space in shaping society. They argue that buildings are not just physical structures but also serve as tools for creating and influencing social life. The design and organization of space within buildings have the potential to impact social interactions, behaviors, and relationships, ultimately contributing to the development of a socially sustainable society. Spaces within buildings are not merely empty containers but active components that actively shape and facilitate social interactions. The layout, configuration, and arrangement of spaces influence how people interact, communicate, and engage with one another. For example, the design of common areas or gathering spaces can encourage socialization, collaboration, and community-building among individuals. On the other hand, the spatial separation or division of spaces can create barriers and hinder social connections. Furthermore, the physical attributes of a building and its spatial organization can reflect and reinforce social values, norms, and hierarchies. The design choices, such as the allocation of spaces for different activities or the placement of amenities, can reflect societal priorities and influence social dynamics. Therefore, the provision of inclusive and accessible spaces within buildings can promote equality and social integration. Finally, buildings are not only physical structures but also influential tools that contribute to the creation of a socially sustainable society.

According to the information above about the design and organization of space within buildings, architects and urban planners can actively contribute to fostering social interactions, promoting inclusivity, and enhancing the overall well-being of individuals within the built environment [110].

2.3.2 Social Sustainability Indicators

Table 2.5 Social Sustainability Indicators (Revised by Author)

AUTHORS' NAME	INDICATORS OF SOCIAL SUSTAINABILITY
Heerwagen (2006)	Connected/related to nature, creating a sense of community and belonging, providing opportunities for behavioural choices and control, offering opportunities for regular activities, providing sensory changes and diversity, ensuring security, Providing regular exercise opportunities, aesthetic [113].
Davoodi, Fallah ve Aliabadi (2014)	Social interactions in the space, architectural identity, social security, hierarchy, participatory design, flexibility [87].
Veenhoven (2000)	The livability of the environment, individual's life capability, the utility of life, the appreciation of life [114].
Preiser (1983)	Health, safety, security, functionality, efficiency, psychological comfort, satisfaction, livability, location, cultural niches, meeting user requirements [115].
Voordt & Wegen (2005)	Function, technology, aesthetics, economy, spatial orientation, Providing the freedom to move between different social environments, aesthetic [116].
Bramley (2009)	The presence of opportunities such as access to basic local services like social equality, shops, schools, health centers, entertainment facilities, open spaces, public transportation, job opportunities, and affordable housing [117].
Farrington & Farrington (2005)	Accessibility, places that create social interaction [118]
Barton, Mitcham & Tsourou (2003)	Access to employment opportunities, promotion of physical activity, access to affordable housing [119].
ISO 21542-2011	Outdoor accessibility, indoor accessibility, accessibility of traffic and transportation services, accessibility in the use of specific buildings, aesthetic [120].
Rapley (2013)	Accessibility of the area where the building is located to pedestrians, Special bicycle and motor vehicle parking near the main entrance/entrances, Accessible path to the entrance/entrances, Adequate exterior lighting, Accessible outdoor furniture such as seating areas, trash bins, and similar street furniture, Accessible information resources and services at the entrance/entrances of the area where the building is located, Convenient landing point near the main entrance/entrances, Floor entrances and exits, Simple, understandable, and logical layout plans, Barrier-free access to the building and barrier-free movement inside the structure, Easy access to information desks, elevators, and restroom units for people with disabilities, Intuitive, clear, and accessible fire and emergency evacuation routes, Spacious elevators for people using mobility aids and personal assistants, Individual stairs that facilitate safety-supported evacuation or rescue in emergencies, and are easy to use, Non-slip floor surfaces, Wide door openings and sufficient space around doors to allow wheelchair users to open and close doors easily,

Table 2.5 (continued): Social Sustainability Indicators (Revised by Author)

AUTHORS' NAME	INDICATORS OF SOCIAL SUSTAINABILITY
	Adequate maneuvering space, Proper height, location, and ease of use of controls and keys, as well as good lighting, especially for wheelchair users and similar mobility aids, Good visual contrast of walls, floors, doors, and signs, Clear signage, Important orientations, usages, and emergency information within the building conveyed to users through tactile, auditory, and visual means, Good acoustics, Continuous maintenance and management of the accessible and usable built environment [121].
Chiddick (2006)	Maximizing the area constructed on the footprint of new buildings, Maximizing the area constructed with reasonable additions and extensions in existing buildings, Aligning new uses in renovation projects with the existing structure, Having a high ratio of usable space to gross construction area, Creating spaces that enable the building to function for active uses (e.g., stairs, entrance lobbies, elevators, atriums, and foyers with a primary focus on circulation), Providing versatile spaces, furniture, and equipment that can be used for various activities, Incorporating design features that allow for different activities at different times, Optimizing space standards for efficient operations, Creating versatile office and research spaces with meeting areas and noise-controlled zones, supporting open plan areas, Optimizing furniture dimensions for efficient work, Providing wireless data access to maximize the effective use of common areas [122].
Blakstad (2001)	Adaptability, flexibility [123]
Nakib (2010)	Health, well-being, safety, indoor air quality, quality of life, positive interaction with other users [124].
Manewa (2016)	Maintaining user satisfaction/building attractiveness, ensuring the livability and vibrancy of the building and its surroundings, preventing crime through continuous use of the building [125].
Rogers (2012)	Emotional and social well-being, physical well-being, health [126]
BREEAM certification system	Image, Identity, Meaning, Accessibility and Parking Facilities, Accessibility, Efficiency, Flexibility, Safety and Security, Spatial Orientation, Spatiality, Privacy, Social Interaction, Health and Physical Well-being
LEED certification system	Visitability and Universal Design, Shared Use of Spaces in the Building, Flexibility and Aesthetics in Design, Transportation, Security.
Dempsey (2012)	Social interaction, participation in common groups-social networks in society, social stability, sense of pride and belonging, safety and security [83].
Bramley & Power (2009)	Social equity, social inclusion, social capital, sense of place, safety and security, a sense of comfort [95].
Björgvinsson, Ehn & Hillgren (2012)	The democratization of the process due to potential users having a say in the decision mechanism and reaching accepted design solutions through the user's participation in the design process [127].
Rapoport (1982)	Supporting the socialization of the space by facilitating indoor-outdoor use, social relationships, and community activities, grounding, social security, and social inclusivity [128].
Berardi (2013)	Flexibility, Adaptability, Social Inclusion [3]
Karuppannan ve Sivam (2011)	Social participation, Safety and security, Social equity, Neighbourhood satisfaction, Social interaction, Sense of place, Quality of urban design [129].

Table 2.5 (continued): Social Sustainability Indicators (Revised by Author)

AUTHORS' NAME	INDICATORS OF SOCIAL SUSTAINABILITY
Opp (2012)	Local environmental quality and disamenity location; health and well-being, environmental justice [130].
Opp (2017)	Access issues, equal access to job opportunities, equal access in connectivity and transportation, equal education access and opportunity, procedural fairness, environmental justice & health risks, community and the value of place, social capital, social segregation, safety and security, fair distribution of income [131].
Ewing and Handy (2009)	Knowing neighboor/sense of community, frequency of their neighboor, participating community, open space, aesthetics, accessibility, permeability, legibility, social infrastructure [132].
Dempsey, Brown and Bramley (2012)	The number and range of services and facilities, job opportunities, education and decent housing on offer within the neighbourhood [117].
Hawkes (2001)	Well-being, creativity, diversity, quality of life and innovation [133].
Sachs	Equity; democracy: effective appropriation of all human rights–political, civil, economic, social and cultural [19]
City of Vancouver (2005)	Equity; social inclusion and interaction; security; adaptability [134].
Colantonio (2009)	Traditional social policy areas and principles, including equity and health, with a range of issues such as participation, needs, social capital, the economy, the environment, happiness, well-being, and quality of life [135].
Burton (2000)	Access to facilities; built space; open space; infrastructure; health; community safety; access to superstores; access to green space; job accessibility; public transport use; extent of walking and cycling; amount of living space; health; crime; segregation; affordable housing [136].
Chiu (2003)	Internal housing conditions; external residential quality; affordability; accessibility to housing market; inadequately housed household; accessibility to public housing; adequacy of government subsidy in housing [9]
Raman (2023)	Sense of safety; participation, sense of belonging and sense of community; friendliness, community spirit; social network; social interaction [137].
Larimian, Freeman, Palaiologou & Sadeghi (2020)	Social participation, Safety and security, Social equity, Neighbourhood satisfaction, Social interaction, Sense of place [138].
Darchen and Ladouceur (2013)	Social networks or interaction with other residents, Participation in community activities, Sense of place pride, Housing stability (turnover, etc.), Safety (lack of disorder and crime) [139].
Barron & Gauntlett (2002)	Diversity, Quality of Life, Participation, Identity, Accessibility, Equality [140].

In this context, the social sustainability definition and indicators, as stated in the tables, can be explained for the design of a socially sustainable structure based on the definitions provided by [111] and [112], as follows:

Social sustainability in building complexes involves providing access to opportunities, services, and facilities to ensure the participation of all individuals in social, economic, and political life (accessibility). It is supported by various social infrastructures to enable fair access to nature, social, and cultural activities and to establish necessary systems for participation in decision-making processes (participation - user-oriented design - flexibility). The built environment in these complexes is designed to create favorable conditions that foster interaction, communication, and community development among people (social interaction). Additionally, it encompasses a complex area that meets the security needs of the individuals.

Based on the literature, the authors and the most frequently mentioned indicators of social sustainability are listed below in the obtained table:

Table 2.6 Social Sustainability Indicators the Most Mentioned in Literature (Revised by Authors)

AUTHORS NAME	THE MOST MENTIONED
Bacon et al., (2012); Chan and Lee, (2008); Dempsey et al., (2012); Karuppannan and Sivam, (2011); Burton (2000).	Open space
Ancell and Thompson-Fawcett, (2008); Bacon et al., (2012); Chan and Lee, (2008); Choguill, (2008); Karuppannan and Sivam, (2011); Porta and Renne, (2005); Weingaertner and Moberg, (2011); Burton (2000); Opp (2017);Ewing and Handy (2009).	Accessibility
Bramley et al., (2009); Bramley and Power, (2009); Dave, (2011); Dempsey and others, (2011); Dixon, (2011); Karuppannan and Sivam, (2011); Landorf, (2011); Weingaertner and Moberg, (2011).	Security
Barron and Gauntlett, (2002); Chiu, (2003); Cuthill, (2009); Dixon, (2011); Magis and Shinn, (2009); Weingaertner and Moberg, (2011).	Well-being
Colantonio, (2010); Enyedi, (2002); McKenzie, (2004); Polese and Stren, (2000); Yiftachel and Hedgcock, (1993); Hawkes (2001).	Quality of life
Ancell and Thompson-Fawcett, (2008); Bacon and others, (2013); Barron and Gauntlett, (2002); Bramley and Power, (2009); Colantonio, (2010); Dave, (2011); Dempsey et al., (2012); Dixon, (2011); Landorf, (2011); Woodcraft and others, (2011).	A sense of community
Porta and Renne, 2005; E. Chan and Lee, 2007; Bramley et al., 2009; Karuppannan and Sivam, 2011; Landorf, 2011; Dempsey et al., 2012; Bacon and others, 2013; Larimian, Freeman, Palaiologou & Sadeghi (2020); Ewing and Handy (2009) Power, (2009); Choguill, (2008); Dave, (2011); Dempsey et al., (2011); Dempsey et al., 2012; Karuppannan and Sivam, (2011); Landorf, (2011); McKenzie, (2004); Polese and Stren, (2000); Spangenberg, (2004); Weingaertner and Moberg, (2011); Yiftachel and Hedgcock, (1993); Larimian, Freeman, Palaiologou & Sadeghi (2020).	Social Infrastructure
City of Vancouver (2005); Berardi (2013); BREEAM certification system; LEED certification system; Blakstad (2001); Chiddick (2006); Davoodi, Fallah ve Aliabadi (2014).	Flexibility & Adaptability

Note: This table is based on data obtained from the studies of the authors in question. The indicators represent the most frequently mentioned issues related to social sustainability. The ranking in the table does not reflect a specific order of priority or importance; it only shows the frequency mentioned.

a) Accessibility

Table 2.7 Accessibility Definitions from Literature (Revised by author)

AUTHOR	DEFINITION OF ACCESSIBILITY
Voordth & Wegen	Regular users and visitors should not have difficulty reaching their destinations, being able to participate in planned activities, and utilizing the facilities necessary for the purpose of the structure [141].
Andrade et al.	Designing buildings, cities, and products that can be used equally comfortably, safely, and independently by all people, regardless of their abilities or limitations [142].
Vanderveen et al.	There is an important distinction between the built environment and human needs because access to the built environment is not a natural or normal action. Therefore, accessibility regulations in structures or the built environment should be approached with a specific focus on social inclusion, which aims to ensure the participation of all individuals in social life [143].
Rapley	It is essential that the streets, roads, sidewalks, pedestrian paths, signs, open spaces, rest areas, and other elements between and around the structures are safe, suitable, and enjoyable for everyone [121].
Mahdzar	Convenience at the destination point [144].
Church & Marston	It is a goal in transportation planning, land-use planning, and building design, generally [145].
Doğan	Spatial accessibility is the accessibility of outdoor spaces first [146].
Soja	All individuals within the built environment have the right to access any service and opportunity that holds public value [147].
Farrington & Farrington	People's ability to access and participate in opportunities and activities [148]
Oosterlinck vd.	The positioning of projects on the main spatial structure of efficient and multimodal transportation networks that utilize multiple transportation modes [149].

The accessibility indicator, which allows all necessary users for social sustainability to have smooth access to the structure, has its measurement criteria drawn from the literature as follows:

- Fast and easy access to activities [144]
- Ease of access to basic services [150]
- Outdoor accessibility [121; 151]
- Indoor accessibility [151]
- Accessibility to transportation vehicles [151; 121]
- Access to the area where the structure is located [121]
- Ease of access to basic services [150]
- The increase in slow transportation opportunities [149]
- Increasing the potential for social interaction [149]
- Ease of access to public transportation facilities [152]

b) Security

Table 2.8 Security Definitions from Literature (Revised by author)

AUTHOR	DEFINITION OF SECURITY
Maas et al.	A sense of trust is a prerequisite for health, well-being and quality of life [153].
Crowe	It is the achievement of a reduction in crime fear and crime incidence and an improvement in the quality of life through the correct design and effective use of the built environment [154].
Newman	Security concepts can be established through the modification of existing structures to create a domain of authority, natural surveillance, and effectively reduce crime [155].
Kent & Thompson	Safe, clean, and attractive streets and public spaces in the built environment create a sense of security by supporting the development of community bonds and empowering the community [156].
Bramley et al.	Security is a feeling that increases trust and reciprocity among residents, contributing to a sense of community and sense of place in a neighbourhood [157].
Ratnayake	The level of illumination in the built environment, along with environmental cues such as human presence and visibility, ensures security [158].
Cozens	It is to ensure that the built environment does not pose a threat to current or future users [159].

Based on the literature, it can be said that the security indicator plays a role in achieving many other social sustainability indicators and that ensuring environmental security will enhance social interactions [159]. Since the absence of a sense of security can have a negative impact on human health and well-being, social interactions such as community participation, public engagement, etc., the following items should be prevented to form the security indicator:

- Crime potential and fear of crime pose a threat to the long-term sustainability, functionality, vibrancy, and longevity of the city [159]
- The impact of the perception of security on all types of active travel and recreational physical activities [156]
- Formation of crime-prone areas and areas of social exclusion [129]
- Due to crime potential and fear of crime, walking patterns and freedom of choice in the built environment are significantly restricted [158]
- Presence of security guards inside or outside the building [109]

c) Quality of Life

Table 2.9 Quality of Life Definitions from Literature (Revised by author)

AUTHOR	DEFINITION OF QUALITY OF LIFE
Ochodo et al.	The potential for Quality Of Life is associated with the impact of the environment in coping with stress and facilitating recovery [160].
Heerwagen	The building features that support human health and well-being include the presence of daylight, outdoor views, green plants in the interior or landscape, and the degree of sensory variability in the environment [161].
Mouratidis	Opportunities for socializing in space and strengthening social connections are components of a quality life [162].
Evans	Satisfaction, abilities, social environment, personal factors related to the individual's character and abilities, biosocial physical environmental factors/events [163].
Turksever	The fewer perceived deficiencies an individual has in life, the higher the quality of life [164].
Bölen et al.	The housing and its surroundings are well planned, the satisfaction of users is high [165].
Eurofound(European Foundation for Improving Living and Working Conditions)	A broad concept related to general well-being in society that concerns social life [166].
WHOQOL	It is a complex and broad concept shaped by numerous factors such as an individual's physical health, psychological state, level of freedom, social relationships, and interactions with the main features of their environment [167].
Dissart & Deller; Ferris.	Quality of life is described as a concept that includes both environmental and psychological components, and it is acknowledged that the quality of life is dependent on both internal and external factors [168; 169].
Yıldız	Quality of life, in a very general sense, is the ratio between the supply and demand of services and all conditions needed by the urban population [170].
Kamp et al.	It is the consideration of the measurable spatial, physical, and social components of the environment and their modes of perception together [171].

As understood from the literature, in order to make the quality of life indicator, which has a very broad definitional scope, in socially sustainable architecture, the following items should be provided:

- The diversity and quality of services (education, healthcare, recreational facilities, transportation, municipal services, good governance, etc.) should be improved [170].

- Orientation towards gardens with vegetables, flowers, and local plants, along with learning activities such as caring for animals and preserving, renewing, and monitoring the habitat, should be increased for the benefit of child health and well-being, especially mental health [172].
- Spatial organizations achieved through establishing and maintaining a balance between humans and the living environment should incorporate values that cater to user desires and needs [173].
- Open and closed space standards (including physical environmental qualities, environmental pollution, status of open and green spaces, etc.) should be taken into consideration along with the well-being of the public (income level, unemployment rate, crime rates, etc.) [170].
- Designing spaces that increase social interaction with the environment and neighbors enhances the quality of life [129].
- The built environment needs to be designed in a way that responds to people's needs for both privacy and social interaction [174].
- Open spaces' qualities are seen as an important factor that enhances people's satisfaction and encourages the better utilization of urban spaces, ultimately increasing the quality of life. These qualities contribute to elevating the social, environmental, and economic value of the built environment [175].

d) The location and orientation

The location and orientation of the structure together constitute two significant factors that influence the designer's design decisions. It is known that these two aspects can either facilitate or hinder users' social interactions [176].

Table 2.10 The Location and Orientation Definitions from Literature (Revised by author)

AUTHOR	DEFINITION OF THE LOCATION AND ORIENTATION
Feitelson & Salomon	There is a relationship between the location of a structure and its accessibility. The spatial patterns of structures, which emerge based on usage and site selection, are influenced by a range of qualities related to the transportation network, including ease of access to the transportation network, movement speed within the network, access and reliability of movement along the network, and associated costs [177].
McIntyre	The location of a structure that enables physical activities directly affects the usability and livability of both the structure and the built environment [176].
Soja	It has been stated that all individuals within the built environment have the right to access any kind of service and opportunity that holds public value, and this right to access is defined by the concept of spatial justice [178].

Ensuring social sustainability for a building's location hinges significantly on facilitating accessibility (a fundamental human right) to essential services and facilities within the built environment. Every individual in a constructed setting should be granted the right to access a diverse range of public services and facilities (Soja, 1999). Hence, it is imperative to have easy access to all essential services within specific distances relative to the building's location. Accessibility, as defined by Farrington & Farrington (2004), is "the ability of people to access and participate in opportunities and activities," occupying a central role in social justice and inclusion policies. Achieving social justice involves granting individuals access to a variety of activities prevalent in their societal context. Social inclusion, defined as human's active participation in society, necessitates increased accessibility for greater participation.

e) Function and efficiency

Through spatial organization, ensuring the control of unwanted interactions, supporting social interactions, providing accessibility to all spaces, creating comfort and a sense of security, facilitating wayfinding, establishing a connection with nearby plants and landscapes, and ensuring user comfort contribute to functionality and efficiency as a subtopic in social sustainability [69].

Table 2.11 Function and Efficiency Definitions from Literature (Readapted by author)

AUTHOR	DEFINITION OF THE FUNCTION AND EFFICIENCY
Hillier, Hanson & Peponis	Function is a characteristic spatial pattern and is a characteristic part of the overall spatial pattern [179].
Voordt, Vrielink & Wegen	It is a reflection of socio-cultural goals and values related to the shaping of space [180].
Mzoori	Efficiency in this context refers to the ease with which a user can enter a building, utilize various spaces within it, and navigate throughout the building. Accessibility for everyone is the primary focus of physical efficiency [181].
Chiddick	A property is considered efficient when it uses all of its available land for buildings, landscaping, and good accessibility while taking into account future expansion needs and suitable density for surrounding development [122].
Halas et al.	Efficiency is the relationship between spatial location, spatial organization, and economic efficiency [182].
Mahdzar	The buildings have "spatial functions" and "social functions," and it discusses the relationship between these two groups of functions, explaining it based on the accessibility and sociability of the street [144].
Carr et al., (1992)	It emphasizes that outdoor spaces that do not meet the needs of people or do not involve suitable uses for them will fail due to their limited usability [183].

Based on the data above getting from literature, the following points should be followed to ensure functionality and efficiency in a building:

- Creating short walking distances by grouping related functions next to each other, positioning functions that require natural lighting against an exterior wall, establishing a clear hierarchy between public and private spaces, and zoning for different levels of activities and temperatures are necessary [180].
- Creating spaces that allow the building to fulfill its function for active uses (such as staircases, entrance lobbies, elevators, spaces like atriums and foyers where circulation is the primary or sole function) is essential [122].
- Enabling everyday users and visitors to participate in activities without difficulty [181].
- Design features that allow for different activities at different times [122].
- Creating versatile office and research spaces with open floor plans supported by meeting areas and quiet zones [122].
- Spatial orientation, recognizability, and identity, as well as the functional use of colors and materials, are necessary for supporting cleaning and maintenance, as well as technical maintenance [180].

f) Flexibility

Table 2.12 The Flexibility Definitions from Literature (Readapted by author)

AUTHOR	DEFINITION OF FLEXIBILITY
Sinclair et al.	Spatial flexibility refers to the changes required in spatial relationships and spatial organization, functional flexibility involves changes needed in the functions of the space, and aesthetic flexibility is defined in relation to changes needed in the form of the building, facade arrangement, and identity [184].
Groak	The space should be suitable for different physical arrangements [185].
Nakib	The ability to embrace and adapt to change by accommodating different uses, allowing for various spatial and functional configurations, and enabling the updating of technologies without significant disruption to ongoing activities and the environment [186].
Schneider & Till	The ability of structures to accommodate both different social uses and different physical arrangements [187].
Blakstad	Flexibility is a method aimed at providing physical adaptability [188].
Manewa et al.	It is the assurance of the continuity of future functions or purposes [189].

Based on the literature review, the following key issues should be entegrated to ensure flexibility in a building:

- Spaces that meet the needs should be designed and provide flexibility wherever possible [3].
- In line with changing conditions and demands, spaces should have the ability to change and offer various usage alternatives [87].
- A structure should provide technical solutions within its basic structure, allowing elements such as walls, movable panels, and furniture to be altered, moved, and repositioned [188].
- The spatial divisions within the building should allow for organized arrangements [180].
- A structure should be suitable for various social uses [190].
- It should provide health, well-being, safety, indoor environmental quality, quality of life, and positive interaction with other users [186].
- Continuous and optimal use of the space needs to be supported [184].

g) Aesthetics

Table 2.13 The Aesthetics Definitions from Literature (Revised by author)

AUTHOR	DEFINITION OF AESTHETICS
Voordt & Wegen	It is a component of spatial quality that pertains to how beautiful and inspiring the space is perceived, its alignment with the unique texture and culture of the city, and how users experience and interpret it [180].
Lang	It involves the symbolic meanings attributed to the space, the liking towards the space, and the relationship established with the space [191].
ISO 21929-1:2011	Aesthetic quality is related to the allure of a 'place,' a region, or a city, and it holds significance in contributing to the well-being and quality of life of people living, working, or visiting there [151].
Lynch	It is the generalized mental image of the physical external world within the human mind [192].
Doğan	Aesthetics is a form of reflexive thought [146].
Kagan	It is the science that investigates the richness of all aesthetic values that arise around humans, manifest within practical activity, and reflect reality, and can be detected in art [193].
Çahantimur	It is a general system of preferences, a rules system that concretizes this preference [194].
Baumgarten	It is a concrete field of knowledge where meanings are conveyed within a sensory form [195].
TDK Turkish Dictionary	The branch of philosophy that deals with beauty and the effects of beauty on human memory and emotions. It concerns itself with the sense of beauty or what is suitable for the sense of beauty; the theoretical study of beauty in art and life, in accordance with the general laws of artistic creation, aesthetics, literary criticism [196].

The ISO 21929-1:2011 standard is a standard that addresses sustainability in building construction. One of the focal points of this standard is to consider not only the environmental and economic aspects of building design and construction, but also their impacts on the well-being and quality of life of communities. Aesthetic quality refers to the visual appeal, beauty, and aesthetic value of building design and its surroundings. This benchmark highlights how the creation and maintenance of aesthetic quality can contribute to the well-being and quality of life of communities. Spaces that carry aesthetic value are those that stand out in their surroundings, providing enjoyment and leaving an impact on people. This standard not only addresses the functional and environmental aspects of sustainable building design, but also the cultural and societal aspects. Aesthetic quality can enhance the quality of life of a building or space and can encourage social interaction by bringing communities together. It can also help individuals form emotional connections with their surroundings. The norm emphasizes that sustainable building design goes beyond just energy efficiency, material usage, and environmental impacts. Aesthetic quality is a significant factor with the potential to enhance people's quality of life. Thus, taking aesthetic value into account when designing buildings can aid in the pursuit of sustainability objectives. [151]. Based on the literature, the following key issues ought to be adhered to ensure aesthetic quality in a building:

- A building should have design responses in terms of image, identity, and meaning [197].
- Creating a strong spatial enclosure on streets is not only aesthetically beneficial but also a positive design requirement for security reasons [199]
- To balance and harmonize environmental technology while incorporating aesthetic content, sustainable architectural practices should be developed in design efforts [199].
- The design of a building should harmoniously integrate its structure, technology, materials, location, surroundings, users, and social-cultural context [200].
- Buildings equipped with eco-technological features or filled with ecological equipment tend to appear mechanical on the surface. However, grasping the concept of natural narrative and cycles, and generating services that are aligned with them, will introduce a new universal aesthetic. Therefore, in the design of

structures, it is essential to comprehend the natural narrative and cycles, and incorporate building elements accordingly [201].

h) Health and physical well-being

Table 2.14 The Health and Physical Well-being Definitions from Literature (Revised by author)

AUTHOR	DEFINITION OF THE HEALTH AND PHYSICAL WELL- BEING
WHO	It's not just the absence of illness and weakness, but also the state of optimal physical, mental, and social well-being.
Heerwagen	Unlike essential needs directly impacting health (clean water, nutritious food, sleep, rest, etc.), it corresponds to needs that indirectly influence all health-related matters [161].
Bäckman etc.	It reflects the overall quality of life and sense of satisfaction associated with the places where people live, work, have fun, and spend time [202].
Ochodo etc.	It is related to the impact of the environment on coping with stress and facilitating recovery [160].
Thompson & Kent	It exists within an environment that connects citizens together to foster a sense of community [156].
Mouratidis	The opportunities for social interaction within a space and the strengthening of social connections are components of social well-being or a state of well-being [203].

Considering the literature data, the following guidelines should be adhered to guarantee health and physical well-being in a building:

- Outdoor views with aesthetic touches and the presence of indoor plants ensure health and physical well-being through their positive effects on human psychology [204].
- Providing access to regular exercise facilities within a building has a positive impact on human health [161].
- Encouraging gatherings, spending time, relaxation, or simply privacy; and promoting individuality within a structure has an impact on human health and well-being [116].
- The integration of art within a structure, appreciation for relaxation and deep contemplation, and acknowledgment of organization contributes to the user's health and well-being [116].
- Creating social environments that allow neighbors to get to know each other, encouraging gatherings, spending time for relaxation or simply privacy, along with fostering a sense of individuality, provides users with health and physical well-being [205].

To ascertain the indications within the conceptual framework used for this study, the components were re-examined through a literature analysis, and a table (Table 10) was compiled based on the frequency of mentioning these indicators. The following table was produced by investigating the architectural evaluation of these indications in the building structure. (Table 19).

Table 2.15 Socially Sustainable Architectural Design (Source: [109])

INDICATOR	HOW TO BE EVALUATED ARCHITECTURALLY IN THE BUILDING STRUCTURE
Equality/Justice/Social Justice	Pedestrian Path / Use of Green Space / Accessibility / Need for parking / Use of public transport
Social Sustainability/ Social Gain	Neighbourhood Relations / Public Use of Community Areas / Garden Use / Park Use
Liveability/ Social Sustainability	Positive-Negative Features of the Use of Living Space/
Quality of Life/Health Compliance	The desire to move to another dwelling/ The problem with housing/The level of income/ownership/The network of social relations
Perception of the City and Sense of Belonging	Social exclusion status / sense of belonging / Urban activities in which he can participate in public life/
Identity	The feeling of living in a residential building with local architecture
Aesthetic Perception	Satisfaction with the Facade of the Dwelling, Its Colour, Appearance
Security	Presence of security guards inside or outside the building / Whether there are surveillance systems at the entrance to the structure / Examination of urban security features such as pedestrian paths, school gates in the area
Accessibility	The presence and transportation of elevators in the structure for the convenience of transportation of disabled people / Examination of disabled roads and access facilities in the current region/
Flexibility	Evaluation of the suitability of housing for changes in user requests / Evaluation of the ability to shape environmental urban furniture on an urban scale in the inhabited area according to user requests
Economic Equality	Property status / Income status of persons / Finding out if there are energy-efficient uses of the structure in which they live/

2.4 Sustainable Development Model

Sustainable development is a strategy in which societies consider environmental factors and quality of life while pursuing their economic development goals. This approach aims to ensure the sustainable use of resources, protect the environment, and leave a healthy living space for future generations. In traditional development approaches, economic growth and increased prosperity are prioritized, while factors such as environmental impacts and depletion of natural resources are often overlooked. However, sustainable development addresses this imbalance by considering economic, social, and environmental elements together [67]. While supporting economic growth, sustainable development also promotes the efficient and

effective use of natural resources. This includes practices such as sustainable use of energy and water resources, waste management, and reducing environmental pollution. Additionally, it focuses on the well-being and quality of life of all segments of society while upholding social justice and equality principles. The strategy of sustainable development encourages long-term thinking by considering the needs of future generations. This involves using resources in a balanced manner, protecting the environment, and supporting natural ecosystems. By doing so, it becomes possible to meet the basic needs of people while leaving a livable world for future generations. The establishment of indicators is important due to the ambiguity of sustainability definitions. In order to overcome this, the United Nations Commission on Sustainable Development (UNCSD) has developed indicators under three subheadings of sustainability and attempted to define sustainable development [38]. The UNCSD's work has focused on the development of indicators under three main headings that encompass the environmental, economic, and social dimensions of sustainability. These three headings are referred to as environmental sustainability, economic sustainability, and social sustainability.

Table 2.16 Social indicators for sustainability developed by UNCSD (Source: [38])

THEME	SUB-THEME	INDICATOR
EQUALITY	Poverty	The proportion of the population living below the poverty line
		Gini income inequality index
		Unemployment rate
	Gender equality	The ratio of the average female worker's wage to the male worker's wage
HEALTH	Nutritional status	Nutritional status of children
	Mortality rate	Child mortality rate under the age of 5
		A sign of life at birth
	Hygiene conditions	The proportion of the population receiving adequate polluted water waste services
	Drinking water	The proportion of the population who can find clean drinking Jul
	Health Services	The proportion of the population that can receive basic health services
		Vaccination against infectious diseases of children
		The rate of use of birth control methods
EDUCATION	Educational level	Number of children graduated from primary school
		Number of adults graduated from high school
	Literacy	Adult literacy rate
SHELTERING	Living conditions	Living space per person
SECURITY	Crime	Registered crime rate per 100,000 people
POPULATION	Population change	Population growth rate

Table 2.17 Environmental indicators for sustainability developed by UNCSD (Source: [38])

THEME	SUB-THEME	INDICATOR
ATMOSPHERE	Climate change	Greenhouse gas emission
	Degradation of the ozone layer	Consumption of substances that damage ozone
	Air quality	Intensification of air pollution in cities
SOIL	Agriculture	Arable areas
		Fertilizer use
		Use of agricultural chemicals
	Forests	Percentage of forested land
		Tree cutting intensity
	Desertification	Areas affected by desertification
	Urbanization	The width of urban residential areas
OCEAN, SEAS and the COASTS	Coastal areas	The concentration rate of algae on the coasts
		The proportion of the population living in coastal areas
	Fishing	Annual hunting rate of important species
WATER	The amount of water	Annual utilization rate of groundwater
	Water quality	The level of organic material in the water
BIOLOGICAL DIVERSITY	Ecosystem	The area of important ecosystems
		The proportion of areas under protection
	Species	The presence of important species

Table 2.18 Economic indicators for sustainability developed by UNCSD (Source: [38])

THEME	SUB-THEME	INDICATOR
ECONOMIC STRUCTURE	Economic performance	GNP per capita
		The ratio of investments in GNP
	Trade	Balance of payments in goods and services
	Financial situation	Ratio of debts to GNP
		Foreign aid received as a percentage of GNP
CONSUMPTION AND PRODUCTION PATTERNS	Material consumption	Material usage intensity
	Energy use	Annual energy consumption per capita
		The rate of use of renewable energy sources
		Energy use intensity
	Waste production and management	Solid waste production of industry and municipalities
		Hazardous waste production
		Management of radioactive waste
		Recycling and reuse of waste

The indicators in these tables indicate a sustainable society. These indicators can be summarized as improving people's quality of life, preserving the diversity of life on Earth, minimizing the consumption of non-renewable resources, not exceeding the carrying capacity of the Earth, changing habits, allowing everyone to take ownership of their own region, transferring a quality life to future generations, and approaching development and the environment within the framework of integrated policies. These

principles reflect the fundamental values and goals of a sustainable society. Respecting life requires understanding and protecting the value of humans and the natural world. Improving people's quality of life is about meeting basic needs, ensuring equality, justice, and social well-being. Preserving the diversity of life on Earth emphasizes the importance of biodiversity and sustaining ecosystems. Minimizing the consumption of non-renewable resources aims to use resources efficiently and consider them as a legacy for future generations. Not exceeding the carrying capacity of the Earth focuses on considering the limits of natural resources and maintaining ecological balance. Changing habits promotes sustainable lifestyles and encourages the adoption of environmentally friendly practices. Allowing everyone to take ownership of their own region supports local communities in preserving their cultural values and natural resources and contributing to sustainability efforts. Finally, approaching development and the environment within the framework of integrated policies aims to balance economic growth and social development with environmental sustainability. This way, steps are taken in line with the goals of sustainable development, and a harmony is achieved between societal well-being and environmental preservation. When examining sustainable development models in the introduction section, scanning was performed using the 'Vosviewer' application, and countries that have published the most in this regard were taken into consideration:

2.4.1 Sustainable Development Model Reviews In Europe

Table 2.19 Sustainable Development in France (Revised by Author)

1990s-Sustainable Development Initiatives Begin
• This period marked the early stages of sustainable development initiatives in France. Efforts began to focus on creating regulations and frameworks for environmental responsibility.
1993- Creation of the HQE (Haute Qualité Environnementale) Standard
• In the early 1990s, the "Haute Qualité Environnementale" (HQE) standard emerged to promote sustainable development in construction. Officially established in 1993, the HQE certification aimed to set a systematic building process with high environmental standards and efficient energy management. It involved a rating system to guide buildings in achieving high environmental quality.
2000- Adoption of Sustainable Development Regulations
• Research and regulations evolved, focusing on increasing energy efficiency in buildings. The HQE and other initiatives promoted the use of environmentally friendly materials, technologies, and methods to minimize environmental impact. • The "Grenelle Environnement" (or Grenelle Environment Round Table) was launched to involve government, industry, and civil society in developing a coordinated approach to environmental protection. It aimed to set long-term sustainable development goals, including energy efficiency, waste management, and urban planning.

In France, sustainable development and, subsequently, sustainable building systems have a relatively short history [68]. In the early 1990s, the "Centre Scientifique et Technique du Bâtiment" (CSTB) initiated a major research program on this subject. In 1993, the "Plan Construction et Architecture (PCA)" at the French Material Office carried out 13 experimental building projects with high environmental quality, known as "Bâtiments HQE," to develop projects with high environmental quality. These projects took into account five main perspectives: integration with the site, environmental quality of construction products, water management, visual comfort, and environmental management [69].

Furthermore, research and regulations have been established since 1993 to address the issues arising in construction sites and to enhance technical and economic efficiency in the building sector through "Environmentally Friendly Products, Techniques, and Methods". In addition to this "Social Ecological Party" (Parti Social-Écologique) was

indeed founded in France in the year 2000. The party emerged as a political entity that aimed to address the interconnectedness of social and ecological issues and promote sustainability in various aspects of society. It focused on advocating for environmentally friendly policies, social justice, and a transition towards a more sustainable and equitable society [70]. These initiatives reflect the commitment of France to promote sustainable development and advance sustainable building practices. The focus on integrating buildings with their surroundings, considering the environmental impact of construction materials, managing water resources, ensuring visual comfort, and adopting environmentally friendly practices demonstrates the country's dedication to creating more sustainable and environmentally conscious buildings.

2.4.2 Sustainable Development Model Reviews In Sweden

Table 2.20 Sustainable Development in Sweden (Revised by Author)

1972- First United Nations Conference on the environment in Stockholm
• Sweden hosted the first United Nations conference on the environment in Stockholm in 1972, highlighting the rapid depletion of natural resources in the 1960s.
1990- Sweden’s transition to renewable energy resources
• Since 1990, Sweden has gradually transitioned from fossil energy sources to renewable energy sources through ambitious environmental initiatives and policies. The Swedish Government has been working on areas like environmental standards and providing economic support for environmental investments since the 1990s.
2010- Implementation of EU energy efficiency standards
• In 2010, EU-wide standards were designated as the European Commission's energy efficiency standards. Additionally, the Swedish government has implemented new policies to reduce greenhouse gas emissions, improve energy efficiency in buildings, and address the impact of indoor air quality in buildings.

Sweden hosted the first United Nations conference on the environment in Stockholm in 1972, highlighting the rapid depletion of natural resources in the 1960s. Since 1990, Sweden has gradually transitioned from fossil energy sources to renewable energy sources and shaped its settlement projects with the concept of sustainability in mind. Stockholm was designated as the "2010 European Green Capital" by the European

Commission [71]. The Swedish Government has been working on new environmental standards and providing economic support for environmental investments since the 1990s [72]. Additionally, the Swedish construction and real estate sector initiated a significant environmental program from 2003 to 2010 to reduce environmental impacts. In line with this, action plans were developed to address energy, material, and hazardous substance use, as well as indoor air quality in buildings [69]. The Swedish Government's commitment to developing new environmental standards and providing economic support demonstrates its dedication to promoting sustainable practices and reducing environmental impacts. The focus on the construction and real estate sector highlights the recognition of the sector's significant contribution to environmental issues and the need for targeted measures to mitigate its impact.

2.4.3 Sustainable Development Model Reviews In Usa

Table 2.21 Sustainable Development in USA (Revised by Author)

Sustainable Development and Energy Demand
• The achievement of sustainable development requires meeting the increasing energy demand caused by population growth and economic growth, in order to improve living standards and carry out economic or production-related activities
Renewable Energy in the United States
• The United States has taken various steps towards renewable energy. It ranks second in renewable energy sources after hydroelectric power.
Criticism of the United States Regarding Kyoto Protocol
• Despite these facts, the United States has been criticized for not yet signing the Kyoto Protocol
1892- First Use of Renewable Energy in the United States
• In the United States, renewable energy was first used for residential heating purposes in 1891

The achievement of sustainable development requires meeting the increasing energy demand caused by population growth and economic growth, in order to improve living standards and carry out economic or production-related activities [73]. The United States has taken various steps towards renewable energy. It ranks second in renewable

energy sources after hydroelectric power [74]. In the United States, it was first used for residential heating purposes in 1891 [73]. Despite these facts, the United States has been criticized for not yet signing the Kyoto Protocol [75;76; 77]

2.4.4. Sustainability Approaches In Türkiye

Table 2.22 Sustainable Development in Türkiye (Revised by Author)

1970- Initial Focus on Environmental Awareness
• The interest in environmental issues in Türkiye began to rise during this period, especially in the aftermath of various global environmental movements.
1983- Ministry of Environment Established
• Following the 1972 Stockholm Conference, an organization structure dedicated to environmental issues was established within the Prime Ministry under the title "Undersecretariat of Environment." In 1983, this title was expanded to form the Ministry of Environment. Environmental issues were formally stated in the 1982 Constitution.
1992- Environmental Laws and Regulations Implemented
• Regulations related to environmental conservation in Türkiye were made in line with the Environment Law that came into effect in 1983, along with subsequent regulations
2000s and Today: Participation in International Agreements & Ongoing Efforts and International Standards Alignment
• Türkiye continues to participate in international environmental platforms, fulfilling its obligations under the Kyoto Protocol and the United Nations Framework Convention on Climate Change. In this context, the Environmental Law has been amended several times to enhance environmental protections and meet international standards. • Many international and regional legal adjustments have been made to align with the European Union's environmental regulations. The Ministry of Environment and Urbanization continues to work on sustainable development projects and implements policies aimed at reducing greenhouse gas emissions and improving environmental quality standards. The environmental impact assessment (EIA) regulations have also been updated to meet these standards.

Interest in environmental issues in Türkiye began in the 1970s, and after the 1972 Stockholm Conference, separate attention started to be given to environmental concerns in development plans. With the establishment of the Prime Ministry's Undersecretariat of Environment in 1978, environmental issues were included in state

policies. However, the principle of "sustainable development" was not explicitly stated in the 1982 Constitution.

Regulations regarding the environment in Türkiye were made with the Environment Law that came into effect in 1983, as well as subsequent regulations. Additionally, many international and regional legal regulations have been implemented in line with the legal harmonization with the European Union [78]. Türkiye's efforts towards sustainable development were evaluated through the National Report presented at the Johannesburg Summit in 2002. In this process, it was emphasized that sustainability is an objective that can be achieved through the collaboration of states, businesses, civil society organizations, and individuals, rather than individual efforts [79].

Türkiye continues to participate in national and international activities in terms of environmental organization. Initiatives such as the Environment Platform for Sustainable Development and Local Agenda 21 have been considered as exemplary practices by the United Nations Development Programme due to their goals covering all aspects of environmental issues [80]. However, it is emphasized that Türkiye needs to make significant progress in achieving sustainable development goals. According to the report of the United Nations Solutions Network for Sustainable Development, Türkiye ranks 33rd out of 34 countries. Therefore, developing various strategies and determining costs while creating appropriate financing models are of great importance to achieve sustainable development goals. The five-year development plans prepared by the State Planning Organization demonstrate the changing trends of sustainable development policies in Türkiye over time. Giving separate importance to environmental issues, the development of environmental awareness, and the acceptance of sustainable development principles started with these plans. Türkiye also participates in environmental organizations at national and international levels. The Ministry of Environment and the United Nations Development Programme (UNDP) coordinate national preparations and implement projects in the field of environment and development. Sustainability approaches are being implemented in various areas in Türkiye. Some of the approaches adopted for sustainability in Türkiye are given below:

- Environmental Protection and Sustainable Development: Türkiye has embraced various policies and strategies for environmental protection and sustainable development. These include topics such as biodiversity conservation, sustainable management of forests and water resources, waste management, and energy efficiency.
- Renewable Energy and Energy Efficiency: Türkiye is increasing investments in renewable energy sources in line with sustainability goals in the energy sector. In particular, the use of renewable energy sources like wind and solar power is encouraged, and energy efficiency projects are implemented.
- Sustainable Transportation: Türkiye is taking steps towards sustainable transportation goals. Measures are being taken to improve public transportation systems, create cycling lanes and pedestrian-friendly areas, and promote electric vehicles.
- Agriculture and Food Security: Türkiye adopts the principle of sustainability in the agriculture and food sector. Steps are taken to promote organic farming, ensure effective use of water resources, and implement measures for productivity and environmental protection on farms.
- Social Sustainability: Türkiye is also engaged in efforts for social sustainability. The support and development of social issues such as education, healthcare, occupational safety, women's and children's rights are targeted.

The combination of these approaches helps Türkiye to achieve its sustainability goals. Continuous efforts are being made to increase awareness of sustainability and promote widespread implementation throughout the country [80; 81; 78; 79; 8]

2.5 Shelter Design

2.5.1 Disaster

Disaster is defined as "natural, technological, or human-made events that cause physical, economic, and social losses, affecting communities by disrupting or interrupting normal life and human activities, resulting in consequences for people" [206].

For an event to be considered a disaster, it must cause losses in human communities and settlements, affecting a settlement unit by disrupting or interrupting human activities. In other words, a disaster is not the event itself but the result it produces. According to this definition, it is understood that many events in our daily lives cannot be considered as disasters. Incidents such as traffic accidents, home or workplace fires, although causing loss of life and property, are events that can be overcome within the normal organization of society, and their effects can be mitigated within the normal order. Therefore, such events are not considered disasters because they do not extensively impact settlements and activities [207].

In daily life, there is a tendency to measure and evaluate the magnitude of a disaster by the number of casualties, injuries, economic and social losses it causes. However, there are several factors influencing the magnitudes of these situations [208]. Among these are the followings:

- The physical size of the event,
- The distance of the event to settlements,
- Poverty and underdevelopment,
- Rapid population growth,
- Rapid and uncontrolled urbanization and industrialization in hazardous areas,
- Destruction or misuse of forests and the environment,
- Ignorance and lack of education,
- The level at which the society can reach protective and preventive measures against disaster events in advance.

Except for the first two factors, the physical size of the event and the distance to settlement centers, all the others are not of natural origin but rather stem from human activities [206].

2.5.2 Natural Disaster

Natural events, since the formation of the world, are the natural consequences of the cycle of nature's own internal balance rearrangement. From this natural cycle, events are defined as disasters when humans suffer physical, economic, and social losses, and are directly or indirectly harmed [209]. Disasters are classified into two groups based

on their causes: natural disasters and human-made disasters. Natural disasters are the destructive events caused by natural phenomena that occur in the geographical areas where people live. These events are inevitable, unstoppable once they start, and quickly disrupt social and economic life, leading to a significant loss of life [210]. The main types of natural disasters, characterized by when, where, and in what manner they will occur cannot be precisely predicted, include earthquakes, landslides, avalanches, landslips, floods, river floods, volcanic eruptions, blizzards, hurricanes, coastal and lake inundations, droughts, and excessive rainfall [207]. Gökçe, Özden, and Demir (2008) mentioned in the AFAD information inventory state that landslides are the most common natural disaster in Türkiye, accounting for 45%. Earthquakes follow landslides, constituting 18% of subsequent disasters, followed by floods at 14% and rockfalls at 10%. According to the same inventory, although landslides are the most frequently encountered type of disaster, earthquakes, with a 55% share, cause the most damage.

Since the beginning of the 20th century, as a result of natural disasters in Türkiye, 87,000 people have lost their lives, 210,000 people have been injured, and 651,000 homes have been destroyed or heavily damaged. The following table lists the losses brought on by natural catastrophes in Türkiye along with their proportion to overall losses [206].

Table 2.23 Number of houses destroyed by natural disasters in Türkiye (Disaster Affairs GM) (Readapted by author) [206]

NATURAL DISASTER TYPE	NUMBER OF DEMOLISHED UNITS	PERCENTAGE OF TOTAL
Earthquakes	495,000	76
Landslides	63,000	10
Flood	61,000	9
Rock Falls	26,500	4
Avalanches	5,154	1
GRAND TOTAL	**650,654**	**100**

➢ Earthquake:

The information has been learned in recent years from the concept of plate tectonics that the Earth's surface consists of rigid blocks called “plates.” The movements of these plates relative to each other create stresses and deformations along plate boundaries.

When the accumulated stresses exceed the rock's resistance, a fracture occurs, resulting in the generation of seismic waves. This event is referred to as an “earthquake” [207]. Earthquakes can occur in different types based on their causes. Although the majority of earthquakes worldwide occur as explained above, there are also earthquake types that occur due to natural causes, albeit in small numbers.

- *Tectonic Earthquake:* Earthquakes resulting from the movement of plates, as explained above, are generally referred to as "Tectonic" earthquakes, and these earthquakes mostly occur at plate boundaries. 90% of earthquakes on Earth fall into this category. The earthquakes in Türkiye are mostly tectonic earthquakes.
- *Volcanic Earthquake:* The second type of earthquakes is "Volcanic" earthquakes. These occur as a result of volcanic eruptions. It is known that these earthquakes occur due to the explosions caused by the physical and chemical events during the ascent of molten materials from the depths of the Earth. Since they are related to volcanoes, they are local and do not cause significant damage. Some earthquakes that occur in Japan and Italy fall into this category. Due to the absence of active volcanoes in Türkiye, this type of earthquake does not occur.
- *Collapse Earthquake:* Another type of earthquakes is collapse earthquakes. These occur as a result of the collapse of underground voids, galleries in coal mines, and voids formed as a result of dissolution in salt and gypsum deposits. The felt areas are local, and their energy is low, causing little harm. It is known that large landslides and falling meteors also cause small tremors.
- *Sea Earthquakes:* These earthquakes have their focus on the seabed. After sea earthquakes, waves are formed in the seas, sometimes causing significant damage to the coasts; these are called tsunamis. In Japan, where sea earthquakes are frequent, 30,000 people died from a tsunami in 1896 [211].

This classification based on the causes of occurrence identifies tectonic earthquakes, which result from the movement of underground plates, as the most common type of earthquake on the Earth's surface. "90% of earthquakes observed on Earth are tectonic earthquakes." In Türkiye, the most frequently observed type of earthquake is tectonic earthquakes [206]. Türkiye's territory, constituting 66% of the country, is located in the first and second-degree earthquake zones, in other words, within active fault zones. Additionally, 71% of the population resides in these regions [212].

➢ Flood:

Flood is defined as the rapid increase of water in a riverbed due to excessive rainfall in the basin or the rapid melting of snow in the basin, posing a threat to life and property safety around the bed. In other words, this natural disaster occurs when a river overflows from its bed, causing damage to lands, settlements, infrastructure, and living beings in the affected areas, disrupting socio-economic activities. This definition also includes coastal inundations due to wave movements along seashores and lake floods resulting from changes in lake levels in Türkiye [213]. Floods, naturally occurring when water overflows from its natural bed, can lead to loss of life and property in the affected area. This is caused by the rapid flow of water in the river basin, resulting in erosion of the bed, flooding in areas where the speed decreases, sedimentation of transported material, and consequently, changes in the riverbed, causing damage to infrastructure. To prevent or minimize losses and damage, riverbed rehabilitation is necessary. Additionally, in urban areas, basin improvement, especially the design and implementation of rainwater channels based on maximum precipitation and the size of water collection basins, is essential. These considerations, particularly related to global climate change, will increasingly be on the agenda in our country. Local governments need to develop strategies in this regard [214].

➢ Avalanche:

Avalanche, generally defined as the downhill flow of a snow mass due to internal or external factors, occurs primarily on steep valley slopes where there is little or weak vegetation, influenced by gravity. The occurrence of an avalanche depends on factors such as the presence of vegetation, the topography, geomorphological and geological structure of the region, and meteorological conditions. Countries such as Switzerland, Austria, and France (Alpine countries), as well as Italy, the United States, Canada, and some Asian countries, frequently experience avalanche disasters. These countries, being developed, are more affected by avalanches in ski resorts, certain communication lines, and transportation routes rather than residential areas [215]. In these countries, avalanche risk in residential areas is largely mitigated through early warning systems, observation points, planned and precautionary construction, and sustainable urban development. However, in recent years, there has been a significant

increase in casualties due to the growing interest in winter sports and the resulting congestion in ski resorts [213].

In our country, the mountainous areas of the northern-northeastern and Eastern Anatolia regions occasionally experience avalanche incidents due to geographically suitable topography and meteorological conditions. In recent years, there have been casualties related to avalanche disasters in our country, particularly in ski resorts and regions where mountaineering is prevalent. Not just in the aforementioned places but also in Central Anatolia, same condition is witnessed. More than a third of our country's territory is at risk of experiencing avalanche disasters [214].

➢ Landslides and Rock Falls:

Landslide; it is a process that occurs due to the movement in the direction of the slope of the functional material composed of natural rock ground, artificial fill, or a combination of these, under the influence of factors such as gravity, geology, and water content, both natural and unnatural [216]. According to the data from the Disaster Affairs General Directorate, in the period between 1958 and 2000, 4150 structures were affected, and 197 people lost their lives in 2320 landslide incidents. One of the primary measures taken against landslide events is the evacuation of the affected settlements to relocate them to another area. Nevertheless, this approach is not always effective since either new construction is built adjacent to the damaged structures caused by landslides or areas designated as off-limits for construction because of landslides are not entirely vacated. While citizens defend this situation by presenting various reasons, the responsible institutions and organizations appear to be helpless in the face of this issue [207].

Rock falls, on the other hand, are another type of natural disaster that is prevalent in some parts of the Central Anatolia region and the Eastern Anatolia region (İlhan, 2010). During the period between 1958 and 2000, 4250 settlements were affected by that occurred or potential rock falls in Türkiye, resulting in the loss of 197 lives [206].

2.5.3 Overview of Shelter & Shelter Design

Sheltering as defined in the dictionary: It means seeking refuge in an enclosed place to protect oneself from natural. Housing is recognized as part of the right to an

adequate standard of living in the Universal Declaration of Human Rights (Article 25) [217]. However, according to UNHCR's Guiding Principles on Internal Displacement, internally displaced persons are individuals who have been forced to leave or abandon their homes or habitual residence, particularly as a result of armed conflicts, general violence, human rights violations, or natural or human-made disasters, either to escape their effects or to prevent them. As a consequence of these events, it has been noted that globally, over a billion people are not adequately housed [218]. Most disasters directly lead to housing issues [219]. The Sphere Project, defined as Minimum Standards in Disaster Response and Humanitarian Charter, is a collaborative effort of various humanitarian organizations. In the 2004 Sphere Project Handbook, it outlines the circumstances in which the concept of shelter after a disaster will emerge and emphasizes the importance of emergency shelter design after a disaster in accordance with Option C, which states: "People are relocated and settled in different communities and placed in temporary shelter areas." [220]. Based on this premise, the definition of shelter after a disaster and emergency situations is described as follows:

> *"It refers to the actions taken for providing accommodation from the moment a disaster occurs until permanent housing is constructed. After experiencing a calamity, the term 'shelter after a disaster' is defined as the provision of a place, through temporary or permanent solutions, where disaster survivors can find shelter, in place of damaged or destroyed housing."*

[221].

[222] provide valuable insights into the post-disaster housing landscape, emphasizing the critical elements needed for an effective response. In their work, the authors assert that an integrated plan, coordinated activities, and a collaborative chain of stakeholders are essential requisites for navigating the intricate, challenging, and uncertain nature of post-disaster housing processes Essential points are mentioned below:

- Integration: The writers stress how crucial integration is to housing initiatives made after a disaster. An integrated plan makes sure that different elements such as emergency response, transitional housing, and long-term housing solutions are coordinated and interconnected. This method encourages a thorough strategy and avoids splintered attempts.
- Coordination: [222] underline the need of carefully planned actions. Countless organizations and individuals are influential in housing initiatives post a disaster.

By keeping various tasks in sync and reducing effort duplication, effective coordination optimizes the beneficial effects of interventions.

- Engagement of Stakeholders: It is thought to be essential to involve a wide range of stakeholders. This includes local communities, international agencies, non-governmental groups, and government bodies. Every party involved has a distinct role to play in tackling the numerous challenges surrounding post-disaster housing, which helps to create an all-encompassing and lasting strategy.
- Complexity and Uncertainty: The contributors recognize the difficulties, uncertainties, and inherent complexity that come with post-disaster housing. Variable requirements, limited resources, and chaotic circumstances all call for an adaptable and versatile strategy.

[217] provides a foundational perspective on post-disaster housing policies and practices, emphasizing their overarching goal of addressing the diverse shelter needs of disaster victims. In their work, the organization outlines the key objectives and considerations associated with housing initiatives spanning emergency, temporary, and permanent phases. The most significant details are presented below:

- Comprehensive Shelter Approach: The necessity of an integrated approach covering the whole range of shelter requirements is emphasized by UNDRO. This involves attending quickly to emergency shelter needs, setting up temporary dwellings for transitional periods, and creating long-term housing alternatives for rehabilitation on an ongoing basis [217].
- Emergency Shelter: In the immediate wake of a calamity, the organization recognizes an urgent requirement to provide emergency shelter. It is imperative to take quickly and effectively action to guarantee the security and welfare of individuals impacted. It's possible that UNDRO accentuates the critical importance of emergency shelter accessibility and quick deployment [217].
- Temporary Shelter: [217] emphasizes the vital role of temporary shelters given the significance of the transitional character of post-disaster housing. These buildings act as a bridge, affording a more pleasant and semi-permanent living situation until more permanent alternatives to housing can be found.
- Permanent Shelter: Meeting the demands for permanent shelter is an integral component of the long-term recovery phase. In order to restore resilience and

normalcy, [217] highlights the critical importance of putting procedures and guidelines in place that make easier the process for people to reconstruct homes, communities, and infrastructure.

- Victim-Centric Approach: The welfare of disaster victims is the primary concern of post-disaster housing programs. UNDRO presumably reinforces how essential it is to customize housing options to the distinctive needs, social norms, and socioeconomic circumstances of the communities that are impacted [217].

Table 2.24 Stages of the Post-Disaster Housing Process (Revised by author)

AUTHOR	STAGES OF POST-DISASTER HOUSING PROCESS
UNDRO	1. Pre-Disaster Phase 2. Emergency Assistance Phase 3. Recovery (Rehabilitation) Phase 4. Reconstruction Phase [217]
Quarantelli	1. Emergency shelter: Within hours 2. Temporary shelter: Within one or two days 3. Temporary housing: Ideally within weeks 4. Construction of permanent housing: Likely within a few years [223]
Federal disaster agency	1. Spontaneously Occurring Shelters (First 72 hours) 2. Emergency Shelter (First 60 days) 3. Temporary Housing (First year and beyond): Temporary housing involves providing a secure and safe accommodation option for disaster-affected individuals who have lost their homes and have been displaced. This can also include facilitating permanent repairs to damaged homes or finding other suitable permanent housing options. [224].
Coşgun & Arslan	In order to meet the post-disaster housing needs, it is necessary to carry out a preparatory stage where the reactions and behaviors of disaster survivors in the face of the disaster are identified beforehand [225].
Özge	1. Staying as close as possible to their damaged or destroyed homes and sources of livelihood, 2. Temporarily moving to the homes of family members or friends, 3. Temporarily relocating to requested public buildings, 4. Improvising emergency shelters close to the location of their collapsed homes (these shelters often evolve into rebuilt houses), 5. Settling in emergency camps provided by aid organizations, 6. Being evacuated to distant locations (forced evacuation) [226].

The definition of social sustainability by [227] as "an urban development process that fosters harmonious social relationships, enhances social integration, and improves living conditions for the entire community" highlights the necessity of considering social sustainability criteria in post-disaster emergency shelters. This type of shelter is used for a short period to provide life-saving support and is the most basic form of shelter [228]. The fundamental characteristic that distinguishes emergency relief shelters from other shelters is their availability for a short period after a disaster [222].

As stated by [226], emergency shelters must take into account the following fundamental assignments:

- Protection against cold, heat, wind, and rain,
- Storage of belongings and protection of property,
- Assessment of regional demands (rights to ownership and occupancy),
- Addressing emotional, security, and privacy needs,
- Provision of medical assistance to the injured, distribution of food, and other services,
- Temporary accommodation for evacuated families due to fear of potential future damage.

Looking at the definitions of emergency relief shelters, it is emphasized that at this stage, in order to promptly address the housing needs of disaster-affected individuals who have suffered physical and psychological harm and require assistance, it is necessary to utilize shelter types that can be quickly and easily obtained [229]. Japanese architect Shigeru Ban has worked on various post-disaster sheltering scales to address the needs of displaced individuals. His established system is a model that is easily foldable (with no storage issue), enables quick setup, is flexible, and uses cost-effective materials [231] (Figure 2.5)

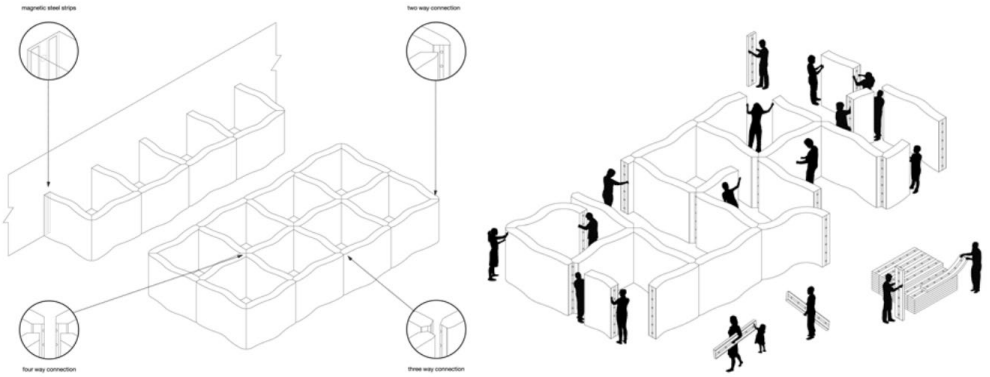


Figure 2.5 Shigeru Ban's Post-Disaster Shelter Model Technical Drawings [230]

Named Sofshelter, this accordion-shaped Kraft paper wall is designed to create a personal space that provides a sense of community and privacy despite the uncomfortable conditions of emergency shelters.



Figure 2.6 Shigeru Ban's Post-Disaster Shelter Model [230]

The delivery of shelter must be timed appropriately. Delays in shelter delivery tend to render recovery and reconstruction even more challenging. The items that follow are the design and implementation demand of emergency shelters:

1. Immediate delivery of emergency shelters right after the disaster (within the same day).
2. Shelter materials should be resistant to adverse external factors (climatic conditions, animal attacks, etc.).
3. Shelters procured from outside the region should arrive at the disaster area in a finished state.
4. Lightweight materials for shelters to facilitate quick procurement.
5. Shelters should be easily transportable for bulk transportation to the disaster area.
6. Shelters to be set up within the disaster area should be easily and swiftly assembled during installation, requiring minimal labor.
7. Availability of organizations capable of distributing, installing, and dismantling shelters.
8. Easy dismantling of shelters.
9. They should be reusable during other disasters or emergencies [208].

In our country, during the emergency relief phase, traditional tent types are commonly used due to their ease of installation and affordability (Figure 14). However, long-term use of these shelters also poses many problems. While these shelters can meet the housing needs of disaster survivors until the construction of temporary housing is

completed, they are not suitable for long-term use due to the materials used in their construction [226].



Figure 2.7 Traditional Tent Types in Türkiye [231]

Table 2.25 SWOT analysis for tent type housing (Revised by author)

STRENGTHS	WEAKNESSES
The ease of installation during the setup phase [231].	Failure to comply with climatic conditions [232]
Affordability in terms of cost [231]	Eating, drinking going to bed, etc. trying to ensure that many vital functions are provided in a common living space [232]
Portability [231]	It is not suitable for adequate functions and cannot be expanded according to family sizes [232]
x	It is not suitable for reuse and damages the environment and economy [232]

Evaluation of Tent (Traditional Type) within the Design and Implementation Criteria for Emergency Shelters

The findings in the table are obtained through the evaluation of traditional emergency shelter tents based on the shelter criteria mentioned above, as analyzed by [208] from the literature:

Table 2.26 Evaluation of Tent (Traditional Type) within the Design and Implementation Criteria for Emergency Shelters (Readapted by author) [208]

DESIGN AND IMPLEMENTATION CRITERIA FOR EMERGENCY SHELTERS	TRADITIONAL EMERGENCY SHELTER:TENTS
Immediate delivery of emergency shelters right after the disaster (within the same day).	✓
Shelter materials should be resistant to adverse external factors (climatic conditions, animal attacks, etc.).	x
Shelters procured from outside the region should arrive at the disaster area in a finished state.	✓
Lightweight materials for shelters to facilitate quick procurement.	✓
Shelters should be easily transportable for bulk transportation to the disaster area.	✓
Shelters to be set up within the disaster area should be easily and swiftly assembled during installation, requiring minimal labor.	x
Availability of organizations capable of distributing, installing, and dismantling shelters.	x
Easy dismantling of shelters.	✓
They should be reusable during other disasters or emergencies	x

2.6 Technical Mapping Of Literature

On January 25, 2023, a research study was conducted with the keyword "social sustainability in architecture" and the selection of "all fields," resulting in 5123 findings. These findings included 2346 articles, 2060 conference papers, 73 books, 175 book chapters, 323 theses, and 146 editorial articles, spanning different disciplines and fields, with the oldest publication dated back to 1994 and the most recent one in 2023. The retrieved data was examined through analyses of authorship, citations, journals, countries, institutions, keywords, and abstracts. The content indexed in the Web of Science database was used as the primary data source for this research.

2.6.1 Co-Authorship Analysis

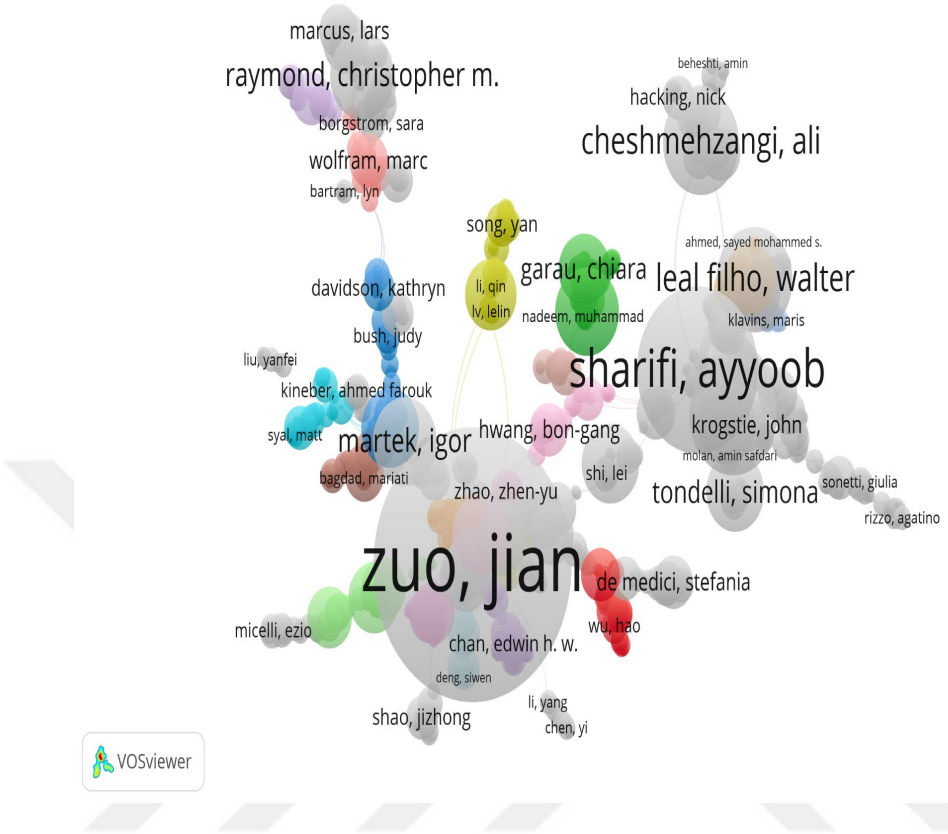


Figure 2.8 Co-Authorship Analysis

"Co-Authorship Analysis" refers to the examination of collaboration patterns among authors in academic publications. It involves analyzing the relationships and collaborations formed between authors who have co-authored articles together. Co-authorship analysis is a valuable tool in understanding research collaborations, identifying key players and trends in a field, and exploring the dynamics of scientific communities. It assists researchers, institutions, and policymakers in making informed decisions related to research collaborations, funding, and strategic planning. It has been observed that the authors who have had the most influence on their writing in the visual contained in the figure are authors such as Zuo, Jian, Sharifi, Ayyoob, Raymond, Christopher. In addition, it has been found that the influence of co-authorship networks also increases after the studies of authors who have an impact on social sustainability in architecture in their writing.

2.6.2 Co- Occurrence of All Keywords Analysis

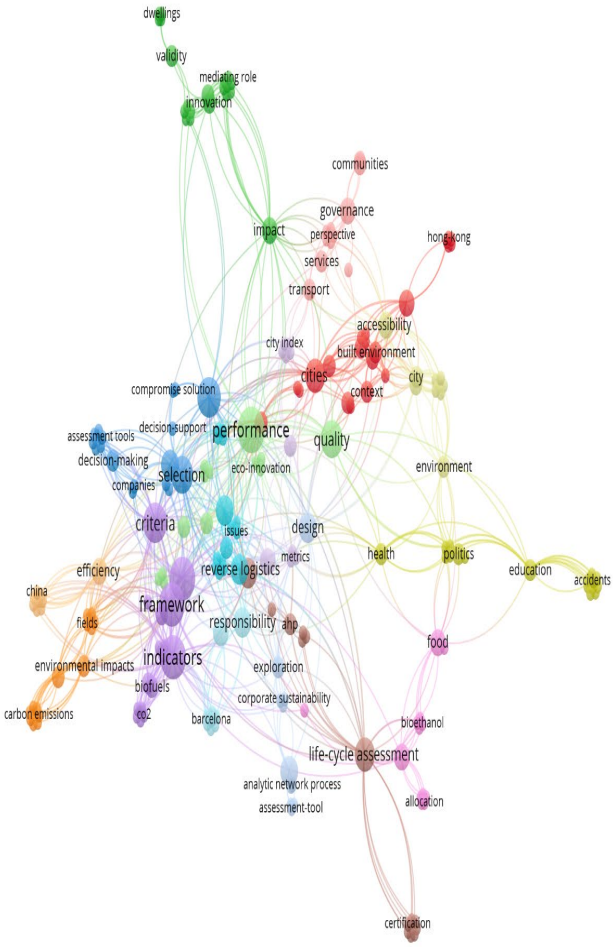


Figure 2.9 Co- Occurrence of All Keywords Analysis

"Co-Occurrence of All Keywords Analysis" refers to the examination of the relationships between all the keywords used in a research field. This analysis is used to understand which keywords are used together in articles related to a research topic and to uncover the connections between them. The analysis of Co-Occurrence of All Keywords provides the following information:

- Keyword Relationships: The analysis reveals the relationships between keywords that are frequently used together. It provides insights into which keywords co-occur, how they are connected, and what conceptual or theoretical relationships exist between them.

- Key Keywords: The analysis results identify the most frequently co-occurring and notable keywords. These keywords may represent important concepts or areas related to the research topic.
- Concept Mapping: Co-Occurrence of All Keywords Analysis can be used to create concept maps. These maps visualize the relationships and hierarchy of keywords around a research topic.

This analysis is a valuable tool for understanding the key concepts, relationships, and trends within a research field. Researchers can leverage the insights from this analysis to comprehend the scientific structure of the relevant field, identify important topics and connections, and gain cues for future research directions. According to the visual network analysis depicted in the figure, the keywords located in the areas where social sustainability is concentrated have been used more frequently in the literature. Some of the prominent indicators highlighted in the network represent key keywords for the research subtext of the interaction of social sustainability in architecture: performance, quality, life cycle assessment, indicators, accessibility, transport, communities, etc.

2.6.3 Country Citation Analysis

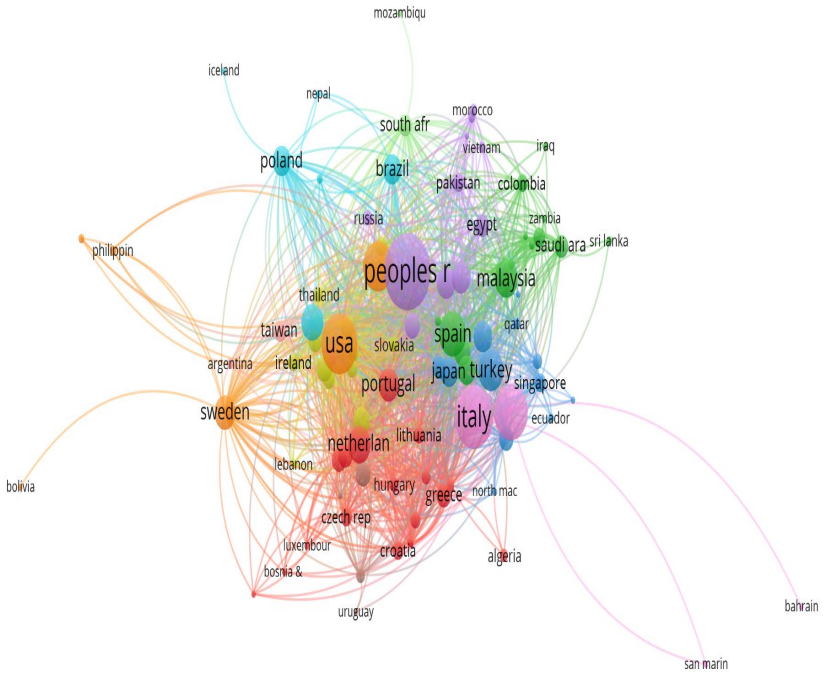


Figure 2.10 Country Citation Analysis

"Country Citation Analysis" refers to the examination of the citation and referencing status of a specific country in scientific publications. This analysis is used to understand which countries are being cited more frequently, which countries are making significant contributions, and to assess the scientific activity of a country. Country Citation Analysis is used to evaluate a country's scientific research performance, understand collaborations and networks, inform national science policies, and develop research strategies. Researchers, institutions, and policymakers can leverage the results of this analysis to understand scientific interactions and international competitiveness. According to the bibliographic data presented in the figure, the prominent countries in publishing regarding "social sustainability in architecture" are USA, Italy, Japan, Sweden, Türkiye, etc.

2.6.4 Co-occurrence with The Authors Keywords Analysis

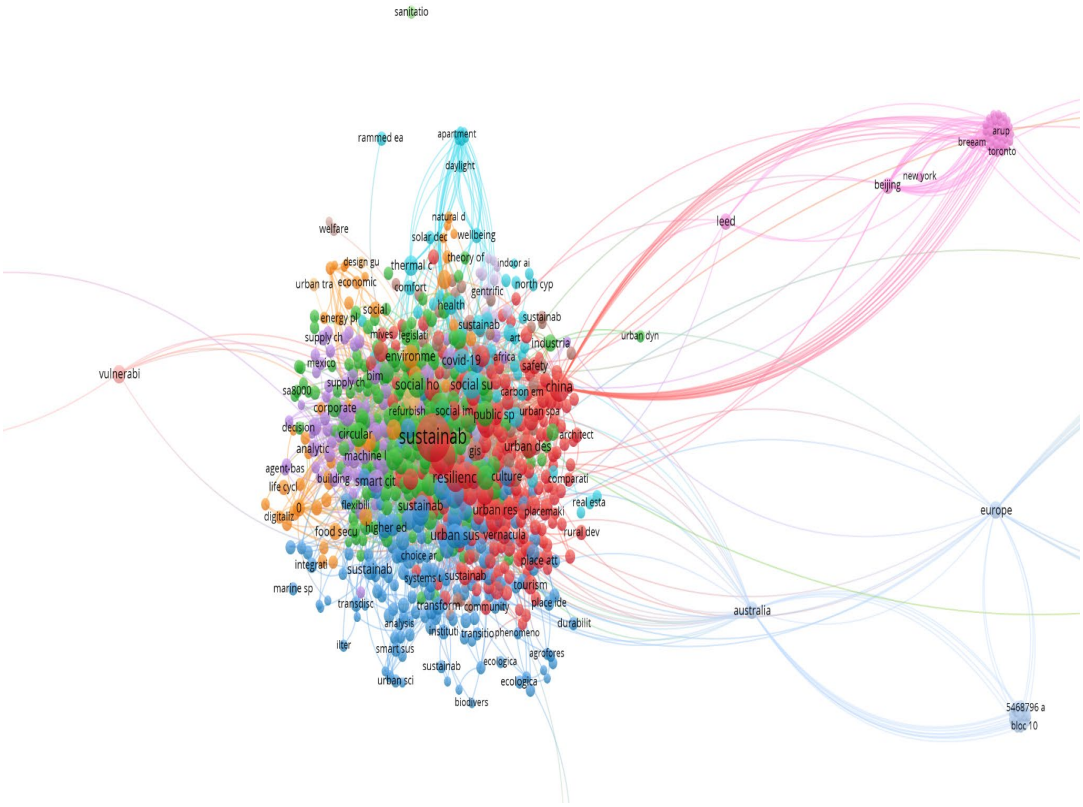


Figure 2.11 Co-occurrence with The Authors Keywords Analysis

"Co-occurrence with The Authors Keywords Analysis" refers to the analysis of relationships where authors' keywords co-occur. In this analysis, there is a focus on

the relationship and frequency of co-occurrence among the keywords used by authors. According to the results of this analysis, the notable keywords include sustainability, sociality, sociology, environment, social sustainability, and smart sustainability. These keywords represent interconnected concepts that are frequently used in the authors' work. Furthermore, when examining the network of relationships, it is evident that authors from countries such as the United States, Europe, and Australia tend to include these keywords in their articles. This suggests that academic and research environments in these countries may encourage a focus on topics related to social sustainability.

2.6.5 Co-citation of Cited Authors Analysis

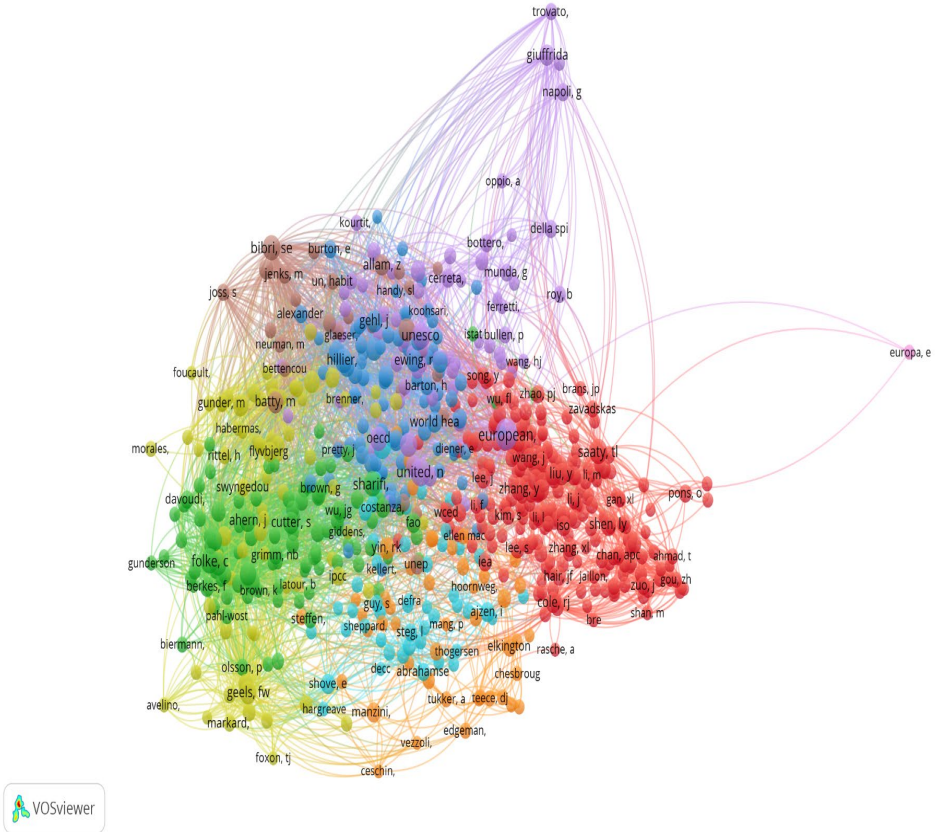


Figure 2.12 Co-citation of Cited Authors Analysis

"Co-citation of Cited Authors Analysis" refers to the examination of the co-citation patterns of authors in academic publications. Co-citation occurs when two or more authors are cited together in the reference lists of different articles, indicating a connection or relationship between their works. By conducting a "Co-citation of Cited

Authors Analysis," researchers aim to identify influential authors or groups of authors who are frequently cited together in the literature. This analysis helps to uncover the intellectual connections and networks within a specific field of study. The results of the analysis provide insights into the most cited authors and their relationships, indicating the importance and impact of their research contributions. Co-citation analysis can reveal clusters of researchers who collaborate or work on related topics, as well as identify key individuals or research groups that have made significant contributions to the field. This type of analysis is valuable for researchers, as it helps to identify seminal works, influential authors, and emerging trends within a particular research area. It can also assist in mapping the intellectual structure of a field and understanding the evolution of knowledge within it. When examining the bibliographic data presented in the visual, it is observed that authors generally have equal dominance, and some of these names include Trovato, Brenner, Hillier, European, World Hea, Kellert, Lee, Kim, etc.

2.7 Assessment Of Literature Review

The literature review for this thesis provides an examination of the evolution of social sustainability within the architectural field, specifically focusing on the design of post-disaster emergency shelters. The starting point of this exploration traces back to the Brundtland Report of 1987, which formally introduced the concept of sustainable development. Subsequent milestones, including the Rio, Habitat, and Johannesburg Summits, contributed to refining the principles of sustainability, emphasizing the need to balance environmental, economic, and social dimensions.

In recent years, an academic interest in social sustainability within architecture has surged, as evidenced by a substantial number of publications in databases such as Web of Science, Scopus, and EBSCOhost. This body of work covers a variety of publication types (articles, conference papers, books etc.) highlighting a diverse range of research approaches. Within this literature review, key indicators of social sustainability have emerged, including Accessibility, Security, Quality of Life, Function and Efficiency, Flexibility, Aesthetics, and Health and Physical Well-being. These indicators reflect a broad consensus among scholars regarding the most essential indicators that contribute to socially sustainable design, especially in contexts that impact vulnerable populations.

However, a significant research gap persists in the practical application of social sustainability principles within architectural designs for emergency shelters. While existing literature provides theoretical frameworks and generalized indicators, there is a lack of specific, actionable models that integrate these indicators into shelter design in a way that addresses the unique needs of populations after disasters. The challenge of measuring and applying social sustainability in this context remains largely unaddressed, creating an urgent need for research that bridges this divide.

The emphasis of social sustainability on localism and its inclusion and reflection of cultural approaches make not only the studies conducted on this topic significant but also the researchers themselves. The bibliographic maps obtained above have guided the data evaluations in the literature review included in the study. The key factors considered in data analyses using bibliographic maps are provided below:

- The All Keywords used in this study consist of data obtained from the bibliographic data mentioned above. Thanks to this data, the social sustainability indicators and strategies discussed in the relevant sections were selected from the most emphasised terms in the literature.
- Before developing the social sustainability model, a study on social sustainability models to be searched in the literature was conducted, taking into account examples from Europe, Sweden, and the USA, which are visualized in the bibliographic data in previous sections and are areas where studies are concentrated. Each of these examples is researched and explained in detail in the relevant sections.
- Based on the results obtained from the Co-citation of Cited Authors Analysis bibliographic data, the authors and studies emphasized in the literature were identified. Accordingly, all indicator selections and strategy determination processes were carried out, forming a foundation for the model development.

In order to ensure that nothing is missed in the literature on social sustainability and post-disaster emergency shelters, information was gathered by conducting a comprehensive scan. In light of this collection and the findings obtained, it has been observed that while various studies in the literature discuss social sustainability indicators on international platforms and certification systems, most of these studies do not provide designers with a checklist. Additionally, considering the principle of "equity," which is central to social

sustainability, the lack of a checklist for designers in the design of post-disaster emergency shelters in terms of social sustainability has been noticed.

CHAPTER 3

MATERIAL AND METHOD

In this section constituting the third part of the master's thesis, the aim is to develop a novel and original socially sustainable post-disaster shelter model. Additionally, the goal is to create a checklist encompassing objectives, criteria, and strategies specific to this model, followed by evaluating the strengths and weaknesses of this created list through a SWOT analysis. These propositions are intended for all architectural designers, considering the principles of social sustainability and user health/comfort.

3.1 Methodology

3.1.1 The Main Purpose of Developing a Model

In many developed countries around the world, efforts are being made to ensure the sustainability of buildings, and these efforts are being put into practice. For instance, in the United States, regulations and guidelines are being established in places like Austin, Texas; Minnesota; and California to create environments for ecological living. The LEED (Leadership in Energy and Environmental Design) rating system is used to assess these practices. In the UK, regulations are being developed by BRE (Building Research Establishment), and constructed structures are monitored using the BREEAM (Building Research Establishment's Environmental Assessment Method) assessment system, which was implemented in the early 1990s. In Canada, the BEPAC (Building Environmental Performance Assessment Criteria) system, introduced in 1993, is used to assess constructed buildings [69]. When examining all of these efforts in detail, it becomes apparent that social sustainability lacks sufficient measurability and the measurement criteria are not given enough importance. The mentioned certification methods and social sustainability efforts conducted globally and in Türkiye are not making significant progress beyond experimental applications and the limited efforts of a few architects [233]. The main reason for this is the lack of an available social-sustainable building model and, consequently, a measurement and evaluation system in our country and worldwide [234]. In this context, the objective

of the master's thesis is to fill this gap in Türkiye and globally by developing a unique social-sustainable post-disaster emergency shelter model that influences the design of emergency shelters usable in post-disaster situations.

3.1.2 The Method Applied in Modelling

In the second section of the master's thesis, social sustainability indicators and principles that will form the inputs for the new post-disaster emergency shelter model have been identified. In this section, within the scope of the master's thesis, a new integrative model has been developed with a selective approach, drawing upon literature that highlights different content and perspectives but aligns with the same objective (social sustainability). This model forms the essence of the master's thesis work. During the process of developing this model, relevant literature on the subject has been reviewed, research reports have been examined, and existing structures related to sustainability and social sustainability models have been studied (in literature sections). Additionally, using VOSviewer, existing systems with varying contents from countries where the subject has been extensively studied have been investigated, design objectives have been compared, and evaluation strategies have been scrutinized. In addition to these efforts, computer software and assessment systems for sustainable building analysis developed by research institutes and private sectors abroad have been thoroughly examined. Detailed insights have been drawn from these examinations to guide the modelling process and considerations. The result of every one of these attempts and research undertakings has consisted of the creation of a distinctive and ground-breaking concept for a socially viable post-disaster emergency shelter model, which was produced through an approachable and selective approach.

3.1.3 Development of a Unique Socially Sustainable Emergency Shelter Model After a Disaster

The subsequent objectives have been established set for the constructed socially sustainable post-disaster emergency shelter proposal in light of the information acquired through the literature:

Table 3.1 Indicators and Features Obtained from Literature (Revised by Author)

INDICATOR	FEATURES
Healthy and Productive Spaces	- High levels of acoustic, thermal, and visual comfort - Daylight strategies - Improved indoor air quality - Safe living environments - Integration of art, appreciation for relaxation, contemplation, and organization, contributing to health and well-being
Security	- Presence of security guards inside or outside - Surveillance systems at the entrance - Urban security features like pedestrian paths - School gates in the area
Flexibility	- Technical solutions such as walls, movable panels, and furniture that can be altered, moved, and repositioned - Suitable for various social uses
Aesthetics	- Satisfaction with facade, colour, appearance - Balancing and harmonizing environmental technology with aesthetic content - Incorporating sustainable architectural practices in design
Accessibility	- Fast and easy access to activities - Access to basic services - Outdoor and indoor accessibility - Access to transportation vehicles and location - Increasing slow transportation opportunities - Potential for social interaction - Ease of access to public transport facilities
Quality of Life	- Level of income/ownership - Social network relations - Diversity and quality of services - Responding to needs for privacy and social interaction
Functionality and Efficiency	- Natural lighting against exterior walls, hierarchy between public/private spaces, and zoning for activities - Enabling participation in activities for users and visitors - Supporting varied activities at different times - Supporting cleaning and technical maintenance

However, proposing a new and integrated system in line with these objectives does not imply the denial or insignificance of existing models. In this research, the intention to create a new and integrated model arises from the conclusion that these models are individually insufficient. Thus, by intersecting and analyzing all models through a selective approach, the aim is to develop a new and comprehensive model. Focusing solely on economic and environmental factors without establishing necessary criteria due to the unquantifiable and variable nature of social sustainability prevents the achievement of a building's sustainability. In addition to this, the aim is to develop an ideal social sustainable architectural shelter model that includes systems controlled by the users, encompasses healthier, local, cultural, and sociological-psychological values, and is human-centered. The main philosophy of the developed shelter model is to ensure equal access to quality living standards for everyone while safeguarding user health and creating suitable comfort

conditions. In order to establish the Social Sustainability model for emergency shelters after a disaster, AHP management will be used, and the model will be created accordingly. Information regarding the AHP method can be obtained from the next section.

3.1.4 The Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is a decision-making method that provides a systematic and structured approach for dealing with complex problems involving multiple criteria and alternatives. Developed by Thomas L. Saaty in the 1970s, AHP has been widely used in various fields, including business, engineering, and social sciences [235]. At its core, AHP helps individuals or groups evaluate and prioritize different options by breaking down a complex decision into a hierarchy of criteria and sub-criteria. The process involves pairwise comparisons to establish the relative importance of each element in the hierarchy, allowing for a comprehensive and rational decision-making process [236] AHP is particularly valuable when there are conflicting criteria and subjective judgments involved in decision-making. It offers a mathematical framework to derive consistent and reliable priorities, making it an essential tool for strategic planning, resource allocation, and problem-solving in diverse contexts [237].

The breakdown of the decision-making process into separate stages is crucial for obtaining at decisions in an orderly manner along with setting priorities:

1. Problem Definition: Clearly articulate the issue at hand and identify the specific knowledge required to address it effectively.
2. Development of Decision Hierarchy: Construct a structured hierarchy, commencing with the overarching goal of the decision, followed by expansive objectives, intermediate levels (criteria influencing subsequent elements), and concluding with the lowest level comprising a set of alternatives.
3. Formation of Pairwise Comparison Matrices: Create a series of matrices for pairwise comparisons. Each element at a higher level is utilized to assess elements in the level immediately below in relation to it.
4. Application of Priorities from Comparisons: Utilize the priorities derived from the comparisons to assign weights to priorities in the level directly beneath. This process is applied to each element. Subsequently, for each element in the lower level, aggregate its weighted values to ascertain its overall or global priority. Continue this

iterative process of weighing and aggregating until the final priorities for the alternatives at the bottom-most level are determined [236].

- **Creating a Hierarchical Structure:**

In the establishment of a hierarchical structure, it is essential to first determine the objective of the decision problem. Stated differently, the hierarchy begins from the upper levels, as criteria and alternatives will be shaped in line with the objective. Examples of objectives in Analytic Hierarchy Process (AHP) problems include the selection of a house, car, machinery, and equipment, choosing the optimal holiday destination, selecting a marketing strategy, career choice, etc. [238].

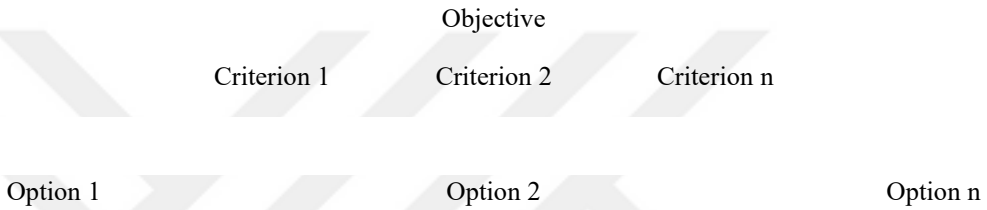


Figure 3.1 The Use of AHP Technique for Comparison of Different Priority Vector Derivation Models Developed in this Technique [238]

- **Binary Comparison Matrix and Solution**:

In this method requiring expert opinion for rating based on criteria, the determination of importance levels necessitates expert judgment. Decision-makers compare the criteria in the evaluation form prepared using [235]1-9 scale specified in Table 1, and ultimately, the priorities of decision alternatives are listed [236].

Table 3.2 Importance Rating Table Used in Comparisons [239]

DEGREE OF IMPORTANCE	DEFINITION	CLARIFICATION
1	Equal Importance	Two activities contribute equally to the objective
3	One is much less important than the other	Experience and judgment slightly Favor one activity over the other
5	Strongly Important	Experience and judgment strongly Favor one activity over the other
7	Very Important	One activity is strongly favoured and its dominance is easily observed in implementation
9	Extremely Important	Evidence of the preference of one activity over another is of great reliability
2,4,6,8	Intermediate Values	Intermediate values for use when compromise is needed

In AHP analysis, as shown in Table 24, the upper limit can be taken as 9. This is because, especially when the number of criteria is less than 10, this method yields consistent results. However, when the number of criteria exceeds 9, inconsistencies generally arise [235]. In the Analytic Hierarchy Process (AHP), when constructing the hierarchical structure for a decision problem, pairwise comparisons are conducted among the elements at each level to calculate the importance and priority values of the criteria [238]. The steps of the method include defining the problem and determining the goal, listing the necessary decision criteria, forming the hierarchical structure of the decision problem, conducting pairwise comparisons of decision criteria at each level to determine the importance and priority levels of the criteria, calculating the consistency ratio, and performing sensitivity analysis [238].

- **Normalization and Relative Importance Weights:**

Normalization and relative importance weights are concepts commonly associated with the Analytic Hierarchy Process (AHP). In the AHP methodology, after creating a pairwise comparison matrix to establish the relative importance between criteria or alternatives, the next steps involve normalization and the determination of relative importance weights. Normalization is the process of converting the values in the pairwise comparison matrix to achieve consistency and comparability. This is typically done by dividing each element in a row by the sum of the elements in that row. The normalized matrix helps ensure that the comparisons are on a consistent scale. The necessary mathematical calculations for determining relative importance essentially involve finding the eigenvector of the pairwise comparison matrices [240].

Table 3.3 Displaying the Relative Weight Data Between the Criteria Determined by Decision-makers (Criteria are denoted as A, B, C, D for illustrative purposes, and the importance weights are selected based on consistent numerical values)

	A	B	C	D
A	1	1/5	1/9	1
B	5	1	1	5
C	9	1	1	5
D	1	1/5	1/5	1

To interpret and assign relative weights to individual criteria, it's essential to standardize the preceding comparison matrix. This standardization is achieved by dividing each value by the total column value [241].

Table 3.4 Calculating the Total of Each Column (From Table above)

	A	B	C	D
A	1	1/5	1/9	1
B	5	1	1	5
C	9	1	1	5
D	1	1/5	1/5	1
Total	**16**	**2.4**	**2.31**	**12.0**

Table 3.5 Comparison Matrix for Table 25 of Criteria after Normalization

	A	B	C	D
A	1/16= 0.063	0.083	0.048	0.083
B	5/16= 0.313	0.417	0.433	0.417
C	9/16= 0.563	0.417	0.433	0.417
D	1/16= 0.063	0.083	0.087	0.083

Calculations performed using the priority vector (or Eigenvector) help determine the impact of each criterion on the organizational objective. The Eigenvector illustrates the relative importance among the criteria, approximated by calculating the mathematical average of all criteria, as presented in Table 28. The precise computation of the Eigenvector is only carried out under specific circumstances. This estimation is commonly utilized to streamline the calculation process, given that the disparity between the exact and approximate values is typically less than 10% [242].

Table 3.6 Eigenvector Calculation

	Eigenvector Calculation	Eigenvector
A	(0.063+0.083+0.048+0.083)/4 = 0.0693	0.0693 (6.93 %)
B	(0.013+0.417+0.433+0.417)/4 = 0.3946	0.3946 (39.46 %)
C	(0.563+0.417+0.433+0.417) / 4 = 0.4571	0.4571 (45.71 %)
D	(0.0.63+0.083+0.087+0.083) / 4 = 0.0789	0.0789 (7.89 %)

In AHP, the values in the Eigenvector have a direct physical meaning; these values determine the participation or weight of that criterion relative to the total result of the goal. For example, among the criteria listed in Table 25, the C criterion has a weight of 45.71% relative to the whole (exact calculation of the Eigenvector).

- **The calculation of the Consistency Ratio in Criterion Comparisons:**

Due to the prevalence of judgment-based estimates rather than absolute measurements in pairwise comparisons, inconsistencies may arise. Therefore, a consistency index, also known as the inconsistency ratio, is calculated to reflect the consistency in

decision-makers' judgments [243]. The Consistency Index Table in Table 25 is used when calculating the consistency ratio.

Table 3.7 Decision Making with The Analytic Hierarchy Process [236]

Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R.I	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49	1.51	1.52	1.54	1.56	1.58	1.59
First Order Differ.	0	0.52	0.37	0.22	0.14	0.10	0.05	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.01

- **Determining the Final Ranking:**

The final step of AHP involves finding the product of the importance weights of criteria with the importance weights of alternatives, multiplied by "n," and determining the priority values for each alternative. The sum of these values equals 1. The alternative with the highest value is considered the best choice for the decision problem [244].

Expert Selection Criteria:

The subsequent criteria were utilized into account when identifying the experts: having at least a bachelor's degree in architecture, having conducted or contributed to studies related to the topic of this research (such as social sustainability, social sustainability indicators in architecture, shelter design, etc.), and being an academician, private sector employee, or government worker. At this stage, a 21-question evaluation form, created using Google Forms and prepared according to the AHP method, was sent via email or social platforms to all the experts. The thesis topic was explained, and their evaluations were requested. Finally, the final results were obtained from 48 experts who provided feedback on the topic. Among these 48 experts, 7 are architects working in the public sector, 11 are architects working as faculty members in academia in Türkiye, and the remaining are architects working in the private sector.

Table 3.8 Experts' Sectors and Numbers (Source: Author)

NUMBER OF EXPERTS	PUBLIC SECTOR	PRIVATE SECTOR	ACADEMIC SECTOR
48	**7**	**30**	**11**

In this context, the methodology has been employed as the method for weighting the principles of social sustainability in this study. To enable 48 experts with expertise related to social sustainability to perform weighting through tabulation based on the specified comparison criteria, a table has been created in “Google Docs” format and sent.

Table 3.9 Comparison Criteria Table (Source: Author)

COMPARISON CRITERIA (Selected from Literature most mentioned)
HEALTHY AND PRODUCTIVE SPACES
SECURITY
FLEXIBILITY
AESTHETICS
ACCESSIBILITY
QUALITY OF LIFE
FUNCTIONALITY AND EFFICIENCY

Out of the selected 48 experts, three criteria were considered: academic, public, and private sectors. The questions created to access the results of 48 experts who were reached online via a Google doc file prepared according to the Analytic Hierarchy Process are as follows. These should be compared using a numerical comparison method as shown in the example below to make a decision and obtain the correct result.

Example of the questions:

Please compare the accessibility and functionality indicators:

Accessibility—---------- *Functionality*

These questions have been formulated based on the formula for the number of questions described in the method above and there are 21 questions in total. As a result of the evaluation by 48 experts, various graphs like the example shown below have been obtained in comparing indicators via Google doc:

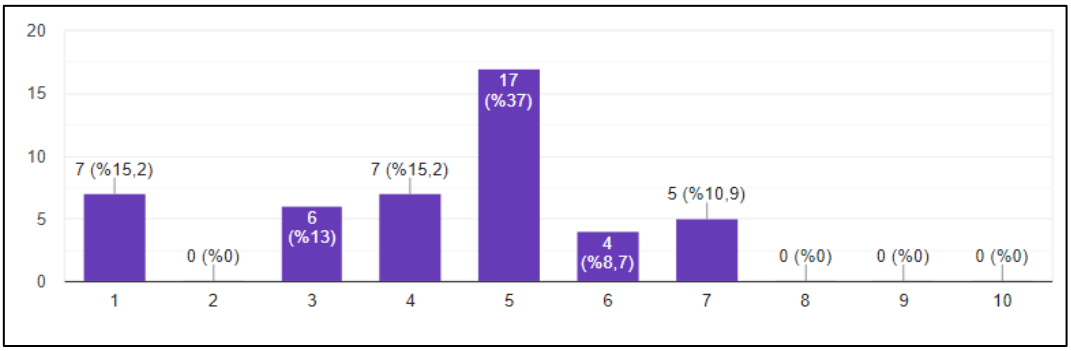


Figure 3.2 Comparing Indicators Via Google Doc (Source: Author)

Based on these graphs and results, the percentages for each indicator have been calculated; these percentages are divided equally according to the criteria and strategies scanned from the literature for each indicator, and the scoring and percentage contribution of each strategy have been calculated.

Accordingly, the result graphs and percentage units for each criterion are as shown in Appendix 2 based on the outcomes obtained and the answers of the experts for each criterion are given in Appendix 1.

In line with the expert opinions obtained from tables and charts; a comparison matrix has been primarily created using Python. To obtain the comparison matrix and results, it is necessary to first analyze user data, then create the comparison matrix, and calculate the weights of the indicators through this matrix. The necessary calculations have been made by writing Python code for this process, and the data has been obtained accordingly. The comparison matrix has been created as follows:

Table 3.10 AHP Results of Social Sustainability Indicators (Source: Author)

	FE	**HPS**	**QOL**	**SEC**	**ACC**	**FLE**	**AES**
Functionality and Efficiency (FE)	1.00	5.00	5.00	5.00	5.00	5.00	5.00
Healthy and Productive Spaces (HPS)	0.2	1.00	5.00	5.00	5.00	5.00	5.00
Quality of Life (QoL)	0.2	0.2	1.00	5.00	5.00	5.00	5.00
Security (Sec)	0.2	0.2	0.2	1.00	5.00	1.00	5.00
Accessibility (Acc)	0.2	0.2	0.2	0.2	1.00	5.00	5.00
Flexibility (Fle)	0.2	0.2	0.2	1.00	0.2	1.00	5.00
Aesthetics (Aes)	0.2	0.2	0.2	0.2	0.2	0.2	1.00

The weights of the indicators can be calculated by taking the n-th root of the product of the numbers in each row of the matrix (where n is the number of indicators). This process gives the normalized weight of each indicator. During the calculation, each comparison is added to the matrix individually through a loop, and the median value is taken for each pair and placed in the matrix to obtain the result.

The items that follow amounts to the obtained weights for each indicator:

- Functionality and Efficiency: 38.78%
- Healthy and Productive Spaces: 24.49%
- Quality of Life: 15.46%
- Security: 7.76%
- Accessibility: 6.16%
- Flexibility: 4.90%
- Aesthetics: 2.46%

These weights represent the relative importance of the indicators according to survey results. Each indicator has been weighted according to these percentage values based on the given decision matrix. The model created based on a scoring system evaluated in terms of these percentages, and incorporating criteria and strategies drawn from the literature, is presented in the following section.

3.1.5 Developing a Model

Considering what has been established objective, a socially sustainable model for post-disaster emergency shelters has been developed, and an objective design guide has been created, encompassing general solutions that can be easily applied in underdeveloped, developing, and developed countries alike.

Green building certification systems that assess the environmental performance of green buildings measure the sustainability of a building through a set of criteria organized into different categories. The structure's overall assessment establishes its environmental impact, or sustainability level, based on the points assigned to each criterion with the score it achieves cumulatively. According to [245], assessment systems can be used as design tools by establishing performance criteria to determine

sustainable design priorities and goals, developing appropriate sustainable design strategies, and guiding sustainable design and decision-making processes. As a result, they constitute an advantageous structure for determining how efficiently buildings function environmentally and incorporating sustainable development into the process of designing.

While the sustainability criteria of buildings can be directly quantifiable, there is a gap regarding social sustainability, which has led to an oversight in this aspect [246]. [247] criticize that sustainability assessment tools tend to focus primarily on the environmental and economic aspects of sustainability, while neglecting to give sufficient importance to social sustainability. Based on this, each subheading within the developed post-disaster emergency shelter model has its own set of sub-strategies, proportional to their respective percentages. The development of these techniques provides users two significant advantages:

1. Designers may calculate the social sustainability scores of the shelters they design by utilizing the subheadings and approaches that have been extracted from the model that was generated.
2. Users may input in and approve the sub-strategies by generating a printed edition of the design checklist corresponding to the constructed model.

Based on the data from AHP methodology and results, the model criteria and strategies and their result, the score range and evaluation based on percentile segments of the 100 accepted social sustainability have been obtained according to AHP matrices. The table that follows is founded around the following conclusions and data:

In the Socially Sustainable Post-Disaster Emergency Shelter Design checklist, a total of seven objectives have been identified, and the percentages of these seven objectives come from the data which could be seen from AHP Method in previous parts . For the objective HEALTHY AND PRODUCTIVE SPACES (24.49%), a total of 5 criteria and 25 strategies have been determined for their implementation; for SECURITY (7.76%) objective, a total of 4 criteria and 12 strategies have been defined; for FLEXIBILITY (4.90%) objective, there are 2 criteria and 9 strategies for their implementation; for AESTHETICS (2.46%) objective, there are 2 criteria and 10 strategies for their implementation; for ACCESSIBILITY (6.16%) objective, there are

10 criteria and 39 strategies have been defined; for QUALITY OF LIFE (15.46%) objective, there are 2 criteria and 7 strategies for their implementation; for FUNCTIONALITY AND EFFICIENCY (38.78%) objective, there are 5 criteria and 14 strategies specified (Refer to Appendix 4).

3.2 Case Study

In the 2016 booklet published by the UNHCR Shelter and Settlement Section, five emergency shelters are defined under the emergency shelter section by UNHCR. These shelter definitions and models, including their technical specifications, are detailed in this booklet. In this section of the thesis, these five shelter examples will be evaluated according to the developed model, and the results concerning social sustainability will be presented below:

1. Wooden Gable Frame Shelter:

This emergency shelter project was initiated in the Ajuong Thok refugee camp in South Sudan with the aim of providing adequate shelter for the camp's population and new arrivals using locally available materials. Two main factors influenced the strategy: the refugees' rural background and their shelter coping skills, as well as the region's abundant forest and thatch grass resources [248].

Table 3.11 Data Sheet of Wooden Gable Shelter (Source: [248])

DATA SHEET OF WOODEN GABLE SHELTER	
LOCATION	Ajuong Thok, South Sudan
PROJECT DATE	January 2013
SHELTER SIZE	12 m² (option)
TIME TO BUILD	Depending on the phase, from emergency to durable, 6 hours - 3 days
LIFESPAN	Depending on the phase, from emergency to durable, 1 - 5 years
CONSTRUCTION TEAM	1 skilled worker + 2 laborers
COST PER SHELTER	Varies depending on the phase, from emergency to durable. Transport costs may significantly impact expenses in remote areas.



Figure 3.3 Wooden Gable Frame Shelter [248]

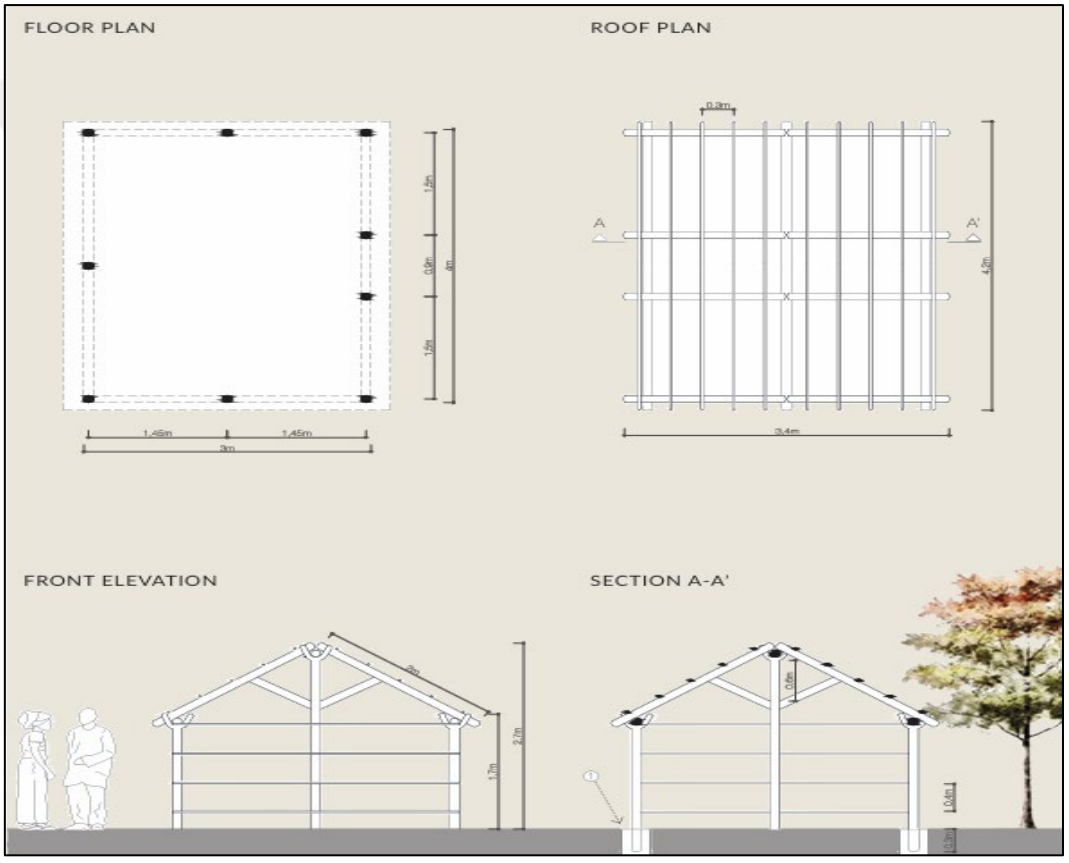


Figure 3.4 Wooden Gable Frame Shelter Technical Drawings [248]

Different models for this type of emergency shelter have been developed by UNHCR. The images below illustrate representations of these models.

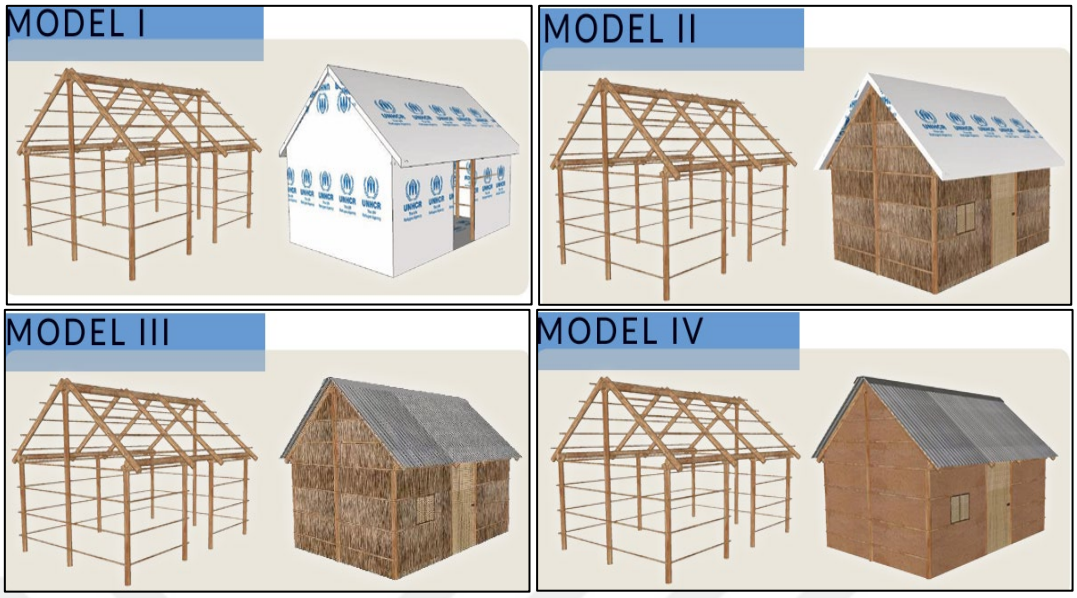


Figure 3.5 Wooden Gable Frame Shelter Different Models [248]

2. Tuareg Shelter:

This emergency shelter project was developed in Burkina Faso, primarily targeting nomadic refugees from northern Mali. The aim of the initiative was to supply shelter support to Malian refugees living in camps to reduce their vulnerability to protection and settlement issues within the camp.

Using the traditional shelter model allowed for the preservation of the Tuareg women's traditional role in shelter construction. Each shelter's portable, nomadic design allowed it to be demolished and transported as needed.

Beneficiary selection and material distribution were conducted through the existing social and tribal structures of the refugee Tuareg communities. The shelter kits included materials to construct different sizes of shelters based on family size.

Table 3.12 Data Sheet of Tuareg Shelter (Source: [248])

DATA SHEET OF TUAREG SHELTER	
LOCATION	Burkina Faso
PROJECT DATE	2012
SHELTER SIZE	21 m²
TIME TO BUILD	1 day
LIFESPAN	2 years
CONSTRUCTION TEAM	3 people



Figure 3.6 Tuareg Shelter [248]

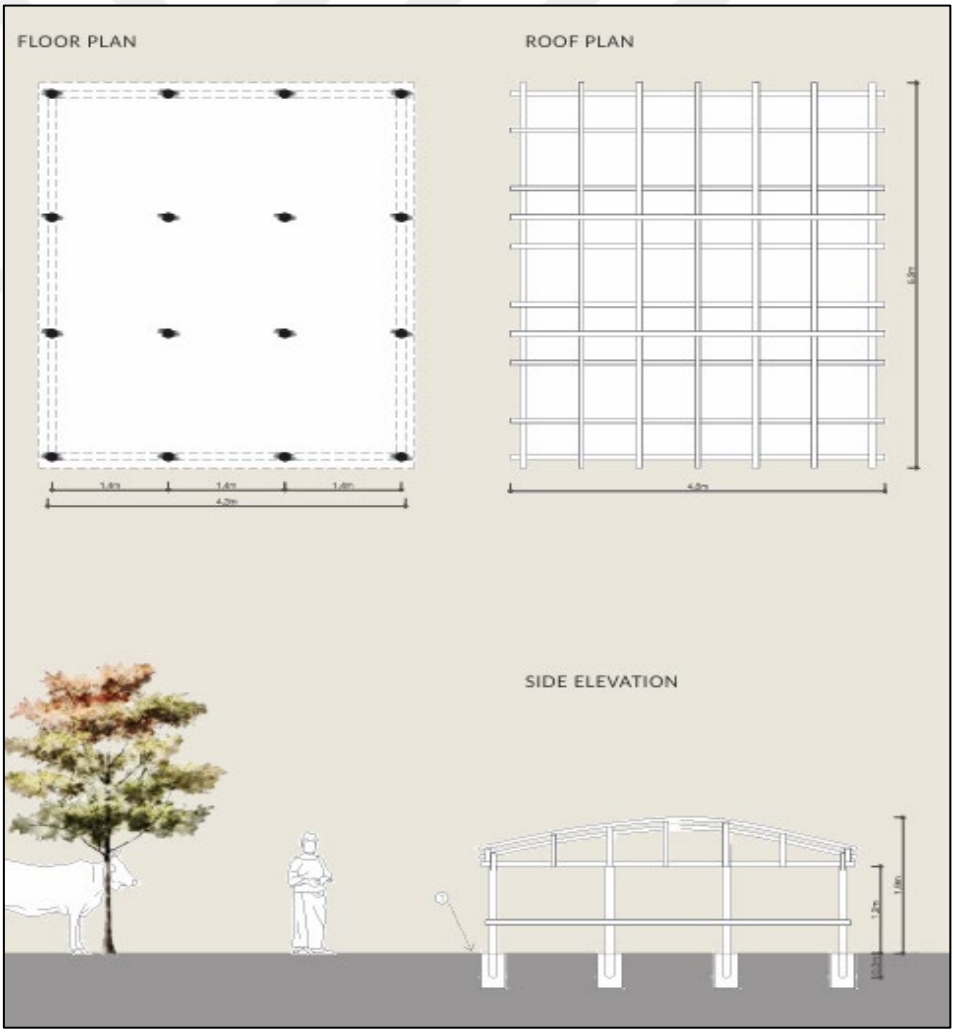


Figure 3.7 Tuareg Shelter Technical Drawings [248]

Different models for this type of emergency shelter have been developed by UNHCR. The image below presents a visualization of these models.

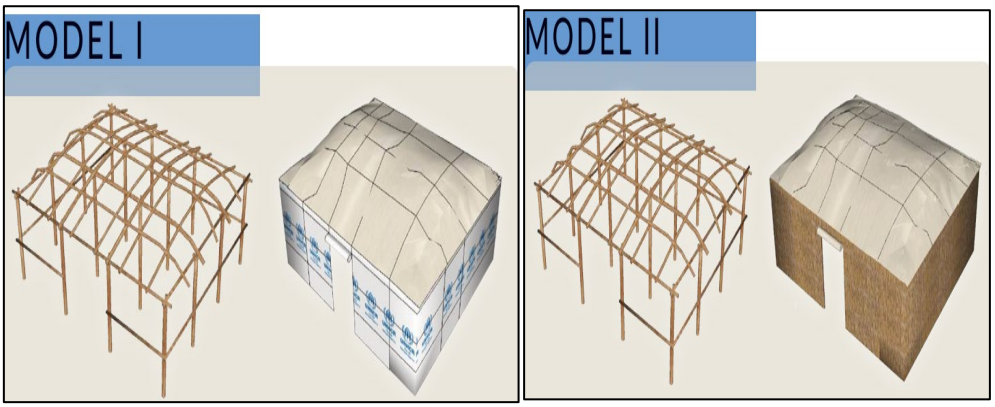


Figure 3.8 Tuareg Shelter Different Models ([248]

3. Tuareg Tent:

This emergency shelter project was implemented in the Sahrawi refugee camps in Tindouf. The tents supplied consisted of canvas, mixed fabric, iron pegs, and bamboo poles, along with cotton ropes.

The tents cover approximately 49 m² and have a footprint of 121 m².

Table 3.13 Data Sheet of Tuareg Tent [248]

DATA SHEET OF TUAREG TENT	
LOCATION	Algeria
PROJECT DATE	October2012
SHELTER SIZE	49 m²
TIME TO BUILD	1 day
LIFESPAN	2 years
CONSTRUCTION TEAM	3 people

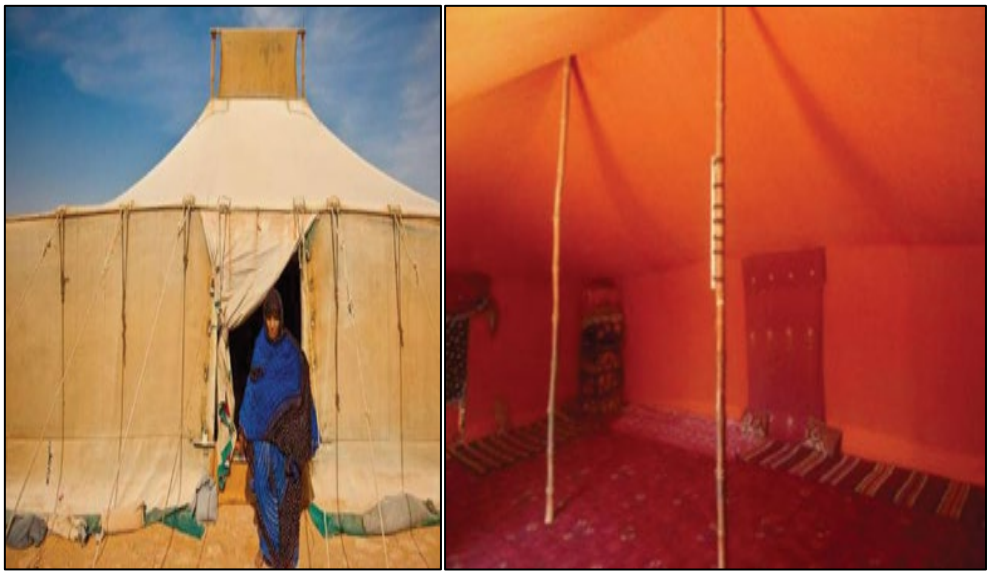


Figure 3.8 Tuareg Tent [248]

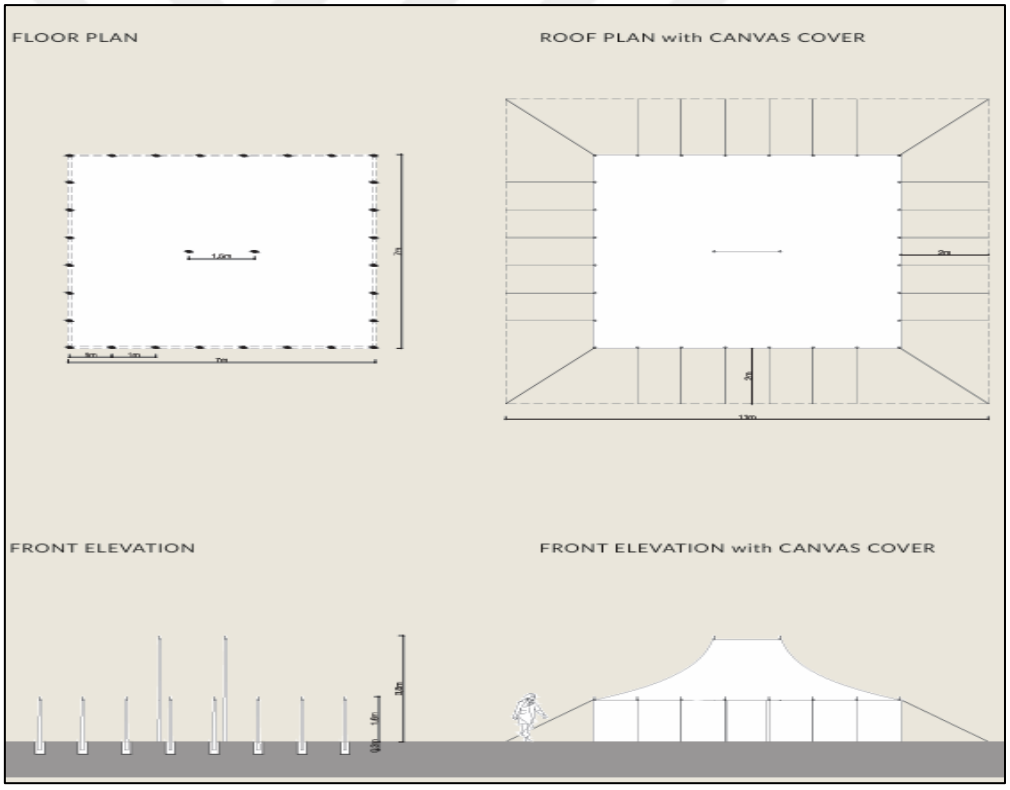


Figure 3.9 Tuareg Tent Technical Drawings [248]

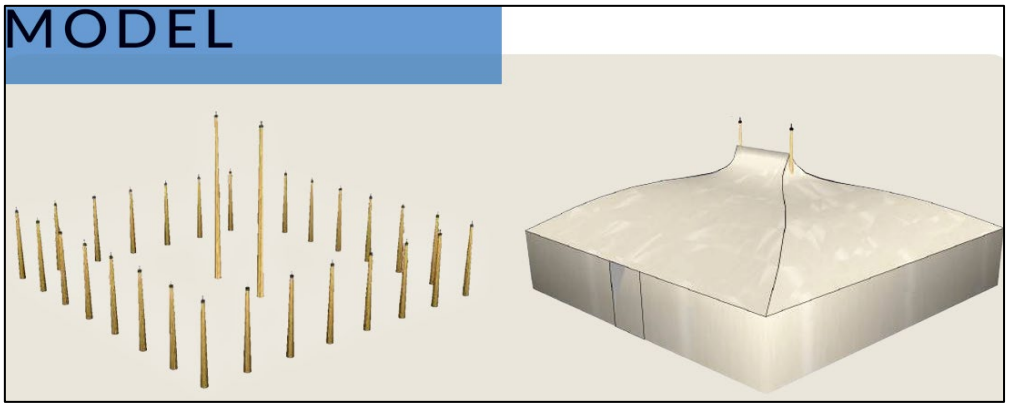


Figure 3.10 Tuareg Tent Model [248]

4. Tukul Shelter:

The Tukul emergency shelter is a traditional structure utilizing simple building techniques, developed across all states of South Sudan. This type of shelter is highly resistant to strong winds, provides good insulation against heat, and was generally well-accepted by beneficiaries. It nevertheless does necessitate intermittent maintenance.

The Tukul shelter offers basic temporary accommodation for 4 to 6 people using locally available materials.

Table 3.14 Data Sheet of Tukul Shelter [248]

DATA SHEET OF TUKUL SHELTER	
LOCATION	South Sudan
PROJECT DATE	2012
SHELTER SIZE	21.6 m²
TIME TO BUILD	1 day
LIFESPAN	2-4 years
CONSTRUCTION TEAM	3 people



Figure 3.11 Tukul Shelter [248]

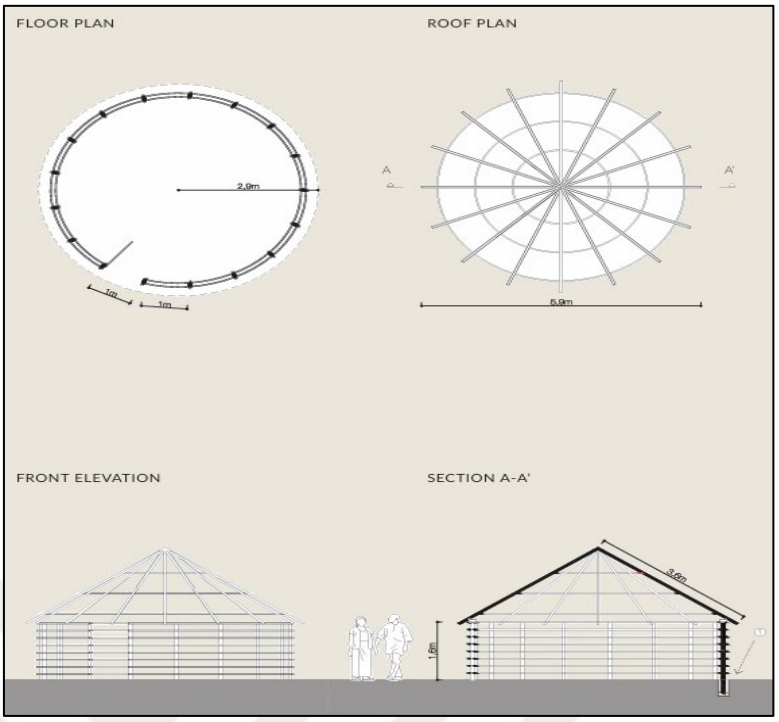


Figure 3.12 Tukul Shelter Technical Drawings [248]

Different models for this type of emergency shelter have been developed by UNHCR. These models are illustrated in the figure below.

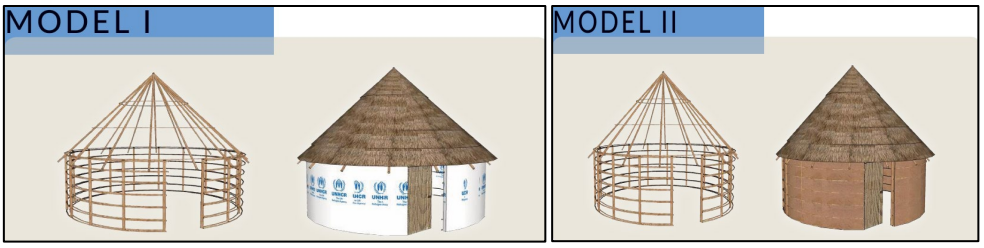


Figure 3.13 Tukul Shelter Models [248]

5. Tent Shelter:

This emergency shelter was designed for rapid response in countries with potentially severe climatic conditions and was implemented in Northern Afghanistan. It consists of a pre-cut and drilled bamboo frame structure covered with plastic sheet cladding, built around existing tents.

The core living area is provided by a standard UNHCR emergency tent, enclosed by an outer structure. The additional covered area around the tent allows for typical household activities within a weather-protected enclosure.

The bolt-together system allows the frame to be disassembled, transported, and reused in the event of further population movement.

Table 3.15 Data Sheet of Tent Shelter [248]

DATA SHEET OF TENT SHELTER	
LOCATION	Sozma Qala, Afghanistan
PROJECT DATE	October 2009
SHELTER SIZE	38.7 m²
TIME TO BUILD	4 hours
LIFESPAN	2 years
CONSTRUCTION TEAM	1 skilled worker + 3 laborers
COST PER SHELTER	$813, not including the inner UNHCR tent



Figure 3.14 Tent Shelter [248]

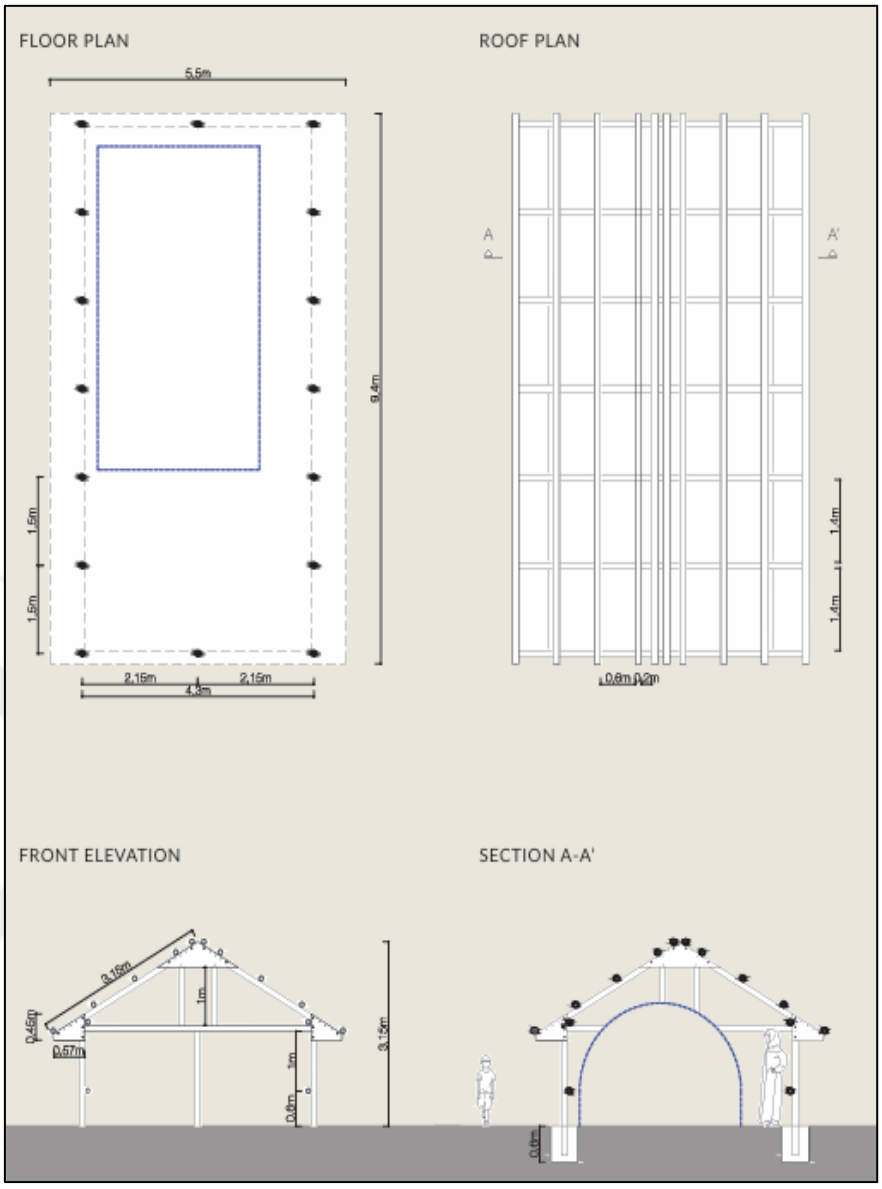


Figure 3.15 Tent Shelter Technical Drawings [248]

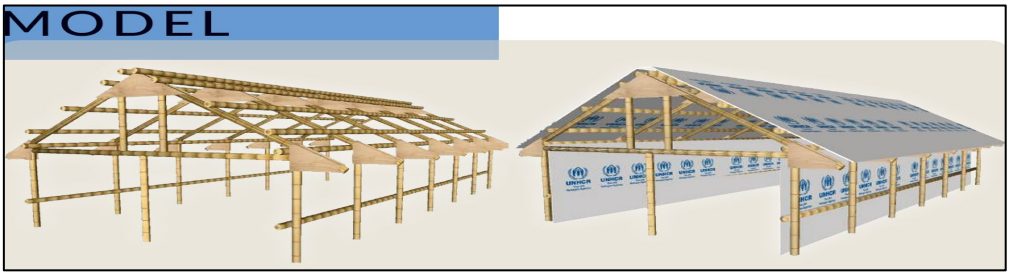


Figure 3.16 Tent Shelter Model [248]

The Social Sustainability evaluation of UNCHR Emergency Shelters according to the developed new model and their results are given in Appendix 3.

CHAPTER 4

FINDINGS AND RESULTS

4.1 Results

The results obtained from the AHP evaluation matrix were calculated as percentages using Python, and the total score for the checklist obtained for Post-Disaster Emergency Shelters was determined to be 100.

The full list of outcomes concerning emergency shelters are presented below, confirming the results table above:

- Wooden Gable Frame Emergency Shelter's total Social Sustainability score is 69,1665.
- Tuareg Emergency Shelter's total Social Sustainability score is 46,611.
- Tuareg Tent Emergency Shelter's total Social Sustainability score is 20,813.
- Tukul Emergency Shelter's total Social Sustainability score is 23,284.
- Tent Emergency Shelter's total Social Sustainability score is 30,086.

Based on the AHP evaluation for the Healthy and Productive Spaces indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix using Python, is 24.49. The scores that the five emergency shelters studied in the case study received from the 'Healthy and Productive Spaces indicator' have been identified below:

- Wooden Gable Frame Emergency Shelter's total Healthy and Productive Spaces Indicator score is 24.49.
- Tuareg Shelter's total Healthy and Productive Spaces Indicator score is 22.0406.
- Tuareg Tent Shelter's total Healthy and Productive Spaces Indicator score is 12.0817.
- Tukul Shelter's total Healthy and Productive Spaces Indicator score is 13.714.
- Tent Shelter's total Healthy and Productive Spaces Indicator score is 12.081.

Considering the AHP evaluation for the Security indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix

using Python, is 7.76. The scores that the five emergency shelters studied in the case study received from the 'Security indicator' are listed below:

- Wooden Gable Frame Emergency Shelter's total Security Indicator score is 2.813.
- Tuareg Shelter's total Security Indicator score is 0.00.
- Tuareg Tent Shelter's total Security Indicator score is 0.388.
- Tukul Shelter's total Security Indicator score is 0.873.
- Tent Shelter's total Security Indicator score is 1.358.

Based on the AHP evaluation for the Flexibility indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix using Python, is 4.90. The scores that the five emergency shelters studied in the case study received from the 'Flexibility indicator' are listed below:

- Wooden Gable Frame Emergency Shelter's total Flexibility Indicator score is 1.6333332.
- Tuareg Shelter's total Flexibility Indicator score is 0.00.
- Tuareg Tent Shelter's total Flexibility Indicator score is 0.00.
- Tukul Shelter's total Flexibility Indicator score is 0.00.
- Tent Shelter's total Flexibility Indicator score is 0.00.

Considering the AHP evaluation for the Aesthetics indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix using Python, is 2.46. The scores that the five emergency shelters studied in the case study received from the 'Aesthetics indicator' are listed below:

- Wooden Gable Frame Emergency Shelter's total Aesthetics Indicator score is 2.1525.
- Tuareg Shelter's total Aesthetics Indicator score is 1.01035.
- Tuareg Tent Shelter's total Aesthetics Indicator score is 0.48321.
- Tukul Shelter's total Aesthetics Indicator score is 0.65892.
- Tent Shelter's total Aesthetics Indicator score is 0.48321.

Based on the AHP evaluation for the Accessibility indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix

using Python, is 4.90. The scores that the five emergency shelters studied in the case study received from the 'Accessibility indicator' are listed below:

- Wooden Gable Frame Emergency Shelter's total Accessibility Indicator score is 2,0636.
- Tuareg Shelter's total Accessibility Indicator score is 1.56053.
- Tuareg Tent Shelter's total Accessibility Indicator score is 1.155.
- Tukul Shelter's total Accessibility Indicator score is 1.25766.
- Tent Shelter's total Accessibility Indicator score is 1.45786.

Considering the AHP evaluation for the Quality of Life indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix using Python, is 15.46. The scores that the five emergency shelters studied in the case study received from the 'Quality of Life indicator' are mentioned below:

- Wooden Gable Frame Emergency Shelter's total Quality of Life Indicator score is 5.7975.
- Tuareg Shelter's total Quality of Life Indicator score is 1.9325.
- Tuareg Tent Shelter's total Quality of Life Indicator score is 1.9325.
- Tukul Shelter's total Quality of Life Indicator score is 1.9325.
- Tent Shelter's total Quality of Life Indicator score is 3.865.

Based on the AHP evaluation for the Functionality and Efficiency indicator, the total score to be obtained from this indicator, according to the percentage data obtained from the matrix using Python, is 38.78. The scores that the five emergency shelters studied in the case study received from the 'Functionality and Efficiency indicator' are listed below:

- Wooden Gable Frame Emergency Shelter's total Functionality and Efficiency Indicator score is 38.78.
- Tuareg Shelter's total Functionality and Efficiency Indicator score is 18.7436.
- Tuareg Tent Shelter's total Functionality and Efficiency Indicator score is 3.878.
- Tukul Shelter's total Functionality and Efficiency Indicator score is 3.878.
- Tent Shelter's total Functionality and Efficiency Indicator score is 9.695.

4.2 Strengths Weaknesses Opportunities Threats (SWOT) Analysis

SWOT analysis is an acronym that stands for Strengths, Weaknesses, Opportunities, and Threats. It is used to assess both internal and external factors of an organization [249]. Internal factors are factors that are under the control of the organization and are analyzed as strengths and weaknesses. Strengths are areas where the organization has a competitive advantage or demonstrates superiority. For example, strong brand image, qualified personnel, or high production capacity can be considered as strengths. Weaknesses, on the other hand, are areas where the organization is disadvantaged or in need of improvement. For example, limited financial resources or outdated technology can be considered as weaknesses [250]. The purpose of the SWOT analysis is to gather comprehensive information to rationalize decision-making processes. This model has been frequently utilized in corporate management [251]. In more recent times, it has been employed to examine different potential scenarios of urban growth and to evaluate both urban and regional initiatives. Given that the aim of the SWOT analysis is to explain how various variables impact decision contexts, it has also emerged as an established technique within the field of environmental assessment [252]. The main advantages of the SWOT analysis in achieving social sustainability and sustainable architecture goals stem from its ability to gather information about the internal and external context and to identify the components of a project. It may in fact be advantageous to identify architectural aspects that need to be invested in by comprehending the variables that have an impact social sustainability; this might involve determining opportunities that require further investigation, threats that need to be mitigated, or areas that require additional attention. This is an effective approach to understanding and addressing the various aspects that contribute to social sustainability and architectural success [253].

Table 4.1 The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist SWOT ANALYSIS

THE SOCIALLY SUSTAINABLE POST-DISASTER EMERGENCY SHELTER DESIGN CHECKLIST'S FEATURE	STRENGTHS	WEAKNESSES
A1	Making social sustainability testable by clearly defining it	The weighting of the importance of social sustainability indicators may vary for different cultures and geographies
A2	Defining social sustainability goals clearly and establishing the criteria and strategies to achieve these goals	The factors influencing social sustainability can vary over time - changes in social, economic, and environmental factors can impact social sustainability goals and outcomes
A3	Contributing to the collection and analysis of the necessary data to measure social sustainability performance	The outcomes of social sustainability efforts can sometimes lead to unexpected reactions or secondary effects - predicting and managing such impacts can be challenging
A4		
A5	Contributing to the evaluation of social sustainability performance and analyzing the positive or negative effects of post-disaster emergency shelters on the community and users	Testing and monitoring social sustainability can be a time-consuming and costly process
A6		
A7	Providing the opportunity to communicate with users and share social sustainability efforts and results, thus increasing transparency and facilitating the collection of user feedback	Due to its complexity and subjective nature, accurately measuring social sustainability requires an objective assessment

Table 4.1 (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist SWOT ANALYSIS

THE SOCIALLY SUSTAINABLE POST- DISASTER EMERGENCY SHELTER DESIGN CHECKLIST'S FEATURE	OPPORTUNITIES	THREATS
A1	Being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible	The possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues
A2	Assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist	The difficulty of the data collection process
A3	Helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner	The possibility of drifting away from local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria
A4		
A5	Assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas	The result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking
A6		
A7	Enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards	x

Note: The Post-Disaster Social Sustainable Emergency Shelter checklist, created based on the necessary literature review and observations, has been subjected to a SWOT analysis method to identify its strengths and weaknesses and evaluate opportunities and threats in relation to them.

A1: HEALTHY AND PRODUCTIVE SPACES
A2: SECURITY
A3: FLEXIBILITY
A4: AESTHETICS
A5: ACCESSIBILITY
A6: QUALITY OF LIFE
A7: FUNCTIONALITY AND EFFICIENCY

In accordance with the table previously mentioned, Sankey Diagram was implemented to produce the data below (From up to down: Strengths, Weaknesses, Opportunities, Threats):

The findings obtained from the SWOT analysis for the "HEALTHY AND PRODUCTIVE SPACES" indicator, what can be observed in the Sankey Diagram's tables and flowcharts are the elements that follow:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of making social sustainability testable by clearly defining it, defining social sustainability goals clearly and establishing the criteria and strategies to achieve these goals, and contributing to the evaluation of social sustainability performance and analyzing the positive or negative effects of post-disaster emergency shelters on the community and users.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-components of the issues that the importance weighting of social sustainability indicators may vary for different cultures and geographies, the outcomes of social sustainability efforts can sometimes lead to unexpected reactions or secondary effects, and accurately measuring social sustainability requires an objective assessment due to its complexity and subjective nature.
- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability, assisting in defining specific social sustainability goals and usability in identifying the necessary steps through the use of a checklist, helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.
- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the difficulty of the data collection process, the possibility of drifting away from the

local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

The findings obtained from the SWOT analysis for the "SECURITY" indicator, as indicated in the table and flowchart in the Sankey Diagram, are as follows:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of making social sustainability testable by clearly defining it and defining social sustainability goals clearly and establishing the criteria and strategies to achieve these goals.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-components of the issues that the outcomes of social sustainability efforts can sometimes lead to unexpected reactions or secondary effects - predicting and managing such impacts can be challenging, and accurately measuring social sustainability requires an objective assessment due to its complexity and subjective nature.
- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible, assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist, helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.
- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the

difficulty of the data collection process, the possibility of drifting away from the local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

The findings obtained from the SWOT analysis for the "FLEXIBILITY" indicator, as indicated in the table and flowchart in the Sankey Diagram, are as follows:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of defining social sustainability goals clearly and establishing the criteria and strategies to achieve these goals, and providing the opportunity to communicate with users and share social sustainability efforts and results, thus increasing transparency and facilitating the collection of user feedback.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-component of the issue that accurately measuring social sustainability requires an objective assessment due to its complexity and subjective nature.
- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible, assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist, helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.
- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the

difficulty of the data collection process, the possibility of drifting away from the local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

The findings obtained from the SWOT analysis for the "AESTHETICS" indicator, as indicated in the table and flowchart in the Sankey Diagram, are as follows:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of making social sustainability testable by clearly defining it and providing the opportunity to communicate with users and share social sustainability efforts and results, thus increasing transparency and facilitating the collection of user feedback.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-components of the issues that the weighting of the importance of social sustainability indicators may vary for different cultures and geographies, the factors influencing social sustainability can vary over time - changes in social, economic, and environmental factors can impact social sustainability goals and outcomes, and accurately measuring social sustainability requires an objective assessment due to its complexity and subjective nature.
- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible, assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist, helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.

- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the difficulty of the data collection process, the possibility of drifting away from the local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

The findings obtained from the SWOT analysis for the "ACCESSIBILITY" indicator, as indicated in the table and flowchart in the Sankey Diagram, are as follows:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of defining social sustainability goals clearly and establishing the criteria and strategies to achieve these goals, contributing to the evaluation of social sustainability performance and analyzing the positive or negative effects of post-disaster emergency shelters on the community and users, and providing the opportunity to communicate with users and share social sustainability efforts and results, thus increasing transparency and facilitating the collection of user feedback.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-components of the issue that the outcomes of social sustainability efforts can sometimes lead to unexpected reactions or secondary effects - predicting and managing such impacts can be challenging.
- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible, assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist, helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby

enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.

- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the difficulty of the data collection process, the possibility of drifting away from the local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

The findings obtained from the SWOT analysis for the "QUALITY OF LIFE" indicator, as indicated in the table and flowchart in the Sankey Diagram, are as follows:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of defining social sustainability goals clearly and establishing the criteria and strategies to achieve these goals, and providing the opportunity to communicate with users and share social sustainability efforts and results, thus increasing transparency and facilitating the collection of user feedback.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-components of the issues that the weighting of the importance of social sustainability indicators may vary for different cultures and geographies, and the factors influencing social sustainability can vary over time - changes in social, economic, and environmental factors can impact social sustainability goals and outcomes.
- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible, assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist, helping to present

social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.

- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the difficulty of the data collection process, the possibility of drifting away from the local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

The findings obtained from the SWOT analysis for the "FUNCTIONALITY AND EFFICIENCY" indicator, as indicated in the table and flowchart in the Sankey Diagram, are as follows:

- Contributions to the strengths of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in the areas of making social sustainability testable by clearly defining it, contributing to the collection and analysis of the necessary data to measure social sustainability performance, and providing the opportunity to communicate with users and share social sustainability efforts and results, thus increasing transparency and facilitating the collection of user feedback.
- Contributions to the weaknesses of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of contributing to the sub-components of the issues that the factors influencing social sustainability can vary over time - changes in social, economic, and environmental factors can impact social sustainability goals and outcomes, testing and monitoring social sustainability can be a time-consuming and costly process, and accurately measuring social sustainability requires an objective assessment due to its complexity and subjective nature.

- Contributions to the opportunities under the "Opportunities" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of being a useful tool to guide and focus on social sustainability - especially for providing guidance to newcomers and making steps in this area more accessible, assisting in defining specific social sustainability goals and its usability in identifying the necessary steps through the use of a checklist, helping to present social sustainability goals and how well shelters approach these goals from a design perspective in a more transparent manner, assisting in the regular monitoring and evaluation of shelter's social sustainability performance, thereby enabling the faster detection of shortcomings and improvement areas, and enabling designers to compare the social sustainability performance of the emergency shelters they design with industry standards.
- Formation of the sub-components under the "Threats" heading of "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist" in terms of the possibility of designers simplifying the social sustainability checklist as a mere checkbox, resulting in a reductionist approach to complex social issues, the difficulty of the data collection process, the possibility of drifting away from the local context and deviating from social sustainability goals due to efforts focused solely on meeting checklist criteria, and the result of focusing solely on meeting minimum requirements can lead to minimizing risk-taking.

Considering an examination of the seven indicators that were utilized in this research, which are widely mentioned in the literature, it was concluded that each has different strengths and weaknesses concerning "The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist." However, similarities have been identified in the opportunities that may arise and the threats that have emerged, indicating potential coordination among them. After conducting a SWOT analysis of the model created within the scope of The Socially Sustainable Post-Disaster Emergency Shelter Design Checklist, its strengths and weaknesses, as well as threats and opportunities, have been identified.

4.3 Recommendations

According to the results of 5 emergency shelter assessments taken from the Shelter Design Catalogue published by UNCHR in 2016, the evaluations according to the percentage results of the social sustainability checklist are included in the previous section. Based on this, in general, all Shelter designs seem to be missing from the Security indicator criteria and sub-strategies. In this context, according to the Social Sustainability Checklist created with the help of the Phyton program, as a result of which the Security indicator is mentioned in the literature and the experts' evaluations using the AHP method, the criteria and sub-strategies that designers should take into account within the scope of emergency shelters are displayed beneath (table 25).

The Flexibility indicator and its sub-strategies included in this study also caused incomplete scoring in the 5 shelter sample in general. In this context, the Flexibility indicator in terms of social sustainability, its criteria and sub-strategies are also included as another indicator that should be considered by emergency shelter designers, as a factor affecting scoring in the Social Sustainability Checklist, which is detailed in the previous sections and quantified by various methods. In this context, since the Tuareg Shelter, Tuareg Tent Shelter, Tukul Shelter and Tent Shelter received a score of 0.00, it has been determined that they lack all the strategies mentioned in the table. The strategies missing in the design of the Wooden Gable Frame Emergency Shelter for Flexibility Indicator according to the Social Sustainability Checklist are: Existence of movable walls, existence of movable panels, furniture to be altered, moved, and repositioned, developing a customized functional adaptability strategy for the shelter and delivering this guide to the users. In this booklet, evaluating whether modular usage aspects are clearly expressed, especially in terms of modularity, should be emphasized, and for the newly proposed function, utilizing detachable dividers for 50% of the designed living spaces within the shelter, in an implementable manner.

As a result of the evaluation of the five shelters on the Healthy and Productive Spaces indicator, the Wooden Gable Frame Emergency Shelter received a perfect score, meeting all the strategies. The Tuareg Shelter is the second highest-scoring emergency shelter on the Healthy and Productive Spaces indicator. The strategies it was found lacking in and did not score points for are: Protrusions on the ground floor and Direct

intake of fresh air from the outside of the shelter and from the direction of clean air. Tuareg Tent Shelter's total Healthy and Productive Spaces Indicator score is 12.0817. According to this result, the strategies that the Tuareg Shelter lacks points for on the Social Sustainability checklist are: Direct supply of fresh air from the exterior of the building and from the direction of clean air, The space on the side facing the wind should be wider, Openings that can be opened and closed according to climatic conditions, and using low-emissivity glass in these openings, Direct intake of fresh air from the outside of the shelter and from the direction of clean air, Shaping with the least window area in the east and west directions, Wide eaves, Utilization of horizontal sun control elements on the south facade and vertical sun control elements on the east and west facades, Protrusions on the ground floor, Availability of an information booklet detailing usage specifics and providing sample scenarios for users, Direct accessibility for users to areas, including outdoor spaces, where they can engage in various artistic activities and community-building activities aimed at fostering a sense of community awareness and Presence of a garden area with diverse plant species that will visually attract attention throughout the year, or a veranda area that can be separated from and closed to the shelter as needed, enhancing communal interaction. Tukul Shelter's total Healthy and Productive Spaces Indicator score is 13.714. According to this result, the strategies that the Tukul Shelter lacks points for on the Social Sustainability checklist are: Direct supply of fresh air from the exterior of the building and from the direction of clean air, The space on the side facing the wind should be wider, Openings that can be opened and closed according to climatic conditions, and using low-emissivity glass in these openings, Direct intake of fresh air from the outside of the shelter and from the direction of clean air, Shaping with the least window area in the east and west directions, Wide eaves, Utilization of horizontal sun control elements on the south facade and vertical sun control elements on the east and west facades, Protrusions on the ground floor, Direct accessibility for users to areas, including outdoor spaces, where they can engage in various artistic activities and community-building activities aimed at fostering a sense of community awareness and Presence of a garden area with diverse plant species that will visually attract attention throughout the year, or a veranda area that can be separated from and closed to the shelter as needed, enhancing communal interaction. Tent Shelter's total Healthy

and Productive Spaces Indicator score is 12.0817. According to this result, the strategies that the Tent Shelter lacks points for on the Social Sustainability checklist are: Direct supply of fresh air from the exterior of the building and from the direction of clean air, The space on the side facing the wind should be wider, Openings that can be opened and closed according to climatic conditions, and using low-emissivity glass in these openings, Direct intake of fresh air from the outside of the shelter and from the direction of clean air, Shaping with the least window area in the east and west directions, Wide eaves, Utilization of horizontal sun control elements on the south facade and vertical sun control elements on the east and west facades, Protrusions on the ground floor, Availability of an information booklet detailing usage specifics and providing sample scenarios for users, Direct accessibility for users to areas, including outdoor spaces, where they can engage in various artistic activities and community-building activities aimed at fostering a sense of community awareness and Presence of a garden area with diverse plant species that will visually attract attention throughout the year, or a veranda area that can be separated from and closed to the shelter as needed, enhancing communal interaction.

As a result of the evaluation of the five shelters on the Aesthetics Indicator, the Wooden Gable Frame Emergency Shelter received an almost perfect score. The missing strategy is: In facades where passive solar systems are not utilized, low-emissivity glass should be used. The strategies that the Tuareg Shelter lacks points for under the Aesthetics Indicator are: Having an importance that is associated with the allure of a 'place,' a region, or a city, and can contribute to the well-being level and quality of life of the people living, working, or visiting there, An interior arrangement that steers clear of creating a routine sameness and prevents all spaces from being perceived with identical meanings, Stimulating the interests of individuals at three distinct scales conceptualized as the 'silhouette of the shelter,' the 'mass composition of the shelter area,' and the 'superficial shaping characteristics of the shelter (texture, color, material, etc.),' to evoke engagement, For the northern window, a glass type with a transmittance value between 60% and 85%, For windows facing east and west directions, to mitigate the risk of excessive heating, a glass type with 30% transmittance, In facades where passive solar systems are not utilized, low-emissivity glass should be used. The strategies that the Tuareg Tent and Tent Shelter lack points

for under the Aesthetics Indicator checklist are: Satisfaction with the shelter's facade (Ease of user-initiated modification is important), Having an importance that is associated with the allure of a 'place,' a region, or a city, and can contribute to the well-being level and quality of life of the people living, working, or visiting there, Pursuing an environmental arrangement that supports the cohesion of the local community, An interior arrangement that steers clear of creating a routine sameness and prevents all spaces from being perceived with identical meanings, The significance of the physical elements present in the shelter and how the arrangement of these elements contributes to one's satisfaction, Stimulating the interests of individuals at three distinct scales conceptualized as the 'silhouette of the shelter,' the 'mass composition of the shelter area,' and the 'superficial shaping characteristics of the shelter (texture, color, material, etc.),' to evoke engagement, For the northern window, a glass type with a transmittance value between 60% and 85%, For windows facing east and west directions, to mitigate the risk of excessive heating, a glass type with 30% transmittance, In facades where passive solar systems are not utilized, low-emissivity glass should be used.

Within the context of the Quality of Life indicator and its strategies, the Wooden Gable Frame Emergency Shelter lacks the following strategies: The presence of high-quality indoor, outdoor, and semi-open spaces that can meet people's needs and expectations for work, gathering, meeting, socializing, collective activities, and actions; Providing facilities, both indoor and outdoor, for the future residents and visitors/users of the shelter area; Opportunities for the community/appropriate stakeholders to share the facilities and infrastructure that serve indoor and outdoor spaces for sports facilities, meeting and conference rooms, as well as for staff/visitors; Accessibility to local facilities and service distribution routes, including detailed information about utility channels and infrastructure connections; The presence of a shelter large enough to allow all users to sit outdoors, with the capability to transform into a veranda, creating a semi-open and semi-public space; The presence of semi-open spaces designed to be accessible for all users, including wheelchair users; Designing minimum space requirements for private outdoor areas (accessible only to the shelter's intended users) to be 1.5 m^2 per individual and the presence of a recreational-oriented ground covering or grassy area with physical elements that promote physical activity in the vicinity of the shelter. The Tuareg Emergency Shelter, The Tuareg Shelter and The Tukul

Emergency Shelter lack the following strategies according to the Social Sustainability Checklist: A shelter design that can offer equal quality with flexible minimum standards, accommodating different shelter programs and features based on user group, age group, and income level; The presence of high-quality indoor, outdoor, and semi-open spaces that can meet people's needs and expectations for work, gathering, meeting, socializing, collective activities, and actions; Providing facilities, both indoor and outdoor, for the future residents and visitors/users of the shelter area; Opportunities for the community/appropriate stakeholders to share the facilities and infrastructure that serve indoor and outdoor spaces for sports facilities, meeting and conference rooms, as well as for staff/visitors; Accessibility to local facilities and service distribution routes, including detailed information about utility channels and infrastructure connections; The presence of a shelter large enough to allow all users to sit outdoors, with the capability to transform into a veranda, creating a semi-open and semi-public space; The presence of semi-open spaces designed to be accessible for all users, including wheelchair users; Designing minimum space requirements for private outdoor areas (accessible only to the shelter's intended users) to be 1.5 m^2 per individual and the presence of a recreational-oriented ground covering or grassy area with physical elements that promote physical activity in the vicinity of the shelter. Lastly, within the scope of this indicator, the Tent Shelter lacks the following strategies: A shelter design that can offer equal quality with flexible minimum standards, accommodating different shelter programs and features based on user group, age group, and income level, Providing facilities, both indoor and outdoor, for the future residents and visitors/users of the shelter area, Opportunities for the community/appropriate stakeholders to share the facilities and infrastructure that serve indoor and outdoor spaces for sports facilities, meeting and conference rooms, as well as for staff/visitors, Accessibility to local facilities and service distribution routes, including detailed information about utility channels and infrastructure connections, The presence of a shelter large enough to allow all users to sit outdoors, with the capability to transform into a veranda, creating a semi-open and semi-public space, The presence of semi-open spaces designed to be accessible for all users, including wheelchair users, Designing minimum space requirements for private outdoor areas (accessible only to the shelter's intended users) to be 1.5 m^2 per individual and The

presence of a recreational-oriented ground covering or grassy area with physical elements that promote physical activity in the vicinity of the shelter.

Within the scope of the Functionality and Efficiency indicator, the Wooden Gable Frame Emergency Shelter meets all the strategies. As a result, this emergency shelter's score for this criteria is excellent. Within the scope of the Functionality and Efficiency indicator, the strategies that the Tuareg Shelter lacks points for under the Socially Sustainable Emergency Shelter indicator are: Designing the wet spaces within the shelter to be grouped on the western and eastern facades, where there is a risk of excessive heating, To optimize the use of daylight, directing the living space with high lighting needs towards the north and/or south direction, Designing intermediate spaces that serve as shared areas and allow for various activities to take place, Designing courtyards that can be created by users through the flexibility and modularity of the shelter, affecting its usability and image with activity diversity and social interaction in mind, The presence of accessible information sources and services that can be accessed by everyone and on an equal level at the entrances to the area where shelters are located, Designing shared spaces with a focus on good permeability and transparency, featuring dining areas, shopping, and activities that support social life to revitalize the area and encourage people to use the space, Barrier-free access to the shelter and barrier-free mobility within the shelter/shelter area and Providing versatile spaces, furniture, and equipment that can be used for different activities and determining design features that allow for different activities at different times.

In the Tuareg Tent and Tukul Shelter, it has been observed that there are no analogous approaches under this indicator. These strategies are: Creating a thermal buffer zone by placing non-opening spaces on the northern facade during the design phase, Designing general-use spaces and circulation areas in the southern part of the shelter as thermal collectors and buffer zones, The presence of movable dividers to create thermal buffer zones between spaces with different thermal values, aiming to enhance energy performance and user comfort, Designing the wet spaces within the shelter to be grouped on the western and eastern facades, where there is a risk of excessive heating, Facilitating airflow within the interior through the use of low partition walls, ventilation holes, openings, and staggered floor plans, To optimize the use of daylight, directing the living space with high lighting needs towards the north and/or south

direction, Designing intermediate spaces that serve as shared areas and allow for various activities to take place, Designing courtyards that can be created by users through the flexibility and modularity of the shelter, affecting its usability and image with activity diversity and social interaction in mind, Ensuring ease of access for users and visitors to the shelter area and the shelter itself (accessibility), allowing people to easily enter the shelter area and the shelter (in a narrow sense, accessibility), and enabling people to easily use the desired spaces and services (usability), The presence of accessible information sources and services that can be accessed by everyone and on an equal level at the entrances to the area where shelters are located, Developing an evening culture within the shelter area that promotes mixed-use and enhances the vibrancy of spaces, catering to all age groups, Designing shared spaces with a focus on good permeability and transparency, featuring dining areas, shopping, and activities that support social life to revitalize the area and encourage people to use the space, Providing versatile spaces, furniture, and equipment that can be used for different activities and determining design features that allow for different activities at different times and Ensuring the continuous cleanliness, maintenance, and management of the accessible and usable shelter and shelter area. Lastly, within the scope of the Functionality and Efficiency indicator, the strategic findings that the Tent Shelter lacks are: Creating a thermal buffer zone by placing non-opening spaces on the northern facade during the design phase, Designing general-use spaces and circulation areas in the southern part of the shelter as thermal collectors and buffer zones, The presence of movable dividers to create thermal buffer zones between spaces with different thermal values, aiming to enhance energy performance and user comfort, Designing the wet spaces within the shelter to be grouped on the western and eastern facades, where there is a risk of excessive heating, Facilitating airflow within the interior through the use of low partition walls, ventilation holes, openings, and staggered floor plans, To optimize the use of daylight, directing the living space with high lighting needs towards the north and/or south direction, Designing courtyards that can be created by users through the flexibility and modularity of the shelter, affecting its usability and image with activity diversity and social interaction in mind, Ensuring ease of access for users and visitors to the shelter area and the shelter itself (accessibility), allowing people to easily enter the shelter area and the shelter (in a narrow sense, accessibility), and enabling

people to easily use the desired spaces and services (usability), The presence of accessible information sources and services that can be accessed by everyone and on an equal level at the entrances to the area where shelters are located, Developing an evening culture within the shelter area that promotes mixed-use and enhances the vibrancy of spaces, catering to all age groups, Providing versatile spaces, furniture, and equipment that can be used for different activities and determining design features that allow for different activities at different times and Ensuring the continuous cleanliness, maintenance, and management of the accessible and usable shelter and shelter area.

CHAPTER 5

CONCLUSION AND FUTURE WORKS

5.1 Conclusion

Sustainable development, in its most basic sense, can be defined as developments that meet today's needs without compromising the capacity of future generations to meet their own needs. This concept includes the non-absolute limitations arising from the capacity of the environment and resources, influenced by current technologies and social organization, to meet human activities and regenerate themselves. By definition, the philosophy of sustainability demands an extensive point of view that takes consideration of the effects on the environment, the economy, and humanity. This encompasses approaches to creating environmentally conscious, equally healthy, as well as effective configurations. The three-pillar conceptualization of sustainability (environmental, social, and economic) is widely accepted in the literature. In the post-World War II context, while the sustainability of economic development was recognized as the main instrument of development in the central countries, by the late 1960s and early 1970s, the Western world witnessed the rise of modern environmental movements, and the dominance of economic development in sustainability began to be questioned with environmental criticisms. During the 1980s, social-focused criticisms, which had been somewhat suppressed, joined the ecological critiques of economic development under the new agenda to be called 'sustainable development', continuing to progress intertwined with economic development. Today, social sustainability, a component of this tripartite structure, has increasingly gained influence in the fields of housing, urban planning, architecture, and urban policy since the 1990s.

Design systems that emerged to meet sustainable construction needs and implement them initially focused on physical and environmental criteria such as resource usage, ecological burden, and the environmental quality of interiors. However, how sustainability can be evaluated and which criteria should be considered is a subject of ongoing debate and development. After the energy crisis of the 1970s, energy

consumption became the main criterion in evaluations under sustainability. In subsequent studies, the concept of sustainable construction has expanded to include not only energy consumption, but also the selection of appropriate materials, sustainable land development, and indoor life quality from environmental and physical perspectives. Today, assessment systems such as the Leadership in Energy & Environmental Design (LEED), BRE Environmental Assessment Method (BREEAM), and their derivatives, along with the Australian Green Building Council's GREENSTAR, the National Australian Building Environmental Rating System (NABERS), and the Nationwide House Energy Rating Scheme (NATHERS) are available. These systems enable designers to measure the sustainability of their designs in terms of two of the three pillars of sustainability (economic and environmental), helping them achieve their goals of delivering sustainable design to users. At this point, the fact that social sustainability is measurable in qualitative terms and varies depending on the user causes it to remain in the background, which hinders the full realization of sustainability. The reason why social sustainability, which is extensively defined and researched in the literature, is overlooked by designers is due to its low potential for measurability within the scope of sustainability.

Disasters, which are natural events, create significant negative impacts on the user, namely the human, who is the main subject of social sustainability. One of the main issues that emerge after a disaster is the act of providing shelter. Emergency sheltering is used during the post-disaster phase. Today, the traditional tent-type shelters in use cannot meet humanitarian needs and only provide short-term accommodation. Disaster victims or refugees who are left homeless are forced to live in substandard conditions in these shelters due to their prolonged use. The economic feasibility of emergency shelters used today is of great importance to institutions. Regarding this issue, many international aid organizations, universities, or architects are conducting research and developing alternative projects. The general aim of these studies is to meet the shelter needs of homeless people within certain standards. In this thesis, the results obtained from the model were discussed with experts working at the Republic of Türkiye's Disaster and Emergency Management Presidency (AFAD), and the consistency of the results was thus confirmed by these experts. However, it was emphasized that

economic factors such as transportation and storage should not be overlooked in any design that is created.

The thesis recommends developing a model that includes social sustainability indicators in the development of emergency shelters after a disaster. The following would allow for the rigorous and quantitative acquisition of specific data on social sustainability. This approach is intended to improve social sustainability simpler to measure while providing designers exact goals.

The indicators evaluated in this study are Security, Flexibility, Healthy and Productive Spaces, Aesthetics, Quality of Life, and Functionality and Efficiency. These indicators were chosen to assess the social sustainability aspects of emergency shelter designs comprehensively. In addition to these, there are also less measurable indicators such as Equality and Justice, which, while challenging to quantify, play an essential role in promoting inclusivity and fairness within emergency shelters. Social sustainability is a broad and inclusive concept that encompasses various parameters. Due to its complexity, aspects like justice and social equality, which are currently challenging to quantify, have the potential to become measurable parameters in future studies. As research progresses, these factors could be systematically integrated into social sustainability assessments, contributing to a more comprehensive evaluation framework.

The assessment of these indicators through AHP (Analytic Hierarchy Process) and expert opinions enhances the measurability of social sustainability. This approach allows for a structured evaluation of each indicator, providing a more comprehensive understanding of their impact and importance in emergency shelter design.

Based on the results of the case study conducted in this thesis, the assessment of five emergency shelter units using the Social Sustainability Checklist reveals several critical areas for improvement, particularly concerning the Security and Flexibility indicators. Most shelter designs demonstrated a lack of strategies aimed at enhancing user safety, highlighting the importance of incorporating essential sub-strategies to ensure security in emergency situations. The analysis also showed significant gaps in flexibility strategies, such as movable walls and modular usage features, which would provide functional adaptability and enhance the user experience. Furthermore, while

the Wooden Gable Frame Emergency Shelter performed well in meeting the criteria for Healthy and Productive Spaces, other shelters lacked key features such as adequate ventilation, natural light optimization, and communal spaces that promote social interaction. In terms of the Aesthetics and Quality of Life indicators, most shelters were found to lack elements that could enhance the sense of place and community well-being. Within the scope of the Functionality and Efficiency indicators, many shelters could benefit from improvements in thermal design, accessibility, and multi-functional spaces. These findings suggest that more comprehensive integration of these strategies into emergency shelter designs can significantly contribute to creating safer, adaptable, and socially sustainable living environments for displaced populations.

In conclusion, the critical analysis of the impact of disasters on social sustainability underscores the urgent need for improved post-disaster emergency shelters. Traditional designs often fall short, leading to inadequate living conditions that compromise the well-being of affected communities. The findings from literature review highlight a significant gap: social sustainability indicators, particularly security, are frequently overlooked by designers in the development of these shelters. This thesis proposes a model that integrates essential social sustainability indicators into the design process of post-disaster shelters, enhancing their measurability and ultimately fostering a sense of belonging for users. The expert validation of new developed model confirms its effectiveness, while also stressing the importance of considering economic factors in achieving sustainable solutions. Lastly, the thesis explored methods for effectively measuring social sustainability within shelter design, utilizing tools like the Social Sustainability Checklist, AHP, and expert evaluations. These methods aim to promote community interaction and strengthen social networks among displaced populations. By addressing these questions, this study contributes to a more holistic understanding of socially sustainable shelter design, laying the groundwork for future improvements in emergency response and community resilience.

5.2 Opportunities for Future Works

This thesis establishes a foundation for understanding social sustainability in emergency shelter design; however, there are further areas to explore to enhance the resilience and well-being of post-disaster communities. Future research could focus on testing the proposed model across different cultural and geographical contexts, expanding the range of indicators to capture diverse community needs. Additionally, integrating advanced technologies and innovative materials into shelter design could provide new perspectives, supporting more adaptive and socially sustainable solutions. By incorporating concepts of locality and social justice-equity into internationally recognized sustainable building certification systems, where economic and environmental sustainability measurements are clarified with detailed criteria and strategies, measurable social sustainability strategies could be developed not only for shelters but also for various building types. This would contribute to developing a well-defined, measurable field of social sustainability within the literature.

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APPENDICES

Appendix A: Results of Ahp Evaluation of Experts

Appendix B: Graphs of Ahp Evaluations

Appendix C: Social Sustainability Results of Unchr Emergency Shelters According to the New Developed Model

Appendix D: The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

Appendix E: Sankey Diagram for SWOT Analysis

Appendix A: Results of Ahp Evaluation of Experts

Table A.1. Result of AHP Evaluation of Experts- Answers of Experts

Please compare functionality and health & productivity indicators (1-3-5-7-9)	Please compare functionality and Quality of Life (1-3-5-7-9)	Please compare functionality and Security (1-3-5-7-9)	Please compare functionality and Accessibility (1-3-5-7-9)	Please compare functionality and Flexibiltiy (1-3-5-7-9)	Please compare functionality and Aesthetics (1-3-5-7-9)
5	3	7	7	3	3
5	8	5	1	2	4
7	7	7	5	3	7
6	7	7	5	5	4
3		1	1	1	1
5	5	5	9		5
7	3	8	5	4	3
9	9	9	7	3	3
10	1	1	5	10	10
9	3	3	3	3	3
7	3	7	3	3	1
4	3	4	6	9	4
3	4	4	7	4	7
	5	6	6	6	7
5	5	4	2	3	5
5	3	1	3	3	1
7	7	4	5	7	5
5	5	5	6	5	5
10	5	9	7	3	4
5	5	7	5	3	1
	7	7	7		
10	1	1	1	1	1
5	5	5	5	2	2
10	1	1	1	1	1
6	4	4	5	4	4
6	6	6	6	6	6
5	5	5	5	5	5
5	5	5	5	5	5
5	5	5	5	5	5
5	5	5	6	5	5
5	5	5	5	5	5
5	5	5	6	5	5
4	5	4	4	6	4
5	6	5	6	6	5
6	5	5	6	6	5
5	5	6	4	5	5
5	5	4	5	5	5
5	5	6	4	5	5
5	5	5	5	5	5
5	5	5	5	6	5
5	5	5	5	5	6
1	1	1	1	1	1
7	7	1	6	5	2
2	7	7	1	4	5
1	9	1	1	10	1
1	1	1	1	4	1

Table A.1. (continued): Result of AHP Evaluation of Experts- Answers of Experts

Please compare health & productivity and quality of life (1-3-5-7-9)	Please compare health & productivity and Security (1-3-5-7-9)	Please compare health & productivity and accessibility (1-3-5-7-9)	Please compare health & productivity and flexibility (1-3-5-7-9)	Please compare health & productivity and aesthetics (1-3-5-7-9)	Please compare quality of life and security (1-3-5-7-9)
5	9	9	7	5	9
3	4	3	3	4	2
7	5	5	3	3	7
7	6	5	5	4	4
	8	1	1	7	8
7	7	7	7	5	7
9	6	8	1	5	7
3	9	1	3	3	9
1	1	6	5	5	1
7	3	7	3	3	3
3	5	3	1	1	9
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4	6	7	4	7	7
	9	5	8	5	9
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7	5	5	5	3	5
7	5	3	4	7	5
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3	5	3	1	1	10
1	5	1	3	3	3
		3		3	7
1	1	1	1	1	1
5	5	5	5	3	5
1	1	1	1	1	10
6	5	5	5	5	3
6	5	5	6	7	6
5	5	5	5	5	5
5	5	5	5	5	5
5	6	6	6	5	6
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6	5	5	6	6	6
5	6	7	5	5	6
7	6	5	5	4	6
5	5	6	5	6	7
5	5	5	6	5	5
5	6	5	6	6	7
5	5	5	5	5	5
5	5	5	5	5	5
4	4	8	5	5	5
	1	1	1	1	1
4	4	4	2	5	4
4	8	7	6	6	8
4	7	5	4	1	9
1	1	2	10	1	1

Table A.1. (continued): Result of AHP Evaluation of Experts- Answers of Experts

Please compare quality of life and accessibility (1-3-5-7-9)	Please compare quality of life and flexibility (1-3-5-7-9)	Please compare quality of life and aesthetics (1-3-5-7-9)	Please compare security and accessibility (1-3-5-7-9)	Please compare security and aesthetics (1-3-5-7-9)	Please compare accessibility and flexibility (1-3-5-7-9)	Please compare accessibility and aesthetics (1-3-5-7-9)	Please compare flexibility and aesthetics (1-3-5-7-9)
9	9	5	7	3	3	3	3
	1	2	3	2	4	3	5
5	3	3	5	3	3	7	7
9	4	4	5	2	4	4	5
1	7	1	4		1	1	1
9	7	9	7	10	7	7	9
5	1	1	1	1	5	5	7
3	3	3	3	3	3	5	3
5	6	5	7	6	5	5	6
3	3	4	9	3	9	5	3
3	3	1	3	1	3	3	3
7	6	6	9	6	5	3	5
7	3	7	3	4	4	4	4
9	6	6	8	8	7	7	10
1	4	5	3	4	4	6	8
3	1	1	3	3	3	3	3
4	5	3	5	3	5	5	5
5	6	5	6	5	5	5	5
5	4	7	5	1	4	5	8
5	3	3	3	1	3	3	3
7	7	5			7	7	
1	1	1	1	1	1	1	1
5	4	1	5	1	3	1	2
10	2	1	10	1	1	1	1
7	5	5	5	4	5	5	4
6	6	6	6	6	6	6	6
5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5
5	4	5	5	5	5	5	5
5	5	5	6	5	5	5	5
6	6	5	6	5	5	5	5
7	5	6	5	6	7	4	6
6	6	6	6	6	6	4	5
5	5	5	6	5	5	5	6
5	5	5	6	7	5	4	3
6	5	6	5	5	5	5	5
6	5	6	7	5	6	6	5
5	5	5	5	5	5	5	6
5	5	5	5	5	5	6	5
5	5	3	4	5	5	7	5
1	1		1	1	1	1	1
8	7	5	1	3	8	4	3
7	1	2	6	5	1	4	1
7	4	6	9	1	6	1	5
1	1	1	2	6	2	1	4

Appendix B: Graphs of AHP Evaluations

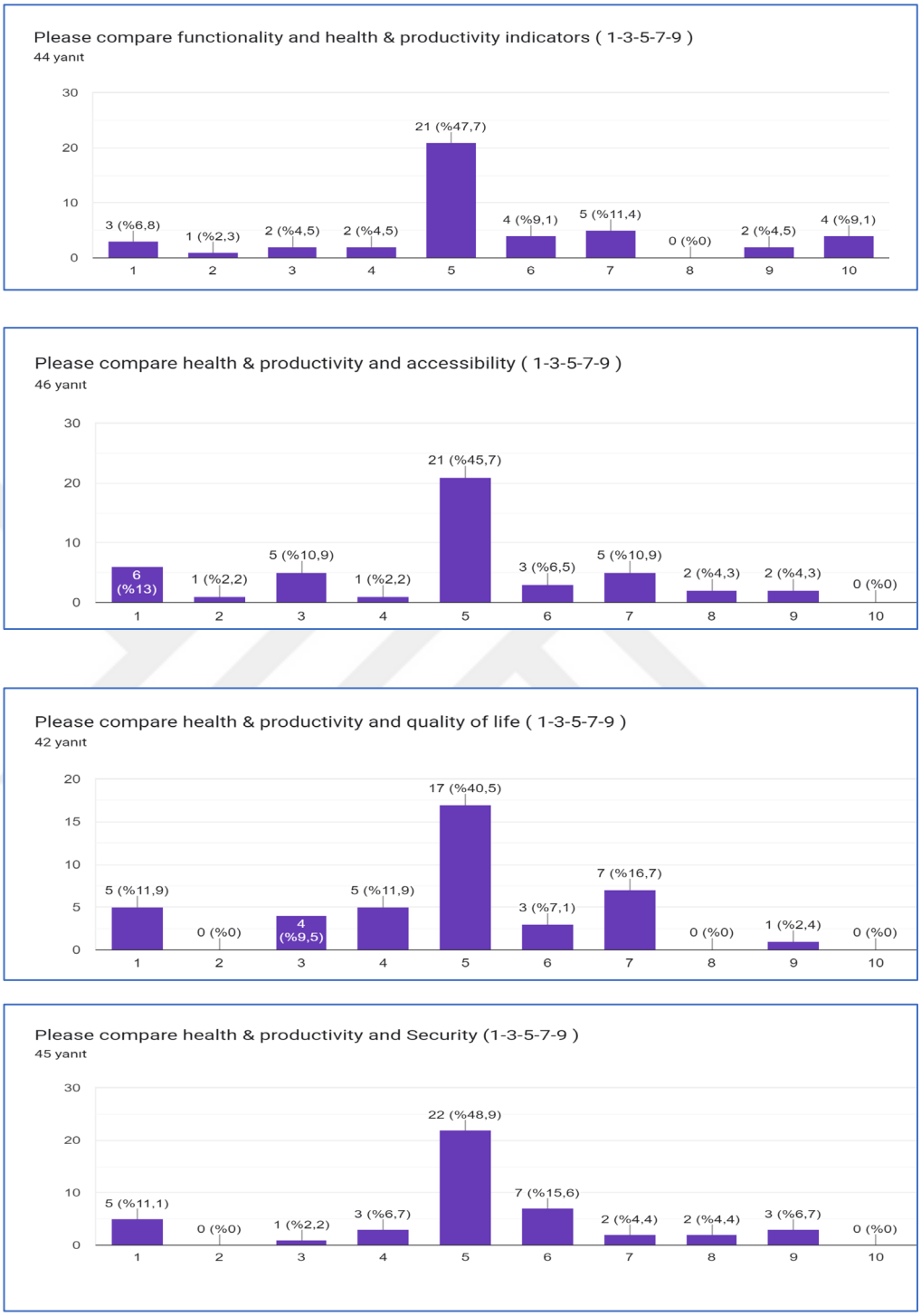
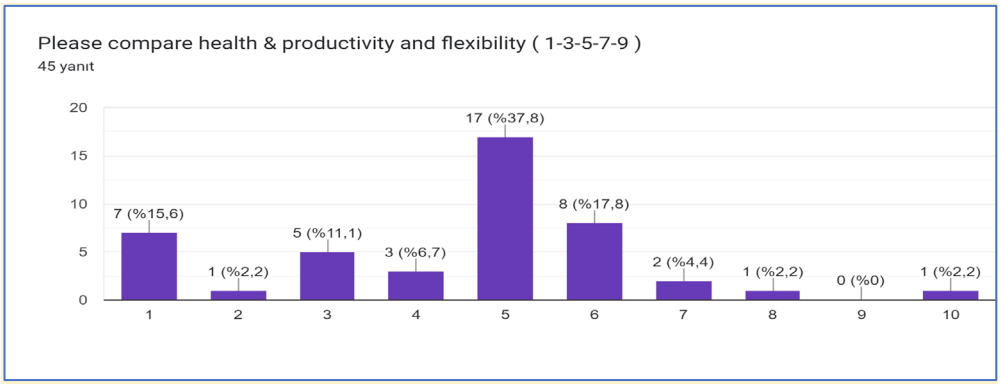
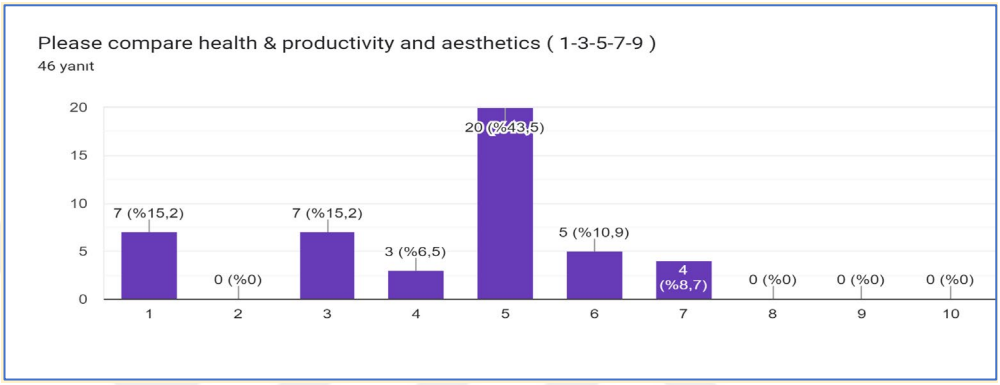
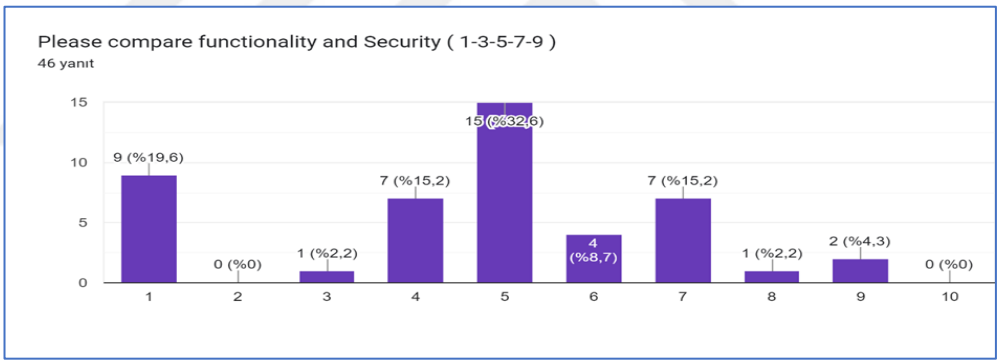


Figure B.1. Evaluation Diagrams of Social Sustainability Indicators







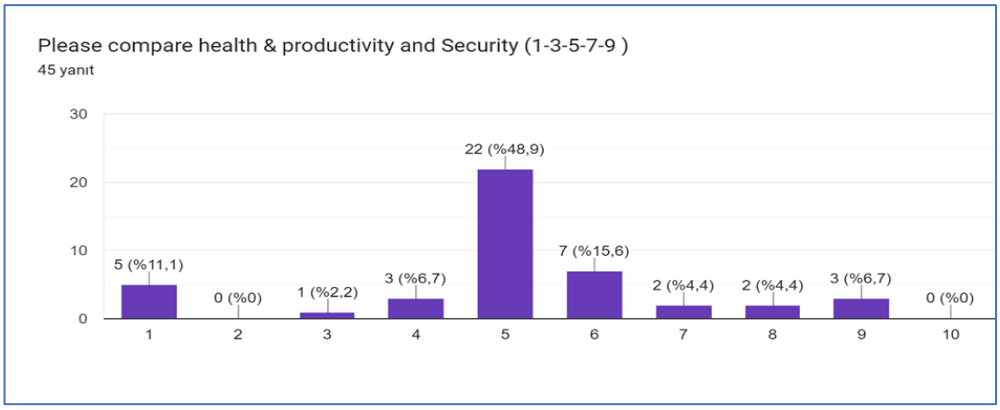
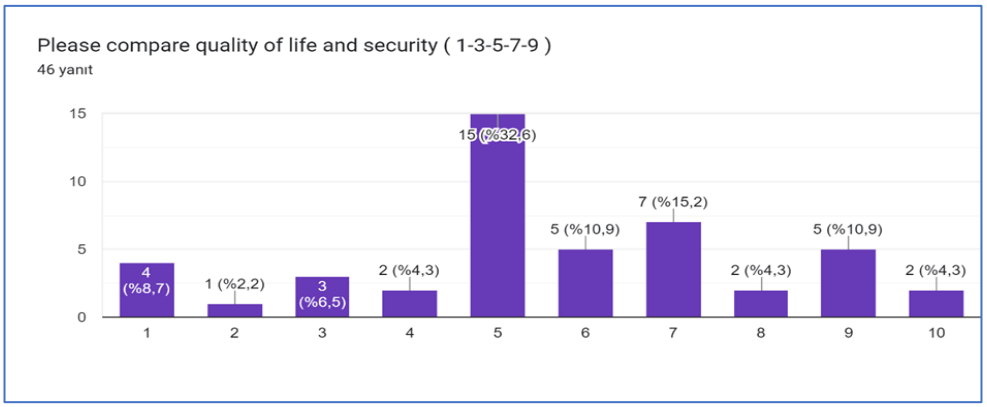
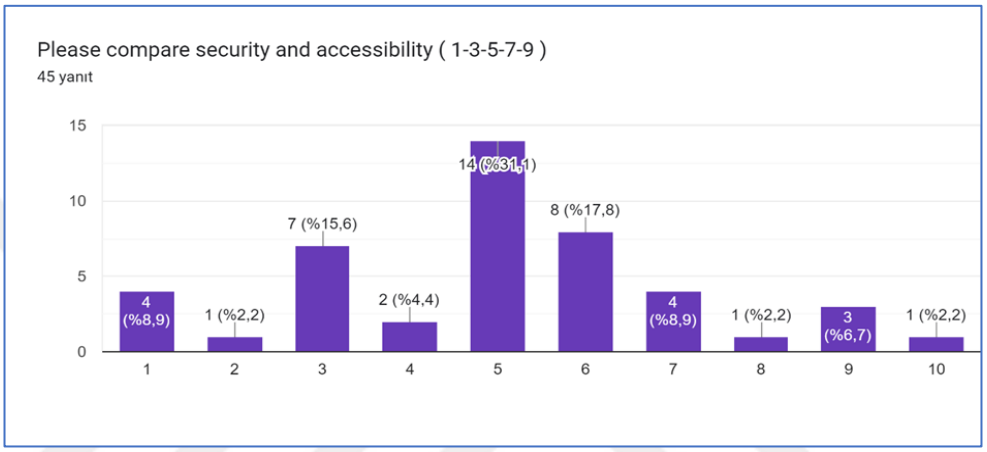
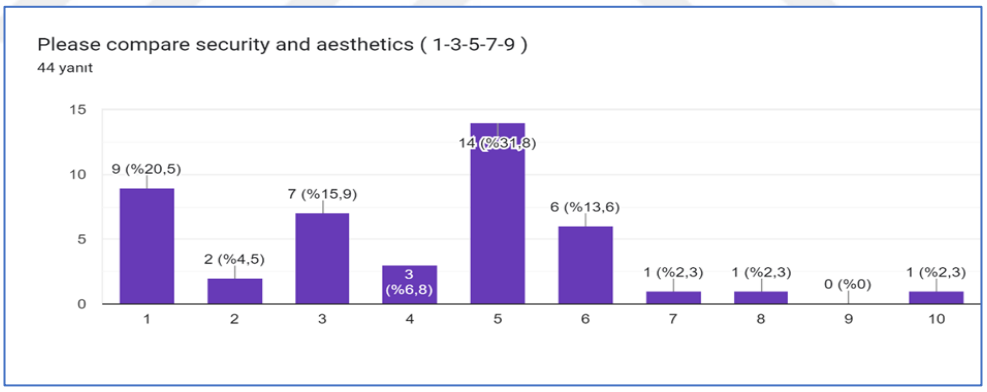


Figure B.1. (continued): Evaluation Diagrams of Social Sustainability Indicators







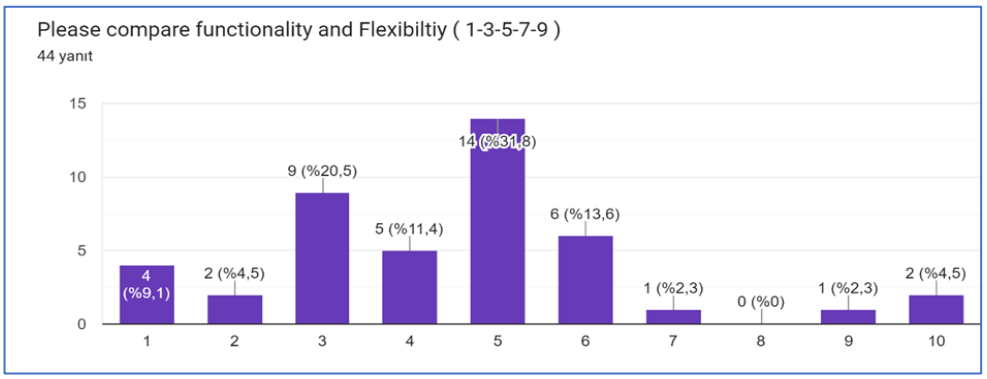


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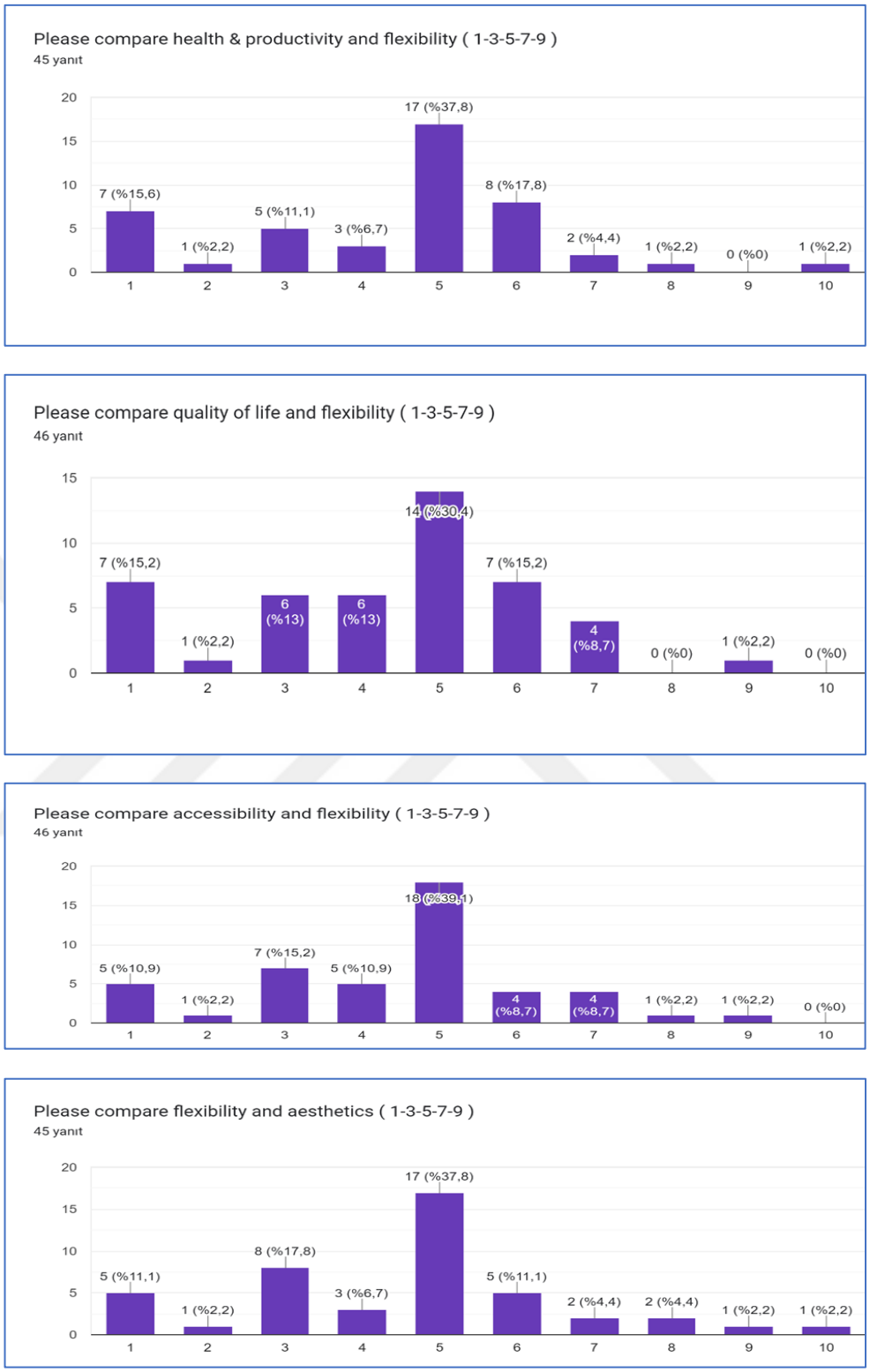


Figure B.1. (continued) Evaluation Diagrams of Social Sustainability Indicators

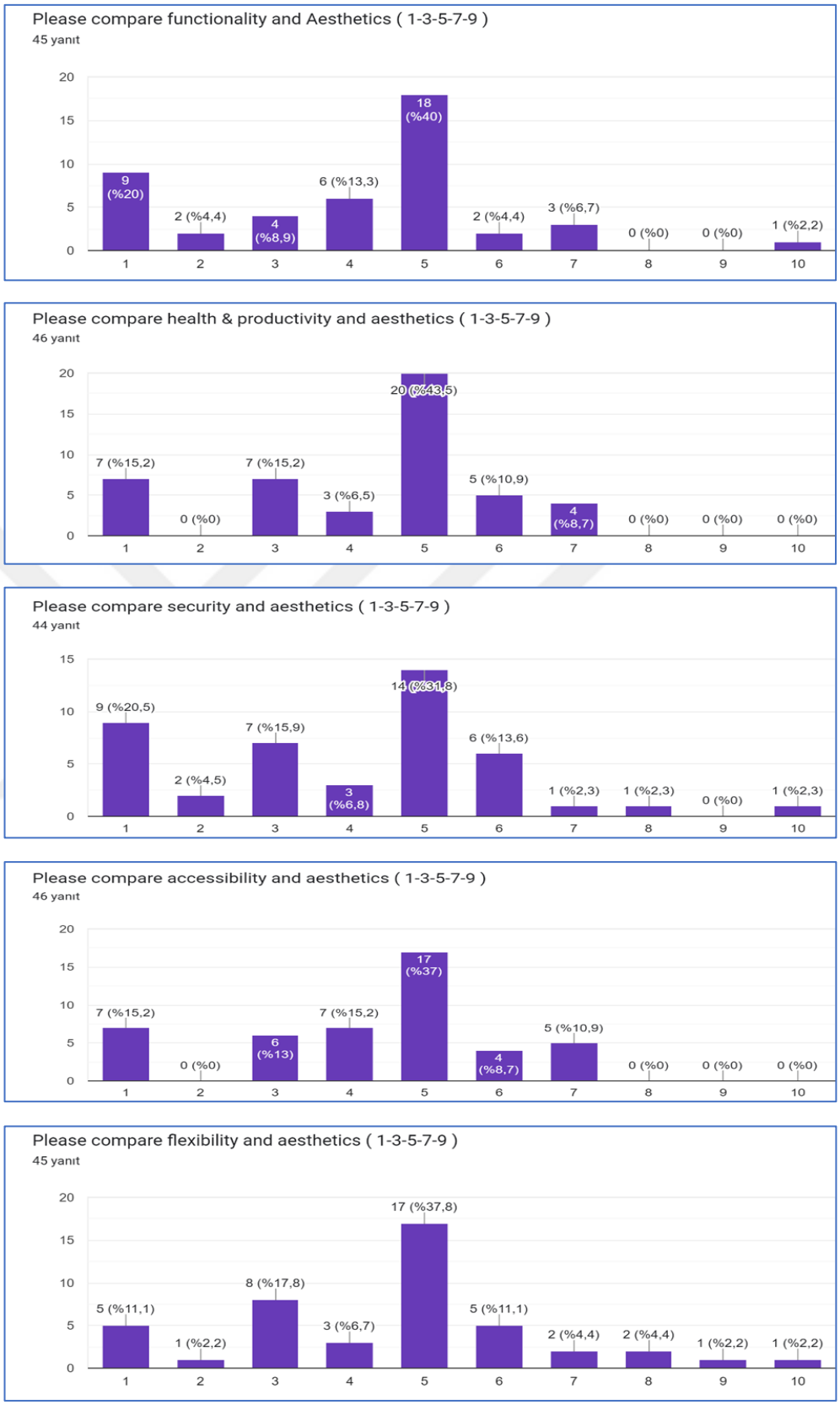


Figure B.1. (continued) Evaluation Diagrams of Social Sustainability Indicators

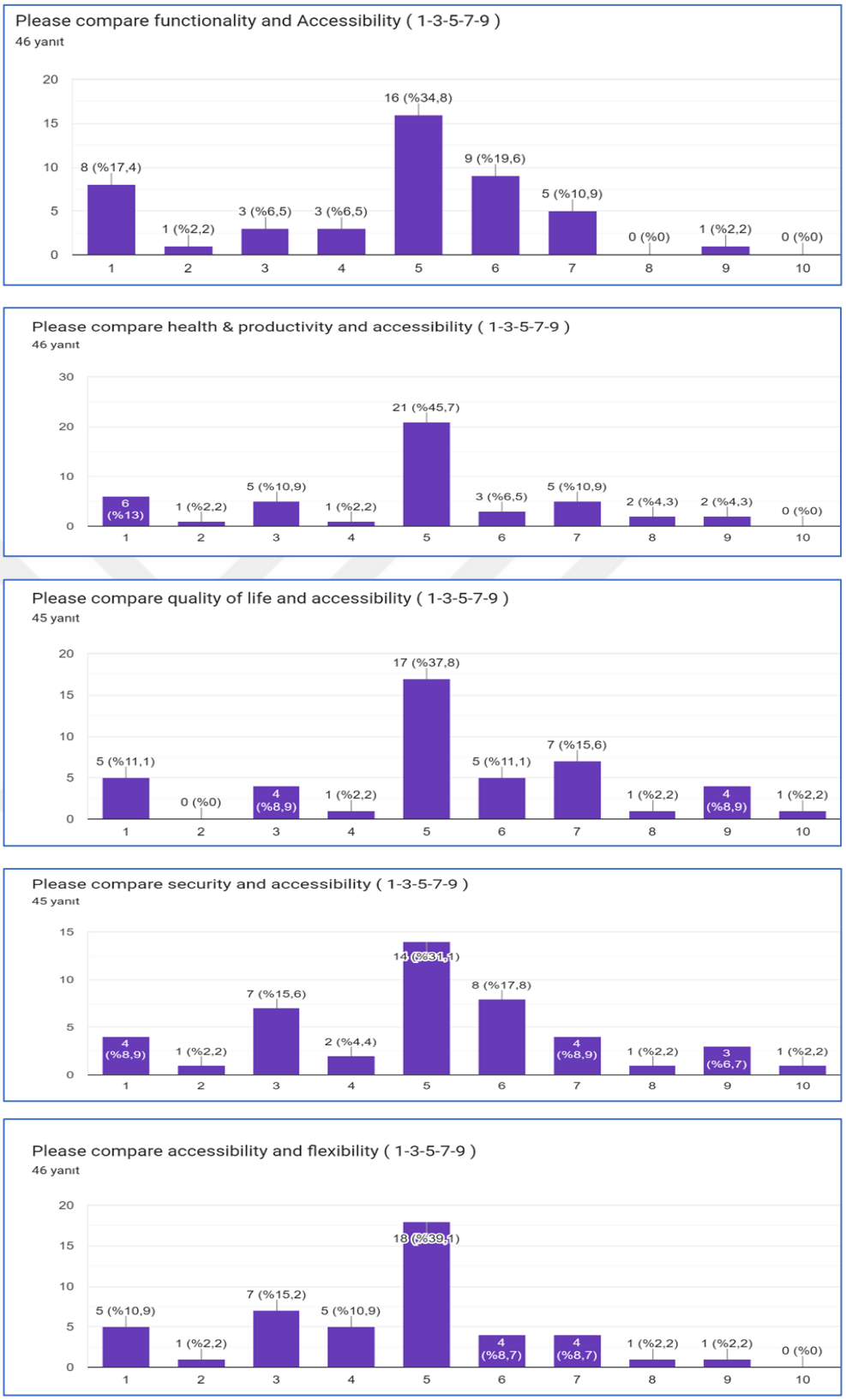


Figure B.1. (continued) Evaluation Diagrams of Social Sustainability Indicators



Figure B.1. (continued) Evaluation Diagrams of Social Sustainability Indicators

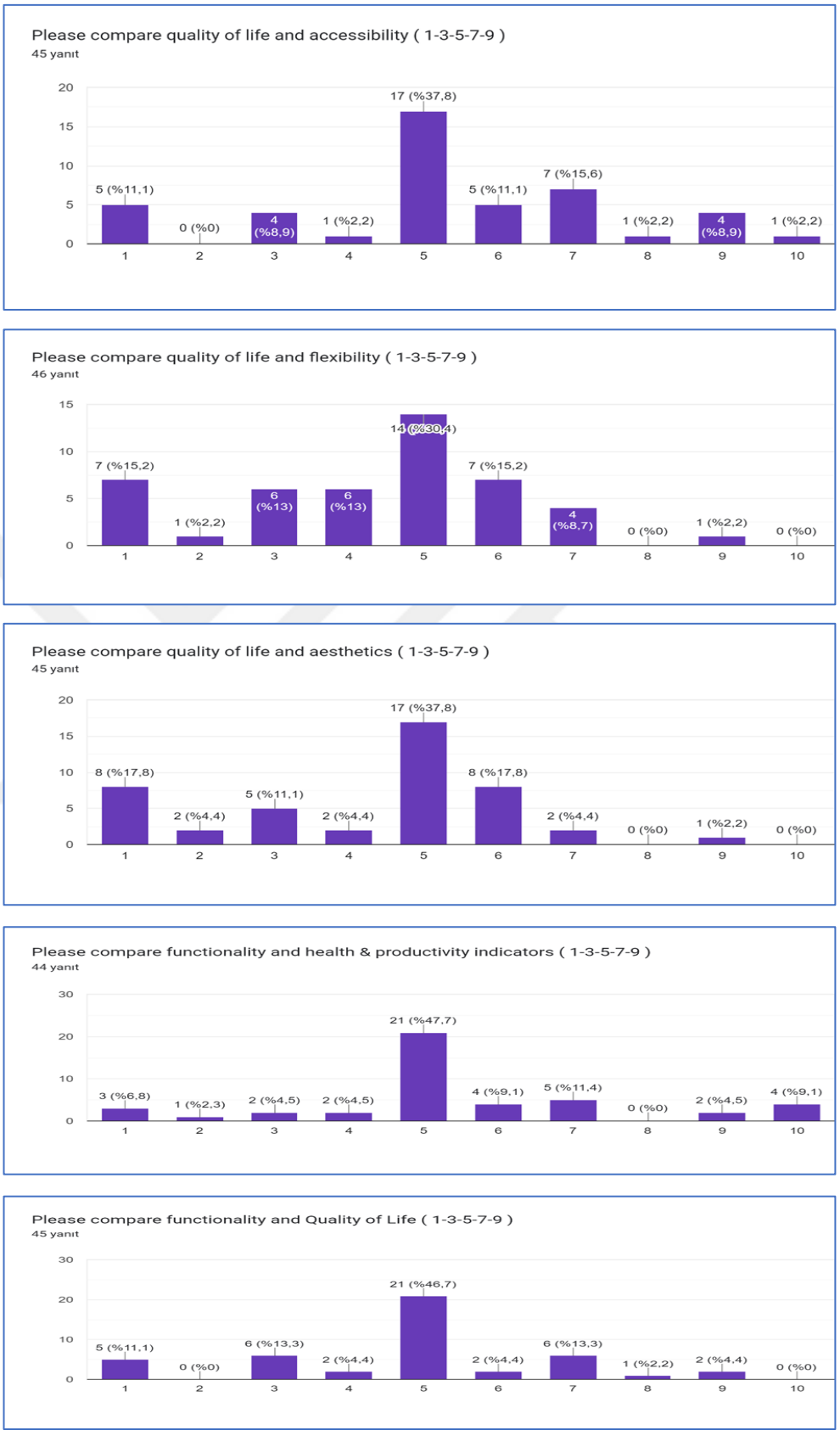


Figure B.1. (continued) Evaluation Diagrams of Social Sustainability Indicators

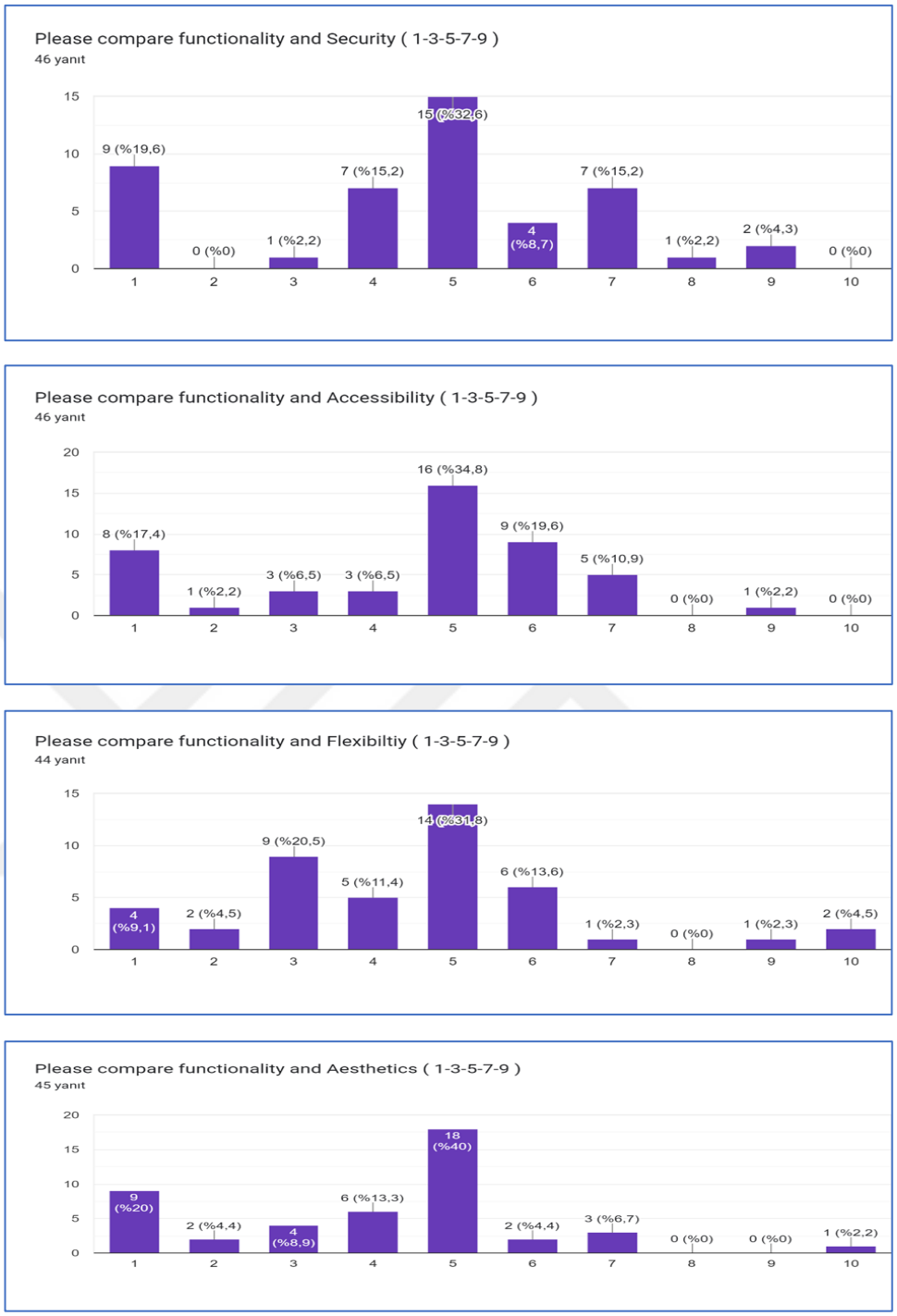


Figure B.1. (continued) Evaluation Diagrams of Social Sustainability Indicators

Appendix C: Social Sustainability Results of UNCHR Emergency Shelters According to the New Developed Model

Table C.1. Social Sustainability Results of UNCHR Emergency Shelters

		WOOD. GAB.FRA. SHEL.	TUAR. SHEL.	TUAR. TENT	TUK. SHEL.	TENT SHEL.	POINT
PURPOSE:HEALTHY AND PRODUCTIVE SPACES (24.49)							
CRI.	**STR.**						
1.1.	**1.1.1**	+	+	-	-	-	0,81633
	1.1.2	+	+	-	-	-	0,81633
	1.1.3	+	+	+	+	+	0,81633
	1.1.4	+	+	+	+	+	0,81633
	1.1.5	+	+	-	-	-	0,81633
	1.1.6	+	+	-	-	-	0,81633
1.2.	**1.2.1**	+	+	-	-	-	0,81633
	1.2.2	+	+	-	-	-	0,81633
	1.2.3	+	+	-	-	-	0,81633
	1.2.4	-	-	-	-	-	0,81633
	1.2.5	+	+	+	+	+	0,81633
	1.2.6	+	+	+	+	+	0,81633
1.3.	**1.3.1**	+	+	+	+	+	1,2245
	1.3.2	+	+	+	+	+	1,2245
	1.3.3	+	+	+	+	+	1,2245
	1.3.4	+	+	+	+	+	1,2245
1.4.	**1.4.1**	+	+	+	+	+	0,9796
	1.4.2	+	+	+	+	+	0,9796
	1.4.3	+	+	+	+	+	0,9796

Table C.1. (continued): Social Sustainability Results of UNCHR Emergency Shelters

	1.4..4	+	+	+	+	+	**0,9796**
	1.4.5	+	+	+	+	+	0,9796
1.5.	**1.5.1**	+	+	-	+	-	1,633
	1.5.2	+	+	-	-	-	1,633
	1.5.3	+	-	-	-	-	1,633
Sub-total:		**24.49**	**22,0406**	**12,0817**	**13,714**	**12,081**	**24.49**
PURPOSE: SECURITY (7.76%)							
2.1.	**2.1.1**	+	-	-	-	-	1.94
2.2.	**2.2.1**	-	-	-	-	-	0.97
	2.2.2	-	-	-	-	-	0.97
2.3	**2.3.1**	-	-	-	-	-	0,388
	2.3.2	-	-	-	-	-	0,388
	2.3.3	+	-	+	+	+	0,388
	2.3.4	-	-	-	-	-	0,388
	2.3.5	-	-	-	-	-	0,388
2.4	**2.4.1**	-	-	-	-	+	0,485
	2.4.2	-	-	-	-	-	0,485
	2.4.3	+	-	-	-	-	0,485
	2.4.4	-	-	-	+	+	0,485
Sub-total:		**2,813**	**0,00**	**0,388**	**0,873**	**1,358**	**7,76**
PURPOSE:FLEXIBILITY (4.90%)							
3.1	**3.1.1**	-	-	-	-	-	0.81666667
	3.1.2	-	-	-	-	-	0.81666667
	3.1.3	-	-	-	-	-	0.81666667

Table C.1. (continued): Social Sustainability Results of UNCHR Emergency Shelters

3.2	**3.2.1**	+	-	-	-	-	**0.40833333**
	3.2.2	+	-	-	-	-	0.40833333
	3.2.3	-	-	-	-	-	0.40833333
	3.2.4	-	-	-	-	-	0.40833333
3.2	**3.2.5**	+	-	-	-	-	0.40833333
	3.2.6	+	-	-	-	-	0.40833333
Sub-total:		**1,6333332**	**0,00**	**0,00**	**0,00**	**0,00**	**4,90**
PURPOSE: AESTHETICS (2.46%)							
4.1	**4.1.1**	+	+	+	+	+	0,17571429
	4.1.2	+	+	-	+	-	0,17571429
	4.1.3	+	-	-	-	-	0,17571429
	4.1.4	+	+	-	-	-	0,17571429
	4.1.5	+	-	-	-	-	0,17571429
	4.1.6	+	+	-	-	-	0,17571429
	4.1.7	+	-	-	-	-	0,17571429
4.2	**4.2.1**	+	+	+	+	+	0,3075
	4.2.2	+	-	-	-	-	0,3075
	4.2.3	+	-	-	-	-	0,3075
	4.2.4	-	-	-	-	-	0,3075
Sub-total:		**2,1525**	**1,01035**	**0,48321**	**0,65892**	**0,48321**	**2,46**
PURPOSE: ACCESSIBILITY (4.90%)							
5.1	**5.1.1**	+	+	+	+	+	0,616
5.2	**5.2.1**	+	+	-	-	-	0,1232
	5.2.2	-	-	-	-	+	0,1232
	5.2.3	-	-	-	-	-	0,1232

Table C.1. (continued): Social Sustainability Results of UNCHR Emergency Shelters

	5.2.4	+	-	-	-	-	**0,1232**
	5.2.5	+	-	-	-	-	0,1232
5.3	**5.3.1**	+	-	+	-	+	0,077
	5.3.2	+	+	+	+	+	0,077
	5.3.3	-	-	-	-	-	0,077
	5.3.4	-	-	-	+	+	0,077
	5.3.5	+	-	-	-	-	0,077
	5.3.6	+	+	+	+	+	0,077
	5.3.7	+	+	-	-	-	0,077
	5.3.8	+	+	-	-	-	0,077
5.4	**5.4.1**	+	+	-	+	+	0,1026667
	5.4.2	+	+	+	+	+	0,1026667
	5.4.3	+	+	+	+	+	0,1026667
	5.4.4	+	+	-	-	-	0,1026667
	5.4.5	+	+	+	+	+	0,1026667
	5.4.6	+	-	-	-	-	0,1026667
5.5	**5.5.1**	-	-	-	-	-	0,20533
	5.5.2	-	-	-	-	-	0,20533
	5.5.3	-	-	-	-	-	0,20533
5.6	**5.6.1**	-	-	-	-	-	0,20533
	5.6.2	-	-	-	-	-	0,20533
	5.6.3	-	-	-	-	-	0,20533
5.7	**5.7.1**	-	-	-	-	-	0,308

Table C.1. (continued): Social Sustainability Results of UNCHR Emergency Shelters

	5.7.2	-	-	-	-	-	**0,308**
5.8	**5.8.1**	-	-	-	-	-	0,20533
	5.8.2	-	-	-	-	-	0,20533
	5.8.3	-	-	-	-	-	0,20533
5.9	**5.9.1**	-	-	-	-	-	0,20533
	5.9.2	-	-	-	-	-	0,20533
	5.9.3	-	-	-	-	-	0,20533
5.10	**5.10.1**	-	-	-	-	-	0,308
	5.10.2	-	-	-	-	-	0,308
Sub-total:		**2,063600**	**1,56053**	**1,15500**	**1,25766**	**1,45786**	**4,90**
PURPOSE: QUALITY OF LIFE (15.46%)							
6.1	**6.1.1**	+	-	-	-	-	3,865
6.2	**6.2.1**	-	-	-	-	+	1,9325
	6.2.2	+	+	+	+	+	1,9325
6.3	**6.3.1**	-	-	-	-	-	1,28833
	6.3.2	-	-	-	-	-	1,28833
	6.3.3	-	-	-	-	-	1,28833
6.4	**6.4.1**	-	-	-	-	-	0,96625
	6.4.2	-	-	-	-	-	0,96625
	6.4.3	-	-	-	-	-	0,96625
	6.4.4	-	-	-	-	-	0,96625
Sub-total:		**5,7975**	**1,9325**	**1,9325**	**1,9325**	**3,865**	**15,46**
PURPOSE: FUNCTIONALITY AND EFFICIENCY (38.78%)							
7.1	**7.1.1**	+	+	-	-	-	1,29266667
	7.1.2	+	+	-	-	-	1,29266667

Table C.1. (continued): Social Sustainability Results of UNCHR Emergency Shelters (continued)

	7.1.3	+	+	-	-	-	**1,29266667**
	7.1.4	+	-	-	-	-	1,29266667
	7.1.5	+	+	-	-	-	1,29266667
	7.1.6	+	-	-	-	-	1,29266667
7.2	**7.2.1**	+	-	-	-	+	1,939
	7.2.2	+	-	-	-	-	1,939
	7.2.3	+	+	-	-	-	1,939
	7.2.4	+	-	-	-	-	1,939
7.3	**7.3.1**	+	+	-	-	-	3,878
	7.3.2	+	-	-	-	+	3,878
7.4	**7.4.1**	+	-	+	+	+	3,878
	7.4.2	+	-	-	-	-	3,878
7.5	**7.5.1**	+	+	-	-	-	7,756
Sub-total:		**38,78**	**18,7436**	**3,878**	**3,878**	**9,695**	**38,78**
GRAND TOTAL		**69,1665**	**46,611**	**20,813**	**23,284**	**30,086**	**100**

Appendix D: The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

Table D.1. The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

PURPOSE	CRITERIA	STRATEGIES	POINT
HEALTHY AND PRODUCTIVE SPACES (24.49%)	High levels of acoustic, thermal, and visual comfort *(4,898%)*	Direct supply of fresh air from the exterior of the building and from the direction of clean air	%0,8163
		The space on the side facing the wind should be wider	%0,8163
		Floor coverings should be of light colors	%0,8163
		If the directions of the sun and prevailing winds are parallel but different, placing the open space in the direction that provides the best shading and doesn't block the wind during the hot season	%0,8163
		Openings that can be opened and closed according to climatic conditions, and using low-emissivity glass in these openings	%0,8163
		Direct intake of fresh air from the outside of the shelter and from the direction of clean air	%0,8163
	Daylight strategies *(4,898%)*	Shaping with the least window area in the east and west directions	%0,8163
		Wide eaves	%0,8163
		Utilization of horizontal sun control elements on the south facade and vertical sun control elements on the east and west facades	%0,8163
		Protrusions on the ground floor	%0,8163
		Providing the necessary amount of daylight while also ensuring sun control against glare and overheating	%0,8163
		Attention to planting non-pollen-producing trees, etc.	%0,8163

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

	Improved indoor air quality *(4,898%)*	Utilization of non-toxic, low volatile compound content paint, adhesive, and coating	%1,2245
		Materials used for exterior cladding should not be used for interior spaces	%1,2245
		Avoiding exposed ceilings and mineral wool wall panels	%1,2245
		Using paints that are free from asbestos and lead	%1,2245
	Safe living environments *(4,898%)*	Use of non-toxic, low volatile compound content paint, adhesive, and coating	%0,9796
		Selection of materials that have low painting, maintenance, and repair requirements, and offer a long lifespan	%0,9796
		Reuse / recycling / repurposing and low-energy materials	%0,9796
		Utilization of locally sourced materials that are compatible with the region where the shelter is located	%0,9796
		Use of materials with a high R-value in the exterior shell of the shelter (high insulation value)	%0,9796
	The integration of art within a structure, appreciation for relaxation and deep contemplation, acknowledgment of organization contributes to the user's health and well-being *(4,898%)*	Availability of an information booklet detailing usage specifics and providing sample scenarios for users	%1,6326
		Direct accessibility for users to areas, including outdoor spaces, where they can engage in various artistic activities and community-building activities aimed at fostering a sense of community awareness	%1,6326
		Presence of a garden area with diverse plant species that will visually attract attention throughout the year, or a veranda area that can be separated from and closed to the shelter as needed, enhancing communal interaction	%1,6326
*SECURITY (*7.76%*)*	Presence of security guards inside or outside the shelter area *(*1.94%*)*	Continuous presence of security personnel in the shelter area	%1.94
	Surveillance systems at the entrance to the shelter *(*1.94%*)*	Presence of security cameras with access and recording capabilities in the area where shelters are collectively installed, with a common field of view and accessibility for security personnel	%0.97

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

		Presence of security cameras with access and recording capabilities, positioned to have a general field of view that includes the entrance area of the shelter, and accessible to security personnel	%0.97
	Examination of urban security features *(*1.94%*)*	Ensuring proximity within specified distances to various services and community centers such as dining facilities, post offices, banks, pharmacies, schools, medical centers, sports centers, and open public spaces in the area where the shelter is located	%0,388
		Enabling effective access to the shelter, the land on which the shelter is situated, and the local transportation infrastructure/facilities related to the shelter, in a way that allows users to access and utilize relevant spaces. Providing users with a booklet containing information about the shelter and the land it occupies	%0,388
		Mitigating potential discomfort arising from heavy vehicle-generated noise, visual disturbances, and vibrations through road layout, shelter orientation, and buffer zones	%0,388
		Adequate illumination of the roads	%0,388
		Designing the overall layout of the area and positioning of shelters in a way that avoids creating potential hiding spots	%0,388
	Eliminating the element of fear, dominance over the visual space within the shelter area is established *(*1.94%*)*	In the relationship between the shelter-street; shelter area/city, there should be a clear distinction made between public, semi-public, and private outdoor spaces	%0,485
		Residential areas, especially with mixed uses including evening gathering activities, can enhance the level of activity and surveillance in a location	%0,485
		To provide a comfortable sense of enclosure, the total width of the streets in the shelter area should not exceed the heights of the shelters	%0,485
		The form, dimensions, and degree of enclosure of external rigid landscape elements such as walls or fences that define the boundaries of the shelter area, within the context of neighboring parcels or street boundaries, should address desires and needs like protection, privacy, intimacy, and security	%0,485
FLEXIBILITY(4.90%)	Technical solutions *(2.45%)*	Movable walls existence	%0.8166
		Movable panels existence	%0.8166

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

		Furniture to be altered, moved, and repositioned	%0.8166
	Suitable for various social uses *(2.45%)*	Designing shelters with optimal spaces, consisting of modular and standard dimensions, that are sufficiently large	%0.4083
		The modularity of the shelter should allow for various uses by enabling methods like connecting, dividing, expanding, and merging spaces with each other	%0.4083
		For the newly proposed function, utilizing detachable dividers for 50% of the designed living spaces within the shelter, in an implementable manner	%0.4083
		Developing a customized functional adaptability strategy for the shelter and delivering this guide to the users. In this booklet, evaluating whether modular usage aspects are clearly expressed, especially in terms of modularity, should be emphasized	%0.4083
		The shelter's networks and connections should have flexibility and expansion capacity	%0.4083
		The shelter's potential for horizontal, vertical, or bi-directional expansion should be compatible with functional changes	%0.4083
AESTHETİCS (2.46%)	Satisfaction with the appearance *(1.23%)*	Satisfaction with the shelter’s color (Ease of user-initiated modification is important)	%0,1757
		Satisfaction with the shelter’s facade (Ease of user-initiated modification is important)	%0,1757
		Having an importance that is associated with the allure of a 'place,' a region, or a city, and can contribute to the well-being level and quality of life of the people living, working, or visiting there	%0,1757
		Pursuing an environmental arrangement that supports the cohesion of the local community	%0,1757
		An interior arrangement that steers clear of creating a routine sameness and prevents all spaces from being perceived with identical meanings	%0,1757
		The significance of the physical elements present in the shelter and how the arrangement of these elements contributes to one's satisfaction	%0,1757
		Stimulating the interests of individuals at three distinct scales conceptualized as the 'silhouette of the shelter,' the 'mass composition of the shelter area,' and the 'superficial shaping characteristics of the shelter (texture, color, material, etc.),' to evoke engagement	%0,1757

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

	To balance and harmonize environmental technology while incorporating aesthetic content, sustainable architectural practices should be developed in design efforts *(1.23%)*	Shelter envelope should prefer light-colored building materials with high reflectivity for the sake of high reflectance	%0,3075
		For the northern window, a glass type with a transmittance value between 60% and 85%	%0,3075
		For windows facing east and west directions, to mitigate the risk of excessive heating, a glass type with 30% transmittance	%0,3075
		In facades where passive solar systems are not utilized, low-emissivity glass should be used	%0,3075
ACCESIBILITY(6.16%)	Fast and easy access to activities *(0.616%)*	easy access to activities	%0.616
	Ease of access to basic services *(0.616%)*	Ensuring accessibility to public transportation networks and bicycle routes	%0,1232
		The entrance(s) of the shelter and shelter area should be connected to a pedestrian sidewalk or a pedestrian pathway network, depending on the nature of the adjacent public space (street, park, etc.), allowing for walking	%0,1232
		All services, facilities, and amenities agreed upon with the local administration (such as local gathering places, housing, education and library services, entertainment facilities - both paid and free, green areas, sports facilities including tennis courts, football fields, swimming pools, etc., pharmacies, medical centers, childcare centers, playgrounds, public internet access, postal services, cafes, places of worship, and other necessities) should be located within a safe and convenient walking distance to all shelters	%0,1232
		Facilities such as a children's playground, recreational area, community sports field, family health center, daycare, preschool, and elementary school should be planned within approximately 500 meters walking distance, while middle schools should be within approximately 1,000 meters, and high schools should be within approximately 2,500 meters in the service catchment area, taking into consideration pedestrian accessibility	%0,1232

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

		Ensuring that the building is located within a maximum distance of 500 meters from service points such as markets, public or private outdoor spaces, food vendors, ATMs, and post offices	%0,1232
	Outdoor accessibility *(0.616%)*	Special bicycle and motor vehicle parks near the main entrance/entrances	%0,077
		Accessible way to the entrance/entrances	%0,077
		Accessible outdoor furniture such as seating areas, garbage cans and similar street furniture	%0,077
		Simple, understandable and logical layout plans	%0,077
		Intuitive, clear and accessible fire and emergency evacuation routes	%0,077
		Sufficient maneuvering space around the entrance for wheelchair users and easy use of the entrance	%0,077
		The continuous maintenance and management of an accessible and usable shelter area, along with its provision	%0,077
		Versatile spaces, furniture, and equipment that can be used for various activities	%0,077
	Indoor accessibility *(0.616%)*	Stepless entry (Taking measures to prevent obstacles to the movement of individuals with disabilities, fire exits, and similar actions when threshold construction is absolutely necessary)	%0,1026
		All entrances should be illuminated and adequately protected from weather conditions	%0,1026
		Having sufficient space in the primary circulation areas to maneuver wheelchairs for wheelchair users	%0,1026
		The presence of easily graspable door handles, cabinet and drawer knobs, as well as easily lockable mechanisms on doors and windows, along with easily graspable single-lever faucets	%0,1026
		Creating contrast in color to facilitate perception for users in areas where slipperiness is common at entrances	%0,1026
		Providing users with a booklet that contains explanations on how the shelter is to be used, how to address issues that may arise during usage, and scenarios for different and	%0,10266

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

		adaptable designs	
	Accessibility to transportation vehicles *(0.616%)*	Enhancing the pedestrian transportation and public transportation waiting areas in the shelter area to make them enjoyable and comfortable (including lighting, landscaping, protection from rain, etc.)	%0,2053
		Providing public transportation connections serving the region	%0,2053
		Creating pedestrian and bicycle-friendly, well-lit, with suitable surface coverings, and safe pedestrian and bicycle paths	%0,2053
	Access to the area where the structure is located *(0.616%)*	The presence of dedicated public transportation routes and stops for the shelter area	%0,2053
		The availability of an application or information boards displaying service frequency data during peak and off-peak hours for users	%0,2053
		When planning the placement of shelters, if the main entrance of the project is located at a certain distance from a suitable public transportation point, it should be positioned within a walking distance of a maximum of 400 meters or 800 meters from existing or planned bus, tram, or minibus stops	%0,2053
	Ease of access to basic services *(0.616%)*	Diversifying transportation options	%0,308
		Development of high-quality public transport	%0,308
	The increase in slow transportation opportunities *(0.616%)*	Facilitating social cohesion and supportive social networks - Transportation policy should help create a supportive local environment by making everyday street gatherings and the viability of local amenities that are the focus of communities more accessible.	%0,476
		the scope and cost of public transportation should be designed in such a way that it does not limit the accessible business area	%0,476
		Ensuring access to open spaces that particularly encourage physical activity, access to points of sale for healthy food, access to healthcare facilities, and access to educational facilities that aid self-improvement, especially for young people	%0,476
	Increasing the potential for social interaction *(0.616%)*	Transportation policy should aim to facilitate the viability of local amenities that are the focus of communities and everyday street gatherings, especially for vulnerable and less mobile groups	%0,2053

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

		Designing living spaces with ample room for movement and activity, abundant sunlight, views of gardens, and seating units inside	%0,2053
		Creating spaces with varying levels of privacy between public and private areas, giving users the choice, such as a design that allows for a veranda when desired	%0,2053
	Ease of access to public transportation facilities *(0.616%)*	The main entrance of the shelter area should be strategically located based on the 'public transportation accessibility index,' which calculates the distance to a suitable public transportation point	%0,308
		Designing a protective cover at public transportation stops to provide shelter from adverse weather conditions. This protective cover should be sufficiently large to accommodate potential users of different ages and abilities	%0,308
QUALITY OF LIFE(15.46%)	The level of income/ownership *(3,865%)*	A shelter design that can offer equal quality with flexible minimum standards, accommodating different shelter programs and features based on user group, age group, and income level	%3,865
	The network of social relations *(3,865%)*	The presence of high-quality indoor, outdoor, and semi-open spaces that can meet people's needs and expectations for work, gathering, meeting, socializing, collective activities, and actions	%1,9325
		Creating a sense of community and belonging through the use of locally specific materials and exterior facades in architecture	%1,9325
	The diversity and quality of services *(3,865%)*	Providing facilities, both indoor and outdoor, for the future residents and visitors/users of the shelter area	%1,2883
		Opportunities for community/appropriate stakeholders to share the facilities and infrastructure that serve indoor and outdoor spaces for sports facilities, meeting and conference rooms, as well as for staff/visitors	%1,2883
		Accessibility to local facilities and service distribution routes, including detailed information about utility channels and infrastructure connections	%1,2883
	Responding to people's needs for both privacy and social interaction *(3,865%)*	The presence of a shelter large enough to allow all users to sit outdoors, with the capability to transform into a veranda, creating a semi-open and semi-public space	%0,9662
		The presence of semi-open spaces designed to be accessible for all users, including wheelchair users	%0,9662
		Designing minimum space requirements for private outdoor areas (accessible only to the shelter's intended users) to be 1.5 m² per individual	%0,9662

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

		The presence of a recreational-oriented ground covering or grassy area with physical elements that promote physical activity in the vicinity of the shelter	%0,9662
FUNCTIONALITY AND EFFICIENCY(38.78%)	Positioning functions *(7.756%)*	Creating a thermal buffer zone by placing non-opening spaces on the northern facade during the design phase	%1,2926
		Designing general-use spaces and circulation areas in the southern part of the shelter as thermal collectors and buffer zones	%1,2926
		The presence of movable dividers to create thermal buffer zones between spaces with different thermal values, aiming to enhance energy performance and user comfort	%1,2926
		Designing the wet spaces within the shelter to be grouped on the western and eastern facades, where there is a risk of excessive heating	%1,2926
		Facilitating airflow within the interior through the use of low partition walls, ventilation holes, openings, and staggered floor plans	%1,2926
		To optimize the use of daylight, directing the living space with high lighting needs towards the north and/or south direction	%1,2926
	Enabling everyday users and visitors to participate in activities without difficulty *(7.756%)*	Designing intermediate spaces that serve as shared areas and allow for various activities to take place.	%1,939
		Designing courtyards that can be created by users through the flexibility and modularity of the shelter, affecting its usability and image with activity diversity and social interaction in mind	%1,939
		Ensuring ease of access for users and visitors to the shelter area and the shelter itself (accessibility), allowing people to easily enter the shelter area and the shelter (in a narrow sense, accessibility), and enabling people to easily use the desired spaces and services (usability)	%1,939
		The presence of accessible information sources and services that can be accessed by everyone and on an equal level at the entrances to the area where shelters are located	%1,939
	Allowing for different activities at different times *(7.756%)*	Developing an evening culture within the shelter area that promotes mixed-use and enhances the vibrancy of spaces, catering to all age groups.	%3,878
		Designing shared spaces with a focus on good permeability and transparency, featuring dining areas, shopping, and activities that support social life to revitalize the area and encourage people to use the space	%3,878
		Barrier-free access to the shelter and barrier-free mobility within the shelter/shelter area	%3,878

Table D.1. (continued): The Socially Sustainable Post- Disaster Emergency Shelter Design Checklist

	Allowing to fulfill its function for active uses *(7.756%)*	Providing versatile spaces, furniture, and equipment that can be used for different activities and determining design features that allow for different activities at different times	%3,878
	Supporting cleaning and maintenance *(7.756%)*	Ensuring the continuous cleanliness, maintenance, and management of the accessible and usable shelter and shelter area	%7,756

Appendix E: Sankey Diagram for Swot Analysis

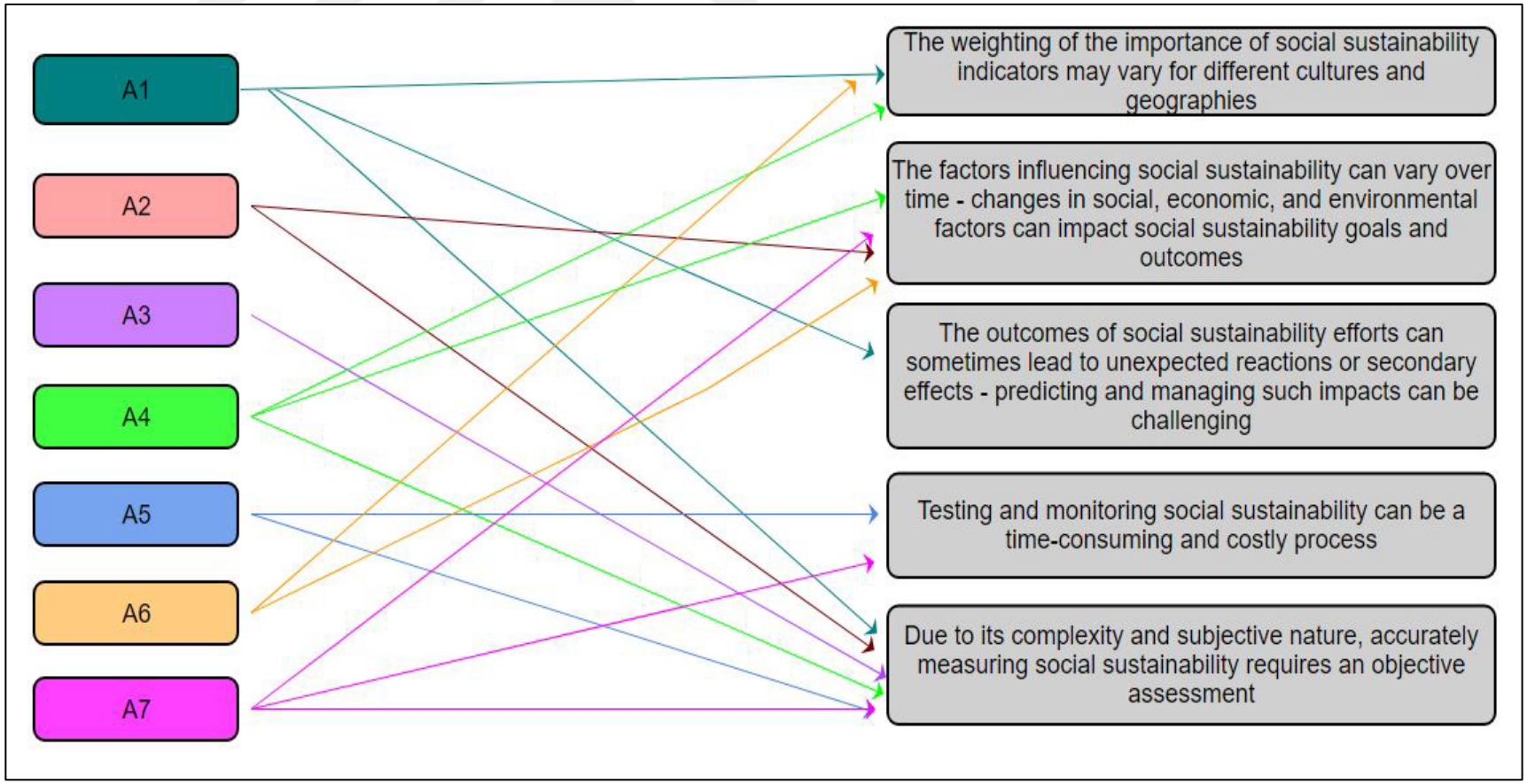


Figure E.1. Sankey Diagram for SWOT Analysis

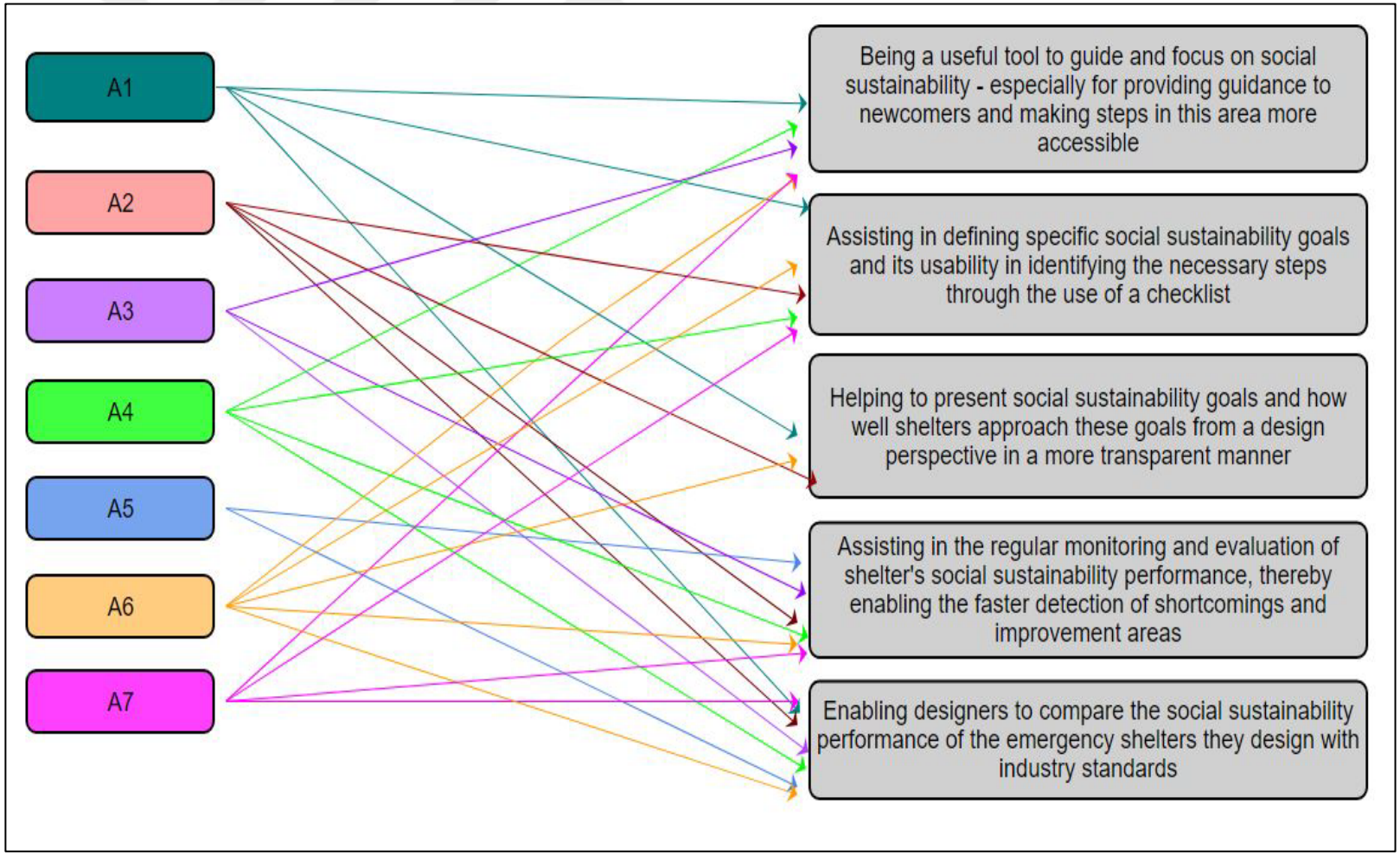


Figure E.1. (continued): Sankey Diagram for SWOT Analysis(continued)

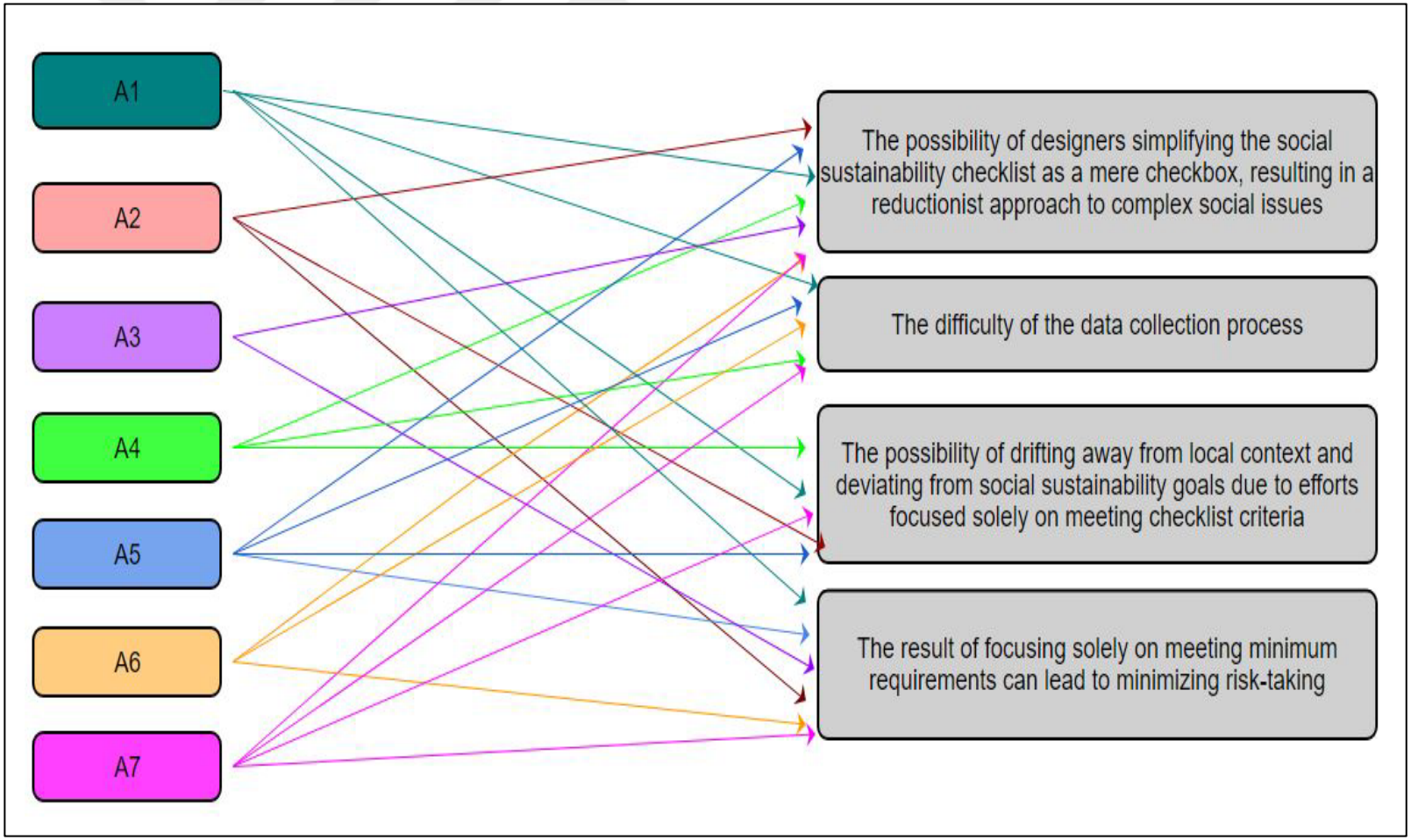


Figure E.1. (continued): Sankey Diagram for SWOT Analysis(continued)

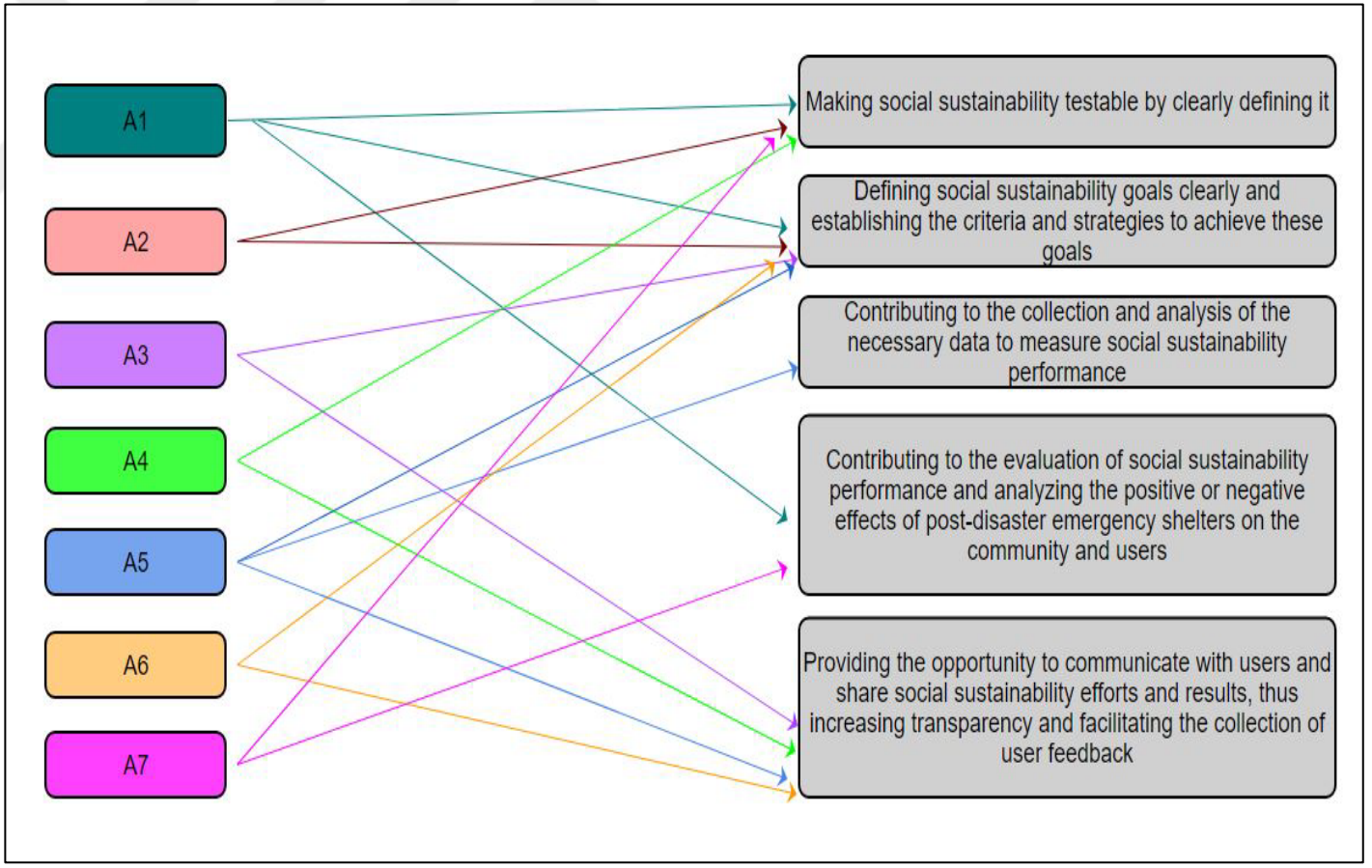


Figure E.1. (continued): Sankey Diagram for SWOT Analysis(continued)