Challenges in Post-Disaster Housing Reconstruction: Analysis of Urban vs. Rural Communities

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Abstract

Reconstruction of safe and secure housing is commonly considered the most effective means of returning rural and urban communities affected by disasters to pre-disaster living conditions. In addition, the reconstruction process and the degree of its success greatly impacts the community’s ability to work through the next disaster. The various challenges that the reconstruction process encounters have been identified, investigated, and analyzed in this study. After reviewing 177 articles in detail, approximately 30% of which pertained to reconstruction of houses after earthquakes, 54 challenges were identified and placed into four categories: general, physical, social, and economic. About 30% of the reviewed articles were studied the challenges of housing reconstruction after earthquake. In addition, the journal of Disaster received the highest frequency (37) among the reviewed papers in which the challenges of housing reconstruction after disaster in urban and rural communities were studied. This study succinctly assists decision-makers and project managers allocate needed resources effectively and improve the performance of post-disaster reconstruction of housing in both rural and urban areas.

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1. Introduction

Considerable damages that governments cannot prevent often occur from natural disasters [1, 2, 3]. Different parts of the world have been faced recently with numerous natural disasters that have caused substantial losses [4, 5]. For example, when Hurricane Harvey occurred in the southern part of Texas in 2017, it destroyed a considerable number of buildings and houses and displaced residents. This type of destruction is common in both rural and urban areas, and often leads to displacing residents permanently [6, 7].

Multiple studies have been conducted to optimize the post-disaster reconstruction of housing in urban and rural communities and to maximize the outcomes of those efforts [1, 5, and 8]. Even so, few researchers have analyzed the rural and urban challenges simultaneously, which is the goal of this study.

A thorough review of 177 scholarly papers provided the background for investigating the challenges associated with post-disaster reconstruction of housing and formulating the following objectives: (1) identify the challenges, (2) categorize the identified challenges, (3) calculate the frequency that the challenges occur, and (4) rank the challenges based on the frequency of them. The findings of this study
can help practitioners assess the challenges associated with post-disaster reconstruction of housing in both urban and rural communities so that they can allocate their resources properly.

2. Research methodology

More than 300 journal articles, conference papers, and research reports published from 2000 to 2019 were studied. More than two-thirds of them were journal papers, and the others were research reports, conference proceedings and dissertations. A four-step methodology was adopted for this study, as presented in Figure 1. Five major databases, including Google Scholar, Science Direct, Compendex, Inspec, and ProQuest were used to collect the articles, and the essential information, like the name of the journal, the disaster type, and the challenges related to post-disaster recovery were presented. As shown in Figure 1, the challenges were categorized, then their frequencies and ranks were calculated.

![Figure 1. Research methodology](image)

2.2. Journal name

For this study, 177 related journal articles issued by well-established publishers from the years 2000 to 2020 were carefully reviewed to identify the challenges associated with post-disaster reconstruction of housing in both urban and rural communities, and a list of them, with their frequencies and percentages, is presented in Table 1. The first five journals listed published 69 percent of the articles. The Disasters journal, which is published by the Overseas Development Institute, ranked first and was the source of 21% of the total number of the papers. The International Journal of Project Management, which is published in collaboration with the Association for Project Management and the International Project Management Association, ranked second with 16%.

<table>
<thead>
<tr>
<th>Journal Name</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disasters</td>
<td>37</td>
<td>21</td>
</tr>
<tr>
<td>International Journal of Project Management</td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>Communication</td>
<td>22</td>
<td>12</td>
</tr>
<tr>
<td>International Journal of Strategic Property...</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>International Journal of Disaster Resilience...</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Journal of Contingencies and Crisis Management</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Journal of Architecture</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Administration &amp; Society</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Computer-aided Civil and Infrastructure Engineering</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Journal of Geographical Sciences</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Eastern Geographical Review</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Habitat International</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Journal of Management in Engineering</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other journals</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>177</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
2.3. Disaster type

The types of disasters were grouped according to various considerations. Some disasters, such as earthquakes, have a sudden impact on society [9], while others like droughts and storms impact the community very slowly [10]. Figure 2 shows the distribution of papers based on disaster type. As shown in Figure 2, about 30% of the articles studied the post-disaster reconstruction of housing after earthquakes.

![Figure 2. Distribution of papers according to the disaster types](image)

3. Post-disaster reconstruction of housing in urban and rural areas

Post-disaster reconstruction of housing in rural and urban areas presents challenges that are specific to each area. Inspired by the studies conducted by Yilmaz et al. [11] and Alipour et al. [12], the authors of the present review categorized the challenges identified through the existing literature into four main categories: general, economic, social, and physical.

3.1. General challenges

The general challenges are presented in Table 2 and were classified into six main categories: (1) resources, (2) planning and management, (3) land values, (4) occupancy and interaction, and (5) population, and (6) occupation. The frequency of the challenges in each category was counted, and the categories were ranked. As illustrated in Table 2, the challenges belonging to the resource category received the highest frequency (55) and were recorded as the first rank. The challenges belonging to the planning and management category received the second highest frequency (32).

Gur [13] and Arslan [14] believed that the size of the population in the affected area plays a crucial role in the length of time required to complete the housing reconstruction. Since urban areas are usually more populated than rural areas, the reconstruction would be expected to take longer in them [15]. Effective management is another important element associated with housing reconstruction after a disaster [16]. According to the studies conducted by Alipour et al. [12], it is easier to establish effective communication and coordination among those in a rural area because rural communities commonly follow their local leaders, while those in urban communities want to know every detail of the process, making the controlling and management of them complicated [17].

In 2013, Tafti and Tomlinson conducted a study in which it was concluded that the affected families/individuals who own the houses that are destroyed are more willing to participate actively in the process of reconstruction. Accordingly, as rural people are usually homeowners and live in their houses, they are active in the reconstruction process. On the contrary, some of the people in the urban areas are tenants and often do not fully participate in the reconstruction.
Boen and Jigyasu [23] found that farming habits are a major challenge in rural areas. The farmers they studied, who were relocated from their native place during a natural disaster, were unable to cope with their new environment, as it required changing their farming habits. The land provided to them for farming might not grow the varieties of crops that they were accustomed to growing, and it was sometimes located far from where they were staying. This caused the farmers to abandon the place they were relocated to and return to their native places to rebuild their houses.

3.1. Social challenges

The social challenges associated with post-disaster reconstruction of housing in urban and rural communities were identified by conducting a comprehensive review, and the results are shown in Table 3. The challenges were classified into five main categories: (1) literacy, (2) culture, (3) lifestyle, (4) community, and (5) government services. The frequency of the social challenges belonging to each category that were cited in the existing literature was counted and the categories were ranked.

As indicated in Table 3, one of the critical challenges associated with post-disaster reconstruction of housing is effectively involving the community in the process [33, 34] In 2010, Jha et al. [35] explained that affected people in rural areas participate actively in the process because they know and trust each other and the responsible organizations, and the advertising is very easy, as it consists mostly of just talking to one another. Conversely, the structure of an urban area is usually complicated, and it is difficult to encourage and/or convince the urbanites to participate [36].

### Table 2. List of general challenges and their categories, frequencies, and ranking

<table>
<thead>
<tr>
<th>Category</th>
<th>Challenge</th>
<th>Previous studies</th>
<th>Frequency</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources</td>
<td>• Availability of public facilities&lt;br&gt;• Accessibility to resources&lt;br&gt;• Competing demand for resources&lt;br&gt;• Scarcity of resources&lt;br&gt;• Institutional capacity for planning and regulation</td>
<td>[18, 19, 20, 21, 22, 23]</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>Planning and Management</td>
<td>• Inadequate planning&lt;br&gt;• Inadequate operational management related to post disaster recovery&lt;br&gt;• Effective management</td>
<td></td>
<td>32</td>
<td>2</td>
</tr>
<tr>
<td>Land issues</td>
<td>• Land Values&lt;br&gt;• Shortage of land for relocation</td>
<td>[23, 28, 29, 30]</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Occupancy and Interaction</td>
<td>• Ownership status&lt;br&gt;• Type of occupancy&lt;br&gt;• Interaction between neighbors</td>
<td>[13, 30]</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Population</td>
<td>• Level of expectations&lt;br&gt;• Number of population&lt;br&gt;• Farming Habits</td>
<td>[13, 14, 31, 32]</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3. List of social challenges and their categories, frequencies, and ranking
As presented in Table 3, Peng et al. [47] stated that a community's capabilities play a significant role in the length of time needed to complete housing reconstruction after a disaster. The people in rural communities are usually capable of self-settlement and work hard to expedite the reconstruction process, while urban people are more dependent on governments and other responsible organizations doing it for them.

Table 3 indicates that community participation is one of the major challenges. After any disaster, it is very common that the affected people are ignored in the process of decision-making [51]. The lack of public participation overshadows the real demand of the affected people [33, 53].

### 3.2. Economic challenges

The challenges associated with economics and finance were identified through the existing literature and are presented in Table 4, which shows that the economic challenges were classified into three categories: financial resources, management, and the local economic level. The frequency of the challenges belonging to each of the categories was calculated and ranked.

<table>
<thead>
<tr>
<th>Category</th>
<th>Challenge</th>
<th>Previous studies</th>
<th>Frequency</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy</td>
<td>• Education level</td>
<td>[26, 37, 38]</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>• Level of public awareness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td>• Cultural disparities after relocation</td>
<td>[39, 40, 41, 42, 43, 44, 45]</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Level of required privacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifestyle</td>
<td>• Poverty, Inequality, and unemployment</td>
<td>[23, 33, 46, 47, 48, 49, 50]</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• Capability of self-settlement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Level of healthcare</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Loss of livelihood</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Using of modern technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation and Mobilization</td>
<td>• Public participation</td>
<td>[14, 21, 25, 33, 40, 51]</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>• Insufficient time allowed for community mobilization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Services</td>
<td>• Local social capital</td>
<td>[42, 52]</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>• Availability of social services</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As indicated in Table 4, the income level of the affected people is a major challenge to housing reconstruction after a disaster [38]. As rural people commonly have a low/limited level of income from occupations such as fishing and agriculture, they cannot afford their essential needs through a post-disaster time [63]. Governments and responsible organizations have to face these economic challenges by distributing and/or investing available funding throughout the process of housing reconstruction.

3.3. Physical challenges

The physical challenges associated with housing reconstruction in both rural and urban areas after a disaster were determined from the existing literature and are shown in Table 5. The challenges were classified into six categories: (1) quality, (2) construction team, (3) design, (4) transportation, (5) safety, and (6) nature of the land. The frequency of the physical challenges was calculated, and then the related ranking was counted.

Table 5 indicates that the sizes of the houses and the number of rooms in them is very important for completing post-disaster reconstruction [38, 64]. In 2010, Onder et al. [33] conducted a study in which they demonstrated that the duration of post-disaster reconstruction in the urban areas may be longer than in rural areas because the houses and rooms in urban areas are usually larger.
Gok [69] and Gok et al. [70] believed that complex designs make housing reconstruction difficult and more subject to multiple issues. Because the designs of urban houses are usually more complex than those of rural houses, their reconstruction can be complicated and more subject to schedule delays and cost overruns [76].

As indicated in Table 5, one of the major challenges to reconstruction is the quality and scale of the work [77], which is often far beyond the capacity of the accessible inspectors. After a disaster, the normal regulations, design requirements, and permits are suspended in order to speed up the construction [78]. This leads to inspectors with heavy workloads and results in poor inspections [66]. In one case in Indonesia, the poor quality of the housing constructed by a nongovernmental organization was unacceptable to the communities, and about 300 houses were destroyed [65].

4. Conclusion

In this study, 177 articles were thoroughly reviewed to identify the challenges associated with post-disaster reconstruction of housing in urban and rural areas. The challenges were classified into general, social, economic, and physical categories. The frequency of the reviewed journals was then calculated, and their ranking was counted. The results revealed that there are remarkable differences between policies of post-disaster reconstruction of rural housing and urban housing. Additionally, effectively communicating with and coordinating the activities of people in a rural area is easier than it is with people in an urban area. The results also demonstrated that affected families/individuals who own the houses that were destroyed are more willing to participate actively in the process of reconstruction. Accordingly, as rural people are usually homeowners and live in their own houses, they are more active in the reconstruction process. On the contrary, some of the urban people in the affected areas are tenants, rather than homeowners, and they often do not fully participate in the reconstruction process. This study will help project managers allocate resources effectively and enhance the outcomes of post-disaster reconstruction of housing in both rural and urban areas.

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