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How to Benefit from Shigeru Ban's Method in Iran

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ABSTRACT

Modern architecture faces numerous challenges, including the need for rapid and cost-effective construction in crisis situations, as well as the necessity of paying attention to environmental sustainability. In this context, the present study aims to examine the performance and feasibility of applying the design and construction approaches of Shigeru Ban, the renowned Japanese architect known for his innovative use of recycled materials and human-centered designs, in the field of Iranian architecture. The research method is based on analyzing and reviewing Shigeru Ban's design and construction principles and adapting them to the needs and challenges of Iranian architecture. The results of this study indicate that Shigeru Ban's innovative and humanistic principles—especially the emphasis on the use of local and recycled materials and temporary, disaster-resistant structures—can offer effective solutions to address the high vulnerability of some regions in Iran to natural disasters, as well as promote sustainability in the construction industry. However, successful implementation of these methods requires attention to challenges such as localizing construction technologies, developing appropriate regulations, and training specialized personnel. Furthermore, this study highlights the high potential of Shigeru Ban's approaches to inspire positive transformations in Iranian architecture.

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Introduction

Earth. Given their vast destructive potential, such disasters can lead to severe damage and loss of life across various dimensions (Shomali, 2013: 3). Among them, earthquakes stand out as one of the most devastating natural hazards, capable of causing immense destruction in a very short time. Global statistics indicate that millions of people become homeless due to natural disasters each year, with earthquakes accounting for over 80% of these displacements. These individuals require temporary shelter before they can regain permanent housing.

Unfortunately, in developing countries, due to weaknesses in construction systems and inadequate oversight of building practices, the destructive effects of disasters such as earthquakes and floods are far more severe, resulting in the collapse of more homes and displacement of a larger number of people (Zorofchi Benis, 2021: 79).

Iran, due to its unique geographical location on the Alpine-Himalayan seismic belt, is considered one of the most earthquake-prone countries in the world. Earthquakes top the list of natural disasters in Iran. According to the Emergency Events Database, approximately 85,000 people have been displaced by earthquakes over the past two decades. Official statistics reveal that 60% of all natural disaster-related fatalities in the past 25 years in Iran are directly attributed to earthquakes. On average, one earthquake with a magnitude of 6 on the Richter scale occurs annually, and one with a magnitude of 7 every ten years (Givachi et al., 2013: 102). The frequent occurrence of these events, combined with inadequate preparedness and a growing population, have all contributed to extensive destruction following earthquakes in the country. This high level of damage highlights the critical importance of addressing temporary housing for disaster victims (Khoram et al., 2014: 96).

Typically, after major earthquakes—especially in areas with deteriorated urban fabric and poorly constructed buildings such as many rural areas and urban fringes lacking proper construction oversight—widespread destruction occurs in residential buildings, rendering many units uninhabitable. As a result, survivors are forced to seek shelter elsewhere. This situation, in addition to the economic hardship caused by the loss of property, leads to psychological distress and the fragmentation of families. Therefore, providing suitable shelter to bring family members together after a disaster is of paramount importance to ensure a sense of security and peace. Offering effective solutions for constructing temporary housing to address post-disaster shelter needs is vital and necessary (Khoram et al., 2014: 96).

The importance of temporary housing and the need for careful planning have driven many designers and architects to explore and propose the most efficient and optimal methods for such shelters. In advanced societies, policy and planning regarding disaster response are based on understanding, planning, prevention, and ultimately offering suitable and optimized solutions (Zhao et al., 2017: 1). Considering this, despite the recurring occurrence of natural disasters in Iran and the presence of some unsuccessful experiences in emergency and temporary housing, the need to adopt new and effective approaches is increasingly felt.

In this context, innovative methods such as those developed by Shigeru Ban—with their unique characteristics—can open new horizons in meeting the basic needs of disaster-affected populations. Shigeru Ban's system, as a fast and flexible construction method, not only enables the provision of shelter in the shortest possible time but also emphasizes the use of local and regional materials, making it more compatible with the environment and the economy of affected areas (Kennedy et al., 2008). Moreover, active participation of the local community in the construction and deployment of such shelters empowers individuals, fosters a sense of ownership and belonging, and can contribute to social cohesion and expedite the post-disaster recovery process (Johnson, 2007).

From this perspective, Shigeru Ban’s method is not merely a technical solution for temporary housing, but rather a comprehensive socio-economic approach that can enhance the resilience of disaster-affected communities. Therefore, a detailed examination of the functionality and potential application of Shigeru Ban’s method within the social, economic, and cultural context of Iran is highly important and worthy of consideration. Accordingly, the present study has been conducted with the aim of evaluating the performance and practical implementation of Shigeru Ban’s approach in Iran.

2. Concepts

All full papers are subject to peer review by the congress referees. Accordingly, paper files prepared in accordance with this guide must be submitted in both DOCX and PDF formats, including all fonts used. The option “Do not send fonts to Adobe PDF” must be disabled when generating the PDF file. Other formats or submission via post or email will not be accepted. Additionally, the submitted file must include the article’s full text along with all elements such as figures and tables.

Acceptance decisions will be communicated to the corresponding author. However, the status of submitted articles can be tracked at any time through the congress website. If accepted, authors must make the requested revisions according to the reviewers’ feedback and submit the final version through the congress website within the designated timeframe.

1-2. Temporary Shelter

Regarding the concept and position of temporary shelter, different perspectives exist. Some consider it as an intermediate link between initial emergency shelter and permanent reconstruction and view it as an inseparable part of disaster management. On the other hand, some emphasize the independent nature of this phase and regard its existential philosophy as providing an opportunity for planners and reconstruction managers to make more informed decisions and also to protect the affected people in a safe temporary shelter (Asefi & Farokh, 2016: 57). Article 25 of the Universal Declaration of Human Rights also emphasizes every individual's right to adequate housing, which is temporarily deprived from disaster victims due to destructive natural disasters disrupting social order (Hadafi et al., 2019: 434). Therefore, considering the lengthy process of permanent housing construction, ensuring this right through temporary shelter seems essential.

In crisis management and post-disaster shelter literature, various definitions and classifications of shelter stages have been proposed. The Central U.S. Earthquake Association divides the post-disaster transition period into four distinct stages:

Immediate shelter (up to the first 72 hours after the disaster), aimed at providing initial safe refuge until conditions stabilize;

Emergency shelter (up to the first two months post-disaster), which includes shelter and food supply for affected individuals;

Temporary shelter (lasting up to one year or more), requiring arrangements for security, water, energy, cooling, and heating for the homeless until permanent housing is available;
Permanent housing, which provides long-term, stable residence solutions for survivors (Hadafi et al., 2019: 435).
Similarly, Quarantelli (1995) distinguishes four types of post-disaster shelter based on behavioral and functional differences:
Emergency shelter (very short-term stay of a few hours or overnight outside permanent home);
Temporary shelter (displacement to a new place with a relatively short stay, considering needs such as nutrition);
Temporary housing (continuation of household daily activities at the new place with awareness of the temporary condition, including mobile units, rental homes, or tents);
Permanent housing (return to renovated or new homes) (Quarantelli, 1995).
Johnson (2008) defines temporary shelter as the interim residence of affected families between the disaster occurrence and obtaining permanent housing, connecting the rapid relief and reconstruction phases (Johnson, 2008: 168).
In Iran, multiple discussions exist about the position of temporary shelter as an intermediate stage. Raheb proposes three types of shelter (Momeni Mookooei & Zeinali, 2017: 385):

1. 1Emergency residence (initial shelter),
2. Temporary housing (from emergency to the end of reconstruction),
3. Permanent housing.

In disaster literature, temporary shelter is often referred to by three terms emphasizing different dimensions: transitional accommodation stressing time, intermediary settlement emphasizing both time and physical form, and temporary housing with greater emphasis on structure and physical form. The comprehensive concept of temporary shelter combines these physical and non-physical aspects of post-disaster refuge and settlement (Mohammadzadeh & Farokh, 2016: 71; Asefi & Farokh, 2016: 58). Therefore, temporary shelter can be viewed as a set of activities including collecting, identifying, and relocating affected individuals to shelter and creating living conditions until return to original residence. The duration of temporary shelter varies depending on crisis conditions and available resources, estimated between six months and two years, with some researchers considering it as the initial core of permanent housing (Fallahi, 2007: 27).

2-2. Types of Temporary Settlements Based on Layout

Temporary settlements are generally organized in two main ways:
a) Dispersed settlements: In this approach, affected individuals can settle in their chosen locations. Based on climatic conditions and other local considerations, temporary shelters are provided for these individuals to establish or install at their chosen sites. This method offers more flexibility for individuals in selecting their temporary living environment and can better align with pre-disaster lifestyle patterns.
b) Clustered or camp settlements: This approach is a common and well-known method in post-disaster sheltering. Initially, an open area, preferably near the disaster site, is selected and prepared. Then, based on population estimates needing shelter and considering factors such as length of stay, climatic and environmental conditions, available resources, and budget, a camp made up of tents,

prefabricated units (e.g., containers), or temporary structures using local materials complying with minimum standards is built (Sajedi et al., 2018: 1004).

3. Temporary Shelter Design

Here is an English translation of the provided text on temporary settlement design approaches and characteristics based on Falahy (1386):
1. Temporary Settlement Design Approaches (Falahy, 2007: 46-47) Falahy identifies three fundamental approaches in designing temporary settlements: Technical-oriented approach (design-centric with focus on technical aspects of shelter):
This perspective emphasizes the engineering and structural aspects of temporary shelters. For example, it addresses how to design and construct housing units either onsite or in factories and the process of relocating them to disaster-affected areas. Temporary houses in this approach include a wide variety of prefab and onsite-built examples with diverse construction materials such as tents, foam, polyurethane, concrete, wood, and metal sandwich panels. The United Nations Development Programme (UNDP) categorizes temporary shelter structures into booth, tent, and panel types based on their physical form.
2.Material-oriented approach: This approach focuses primarily on the type of construction materials used for shelters. Recently, special attention has been given to the use of indigenous and recycled materials. The advantages and disadvantages of these materials in the long term and their ecological and environmental impacts have sparked debates in both developing and developed countries (Motaghi et al., 2019: 74).
3.People-oriented approach (resident satisfaction): This viewpoint evaluates temporary and permanent settlements from the residents' perspective based on functionality and architectural aspects. It also studies the gradual changes households make over time to transform such settlements into real homes. Although its nature differs from the first two approaches, the criteria and benchmarks identified through similar previous cases can be used in future disaster responses. Successful post-disaster design should not only address physical and architectural concerns such as adequate space, climate, thermal comfort, ventilation, lighting, privacy, and security, but also urban design issues concerning location, accessibility, and infrastructure (Forouzandeh, Hosseini, & Sadeghzadeh, 2008). The costs and methods of shelter provision are critical factors. Besides material needs, attention to psychological, cultural, and social conditions of survivors before and after the disaster is vital for creating appropriate designs. Understanding customs, religion, ethnic diversity and relations, local capacity, and livelihoods are among points to consider. Generally, experts emphasize viewing temporary settlement design as a dynamic process rather than a finalized product.

4. General Characteristics of a Temporary Shelter

According to existing definitions of temporary housing, the expected characteristics of a temporary shelter are as follows (Hossein Tabatabaei, 2020):

1. Structural and Technical Features:

- Structure: Prefabricated production capability and lightweight to facilitate easy transportation and installation.

- Materials: Use of indigenous materials that are culturally and socially acceptable.
- Execution: Possibility of construction by workers with simple technical skills, including local individuals, supported by instructional manuals for assembly.
- Durability: Technical design and calculations based on stability and resistance standards suitable for temporary buildings.
- Transportation: Capability for transport by various freight vehicles.
- Heating Equipment: Provision of stoves and other heating devices appropriate for the interior space, with an emphasis on the system's resistance to fire.
- Climatic Design: Adaptation of design to the regional climate conditions, resistance against wind pressure, compatibility with heavy snow loads in cold regions, as well as assessment of earthquake resistance and ground stability.
- Roof Type: Possibility of implementing a pitched or cradle-shaped roof structure depending on conditions.

2. Architectural Features:

- Placement: Compliance with regional settlement regulations in a way that does not create land ownership issues.
- Openings: Possibility to install doors and windows with customizable quantities.
- Thermal Comfort and Ventilation: Building design, materials used, dimensions, and positioning of exit doors aimed at providing thermal comfort and adequate ventilation.
- Plan Flexibility: Ability to design floor plans with or without sanitary and kitchen facilities.

3. Economic Features:

- Reusability: Possibility to reuse all or part of the components.
- Modular System: Use of modular building systems that allow repetition, expansion in different directions, and diversity in design.
- Material Variety: Capability to use diverse materials for cladding and walls, suitable for the region's needs, climate, and available resources while considering economic constraints.
- Economic and Environmental Impacts: Use of materials that do not adversely affect the local economy or environment.
- Replaceability and Storage: Easy replacement of all parts and convenience in their storage.

4. Livelihood Features:

- Facilities: Possibility to install heating and cooling systems inside the building.
- Physical Security: Providing minimum physical security for residents by using materials more resistant than typical tent coverings.
- Psychological Security: Creating mental and psychological security by installing lockable doors to ensure safety for individuals and their belongings.
- Reduction of Secondary Hazards: Minimizing risks from secondary natural disasters including aftershocks, volcanic activity, landslides, floods, and storms.
- Health and Hygiene: Protecting the structure against transmission of diseases and vectors.
- Adequate Space: Providing a minimum of 3.5 square meters of space per person to allow safe separation and maintain privacy among different gender, age groups, and separate families.

- Capacity for Livelihood Activities: Ensuring the possibility of conducting important livelihood activities inside the shelter.

5. Shigeru Ban's Paper Architecture

The Shigeru Ban method is an innovative approach in architecture and construction that emphasizes the use of unconventional materials, particularly paper and cardboard, as primary structural elements. At the core of this method lies the belief that the strength of a building is not necessarily limited to traditional heavy materials such as concrete, steel, and stone; rather, new lightweight materials like paper, when combined with suitable techniques, can be even stronger and more efficient. Ban, with a different perspective on industrial waste such as cardboard cores from paper towels and discarded papers, introduces them as materials with high potential for creating lightweight, durable temporary and permanent structures. This approach not only aims to provide fast, resilient shelter solutions in crisis conditions such as earthquakes, floods, wars, and displacement, but also incorporates environmental sustainability concerns. The use of recycled and recyclable materials — such as waste paper and beverage cartons (used in the foundation and base to prevent water ingress and increase the structure's weight) — significantly helps reduce natural resource consumption and the energy needed to produce new materials. Additionally, the use of foldable materials that can be reused in different locations results in greater resource savings and less environmental damage. However, the text also highlights major challenges such as the low resistance of paper houses to fire and excess water and stresses the need to find suitable responses to apply this method across various climates and to develop smart building systems to address these problems (Rostami & Laffafchi, 2023: 2).

5.1. Background of Shigeru Ban

The origin of this method dates back to the efforts of Japanese architect Shigeru Ban, who, inspired by John Hejduk, was the first to use cardboard cylinders in building structures. His initial idea took shape by wrapping fabric around cardboard tubes in designing the Emilio Ambasz Museum, and afterwards, his office was filled with cardboard cylinders made from discarded papers. During the design of the Alvar Aalto exhibition, when faced with the high cost of wood, Ban took a significant step by using paper cylinders that resembled wood, marking a milestone in the application of this innovative material. These efforts reflect Shigeru Ban's creative and sustainable approach in architecture, which seeks to provide efficient and environmentally friendly solutions to building needs using unconventional materials (Rostami & Laffafchi, 2023: 3).

6. Application of Shigeru Ban's Architecture in Other Countries

Inspired by capabilities such as prefabrication, speed and ease of installation, the possibility of disassembling components, and the use of simple tools in paper architecture, the idea to utilize this technology for providing emergency and temporary shelter after disasters and calamities was formed. In 1999, the United Nations High Commissioner for Refugees (UNHCR) and Doctors Without Borders used paper tubes for emergency shelter and temporary housing for a group of Rwandan refugees (victims of genocide in Tanzania and Zaire). This decision came after expert evaluation and review of materials such as wood, bamboo, aluminum, and plastic, and ultimately, the option to use plastic-coated paper tubes for constructing shelters measuring 6×4 meters was selected. The primary reasons for this choice were:

1. Preventing the destruction of local forests by refugees who were using wood to build structural frames.
2. The possibility of local production, low cost, fast installation, reduced transportation costs, and decreased generation of construction waste.

Paper tubes were first used to build tents with trapezoidal frames to provide emergency housing for Rwandan refugees. A plastic tent membrane was stretched over these frames, and the triangular ends of the frame were tied with ropes to wooden stakes driven into the ground (see Figure 1). Training on the use of machinery and the possibility of onsite tube production were provided to the technical experts at the logistics center of Doctors Without Borders in Bordeaux, France. However, major earthquakes such as Kobe, Japan (1995), Kinalsi, Turkey (1999), and Bhuj, India (2001) played a significant role in introducing the capabilities of paper in post-disaster architecture (Mcquaid, 2003: 30).

Figure 1. Emergency Shelter with Paper Structure (Shigeru Ban) for African Refugees and the Executive Details of the Paper Tube Frame in the Emergency Housing Phase.

On January 17, 1995, the Great Kobe Earthquake claimed over 5,000 lives and left many homeless. For the first time in this city, the use of paper tubes to provide shelter and other urban spaces was considered. The design and construction criteria for temporary housing were based on the use of inexpensive materials, ease of construction, proper insulation, and relative aesthetic appeal. At the Takatori Church site, which was destroyed by fire following the earthquake and served a neighborhood function, a Paper Church was built using these tubes. The speed of construction and the temporary nature of the building were the main reasons for selecting paper tubes for building this church. The design included a rectangular plan measuring 15x10 meters covered with semi-transparent polycarbonate panels. One positive feature of this design was the ability to fully open the front walls and half of the side walls of the church for ventilation and to extend the interior space to the adjacent open area during crowding. This 80-person church was constructed with an elliptical wall consisting of 58 paper tubes, each 5 meters high, 33 centimeters in diameter, and 15 millimeters thick (Mcquaid, 2003:42). To separate the altar from other sections and create storage space behind it, half of the tubes were placed close together along the major axis of the ellipse, while the rest were spaced farther apart. The church roof was shaped like a parabola and covered in polycarbonate plastic to create a spiritual space emphasizing the sky. This plastic covering allowed daylight to enter inside and reflected artificial light from inside to outside during the night (Figure 2).

Figure 2. Installation of Paper Columns

After the church was built, volunteers who participated in its construction began building 27 paper housing units in Minamikuma Park and several more in Shin Minatogawa Park. Paper tubes with a diameter of 108 millimeters and a thickness of 4 millimeters were placed next to each other and sealed with waterproof sponge tape (Naturaaw) (Garcia, 2000:174). The foundation of these houses was constructed using wooden soda crates filled with sandbags. The external roof covering was a PVC tent membrane placed on a triangular truss made of tubes, designed so that the triangular surface remained open between the corner of the wall and the roof opening to allow ventilation in summer. In winter, this part was closed to prevent the loss of indoor heat. For large families needing more space, two units were placed side by side, connected by a two-meter-wide intermediate space and joined at the roof (Figure 3). The finished cost of each house was 250,000 yen, and their most important features were affordability, ease of installation, prefabricated components, and recyclability (Garcia, 2000:177).

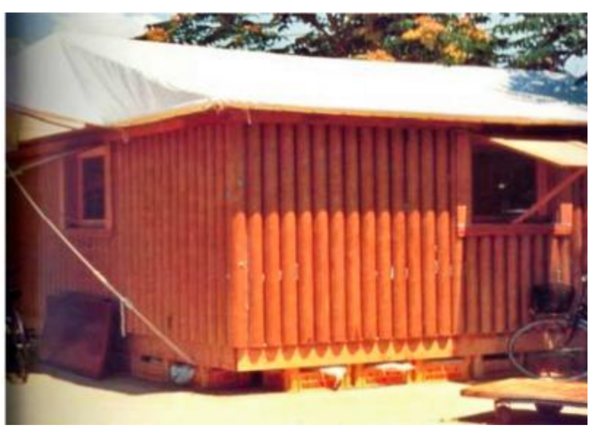

Figure 3. Plan and Temporary Housing, Interior and Exterior Space of the Paper House in Minami-Kuma Nagata Park, Kobe.

The next application of paper tubes occurred after the devastating August 1999 İzmit earthquake in Turkey, which caused 20,000 deaths and left 200,000 homeless (Garcia, 2000: 63). The paper temporary housing in this earthquake was similar to the shelters in Kobe but with modifications to adapt to the climate and lifestyle conditions in Turkey. For instance, their dimensions were changed to 6×3 meters, slightly increasing the available space for residents. These changes were made considering the average household size, compatibility with the standard size of seven-ply plywood sheets available in Turkey, and the regional climate. Additionally, plastic sheets and cardboard were used to enhance insulation and meet the residents' needs (Figure 4). The insulation level in these units was higher compared to the Kobe models, and the joint between the window frame and tubes was sealed with special resin, while the roofs were made of fiberglass (Garcia, 2000: 65).

Figure 4. Relief workers preparing the floor and foundation of the paper temporary housing in Turkey.

The paper tube technology was also used in the reconstruction of areas affected by the 7-magnitude earthquake in Bhuj, Gujarat (January 26, 2001) in western India. In this region, instead of the wooden soda crates used for foundations in Kobe and Turkey (which were not available in Bhuj), rubble from destroyed buildings was used and traditionally covered with mud. This action was a form of recycling earthquake debris, aiding in site cleanup and reducing the volume of rubble needing removal. For the roof covering, bamboo split lengthwise (similar to tiled sloping roofs) was used for the main beams, and full bamboo stems were used for the primary rafters (Figure 5). A woven bamboo mat was spread over the bamboo, followed by a thin plastic sheet to protect the roof from rain, with another mat woven over the plastic. Ventilation of the residential units was provided through the triangular space between the wall and roof and through the gaps in the woven mats. These gaps allowed cooking inside the unit with ventilation and also served as an exit path for insects (Mcquaid, 2003: 40).

Figure 5. Interior and exterior space of the paper house adapted to local customs and traditions

7. Application of Shigeru Ban's Architecture in Iran

Inspired by Shigeru Ban's innovative approach using recycled materials—especially cardboard tubes—in architecture, a pioneering effort was made in Iran to apply this idea. In 2010 (1390 in the Iranian calendar), the Art and Engineering Workshop of the Faculty of Architecture and Urban Planning at Shahid Beheshti University, using paper tubes produced by a local factory, constructed a prototype paper house. This project, initiated, designed, calculated, and executed by Engineer Saeed Mashaikh Faridani, a faculty member of the department, represented an important step towards localizing modern construction technologies and utilizing the potential of recycled materials in Iranian architecture. Although the cardboard tubes used in this Iranian prototype were originally manufactured for packaging fabric rolls and paper towel rolls—lacking the structural and load-bearing properties needed for typical building applications—this experiment successfully revealed the architectural and construction potentials of paper and a significant portion of its latent capabilities (Sartipipour, 2011).

In constructing this small paper house, two types of cardboard tubes with different diameters were used: tubes with a diameter of 17 cm for building the walls and tubes with a diameter of 10 cm for the roof covering. To create integration and connection between different structural components, including floor and roof frames and wall tubes, a creative method was employed. Hemp ropes were threaded through the tubes and their end caps and connected by stitching and clips (Figure 6).

Figure 6. Executed example of the paper house, designed and constructed by Engineer Saeed Mashaikh Faridani

The connections used in this Iranian paper house, which were innovatively devised and implemented by its designer and builder, were prototyped in the Art and Engineering Workshop of the Faculty of Architecture and Urban Planning at Shahid Beheshti University. After necessary testing and verification of their effectiveness, these connections were utilized in the construction of the final paper house prototype (Figure 7). This process demonstrates attention to execution details and the effort to find native solutions suited to the available resources in Iran.

Figure 7. Executed example of the paper house, designed and constructed by Engineer Saeed Mashaikh Faridani

Although this experience was on a small scale and used materials not originally intended for construction, it opened a new window towards the possibility of utilizing recycled materials, especially paper tubes, in Iranian architecture. This project not only demonstrated the design and construction capabilities with this unconventional material but also laid the groundwork for further thought and research on localizing sustainable architectural technologies and using recycled materials in Iran's construction industry. Inspired by the innovative approach of the renowned architect Shigeru Ban, this effort can be the starting point for larger and more practical projects in paper architecture and other recycled materials in the country.

8. How to Better Utilize Shigeru Ban's Approach in Iran Considering Iran's unique features, including its vast climatic diversity from cold mountainous regions to hot and dry plains, its

frequent natural disasters such as earthquakes and floods, and its increasing need for affordable and sustainable housing for various social groups, Shigeru Ban’s architectural principles and approaches can provide solutions to many existing challenges in construction. His design philosophy, founded on innovation in material usage, humanitarian concerns, environmental sustainability, and collaboration with local communities, has great potential for adaptation and application within Iran’s cultural, social, and economic context.

One key area of utilizing Ban’s method in Iran is the intelligent and innovative use of local and inexpensive building materials. Thanks to its rich history and geographical diversity, Iran has significant traditional resources such as soil, adobe, reeds, and various types of wood. Inspired by Ban’s use of unconventional materials, through research and technological innovation, modern and efficient ways can be found for the sustainable and quality use of these resources, especially in rural and underprivileged areas. This will not only reduce construction costs but also foster local economic development and reduce dependency on imported materials.

Given Iran’s geographic location on an earthquake belt, designing and building earthquake- and flood-resistant housing is crucial (Taifouri & Rostagari, 2016). Ban’s approach to designing lightweight and resistant structures using reinforced paper tubes, prefabricated wooden structures, and other innovative materials can offer effective solutions for safe and temporary housing for affected populations. Furthermore, flexible designs adaptable to different climatic conditions can be widely applied in flood-prone areas, considering elevation above ground, proper drainage systems, and moisture-resistant materials, thereby reducing human and financial losses.

Like many developing countries, Iran is facing a growing volume of recyclable materials. Utilizing the potential for recycling and reusing such materials, akin to Ban’s creative use of shipping containers, recycled paper, and plastic, can open new opportunities in the construction industry. Turning these materials into value-added building materials not only helps reduce waste and protect the environment but can also enable the construction of affordable, sustainable residential, educational, healthcare, and even commercial spaces. This requires investment in recycling technologies and the development of modern processing industries.

The development of participatory architecture, a key element in Ban’s approach, can also bring positive results in Iran. Encouraging and facilitating cooperation among architects, engineers, builders, and local communities in the design and construction process can lead to creating spaces that are not only technically efficient and sustainable but also culturally coherent with the traditions, customs, and real needs of the residents. Using indigenous knowledge and traditional skills alongside modern approaches can contribute to fostering a sense of belonging and responsibility among inhabitants toward their living environment and enhance the social sustainability of construction projects.

9.Conclusion

This study was conducted to examine the performance and feasibility of applying Shigeru Ban’s design and construction methods within the context of Iranian architecture. The findings indicate that Ban’s innovative and humanitarian principles—especially the use of local and recycled materials and the focus on temporary, disaster-resistant structures—can address many current challenges in Iran’s architecture and urban planning. Considering the high vulnerability of certain regions in Iran to earthquakes and floods, Ban’s approach to designing emergency shelters and temporary housing using low-cost, readily available materials can play a significant role in reducing damages and accelerating the reconstruction process.

Beyond emergency response, Shigeru Ban's design philosophy aligns well with the values of sustainable architecture in Iran through optimal resource use and attention to environmental sustainability. The use of materials such as bamboo, paper, and wood combined with modular and demountable designs enables the construction of structures with minimal environmental impact and adaptability to Iran's diverse climatic conditions. This can promote responsible construction approaches and reduce reliance on expensive, energy-intensive materials.

However, to successfully implement Ban's methods in Iran, certain challenges must be addressed. These include the precise understanding and localization of construction technologies using unconventional materials, the development of building codes and regulations compatible with these methods, and the training of skilled personnel for designing and executing such structures. Furthermore, promoting the culture of this architectural approach among clients and the general public, as well as establishing frameworks for collaboration between architects, engineers, and governmental and non-governmental organizations, is of particular importance.

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