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Disaster Recovery: The Role of Pre-Planning and Temporary Housing

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ABSTRACT
Disasters, both natural and unnatural are capable of destroying cities in a matter of seconds. The built environment of a city can take years to develop and within moments be taken away. Disasters obviously have enormous human costs, but for those who survive there are huge amounts of work to restore what was taken away. This research focuses on identifying how the construction industry is currently dealing with the disaster recovery projects. A questionnaire survey was conducted in order to understand stakeholders’ perceptions on disaster recovery. Particular focuses were placed on the role of preplanning and temporary housing during the disaster recovery process. The results found that both temporary housing and preplanning play a critical role in a speedy recovery from disaster and more importantly to improve the resilience of the community to disasters.

KEYWORDS
disaster recovery, pre-planning, temporary housing, Australian temporary housing

INTRODUCTION
Disasters occur across the world, and there is often little or no warning the disaster is coming. Once they strike they often leave in their path much damage to the natural and built environments. Research published by The Centre for Research on the Epidemiology of Disasters shows the catastrophic effects of disaster that the following losses occurred as a result of disasters: (1) more than 235,000 people killed; (2) 214 million people affected; (3) economic cost of $190 billion in year 2008 (CRED 2009). Recovery is defined as ‘the coordinated efforts and processes to effect the immediate, medium and long term holistic regeneration of a community following a disaster’ (Norman, 2006). It encompasses: (1) minimization of any escalation resulting from the disaster; (2) regeneration of the wellbeing of individuals; (3) taking opportunities to meet future needs; and (4) reducing exposure to future hazards and the associated risks. Similarly the Emergency Management Act 2004 defines recovery as the means and measures taken during and after an emergency to assist the re-establishment of normal life (Government
of South Australia 2009). It includes: restoration of what is damaged and provisions of new to replace that which is destroyed. Clearly following a disaster there must be sufficient recovery efforts so as to rebuild and repair what has been destroyed. This recovery effort requires cooperation between community and Government, and will heavily rely on the construction industry in the rebuilding phase.

**LITERATURE REVIEW**

*Temporary housing*

Disasters have the ability to destroy much of the built environment, and this includes the homes in which people live. Once a part or a whole town is destroyed in this way, the question arises of what to do with the people who have been misplaced by the disaster. Hayles (2010) pointed out that housing recovery will go through four stages, i.e. emergency shelter, temporary shelter; temporary housing and permanent housing. Of the four stages outlined, temporary housing can be seen as a vital stage as it bridges the gap between the initial shelter and reconstructed permanent housing. Tas et al. (2010) stressed that these four stages should be carried out seamlessly so that the transition can be kept as brief as possible.

According to Johnson (2007, p.436), the temporary housing is both “a stage in the process of rehousing after a disaster”, and “a physical type of housing stock used by families during the post-disaster period”. It is evident that temporary housing is a vital step in reconstruction. How long the temporary housing is to be utilised before a return to permanent housing can and does differ from event to event, however regardless of the length of time it is required for, the temporary housing stage is vital. Also, as Johnson (2007) implies, the temporary housing system is within an immediate and broader environment and will ultimately contribute to not just the immediate recovery but the long term reconstruction and recovery of the broader community.

It is becoming increasingly difficult to ignore the effect on success levels within housing recovery projects that community involvement has. The involvement of the community in temporary housing projects has been shown to have positive effects; however it is systematically problematic (Ganapati & Ganapati 2009). Through examination of two questions surrounding this area in a case study on temporary housing projects in Turkey following the 1999 earthquakes, Ganapati & Ganapati (2009) found that through too narrowly defining the ‘public’ invited to participate many key stakeholders were neglected, meaning their input was missed and therefore the benefits they could instil in the project were ignored. Similarly, Spaling & Vroom (2007) found that purposeful participation in the reconstruction process by the community provided an opportunity for
the project beneficiaries to be involved in the decision making where they may otherwise have not had a say.

For community involvement to be successful in temporary housing projects it needs to occur at the correct stage. When participation occurs at a late stage of the project there can be frequent problems either with the process or outcomes of the project. Conversely when their involvement is implemented in the upfront stages there can be important impacts on the project which carry long-term advantages to themselves and other stakeholders (Davidson et al. 2007). Furthermore the amount of community involvement in a project should be in accordance with the extent allowed by the scale and context of the particular situation, and therefore is not simply an all or nothing approach (Lawther 2009).

**Preplanning**

Previous studies into the effect of government legislation into reducing the impacts of natural disasters have highlighted that improved codes and legislation can have significant effects on disaster reduction (Spence 2004). However, the difficulty of applying such codes and legislations can often be too complex. Spence (2004) argues that simpler codes with deemed to satisfy approaches could in many ways be a step forward.

One problem associated with government legislation and reconstruction projects is that the legislation applied to routine construction, but little provisions made for areas of reconstruction. That is the legislation is not equipped to cope with emergency situations, Rotimi et al. (2008) highlighted the following effects of legislation on reconstruction:

- Loss of momentum in reconstruction projects due to restrictive legislation and lacking government commitment
- Inability to apply pragmatic solutions to real-time reconstruction problems resulting in loss of commitment
- Difficulties in achieving project deliverables and inability to accelerate the process
- The impairment of community recovery/quality of life

There appears to be a relationship between areas highlighted as potential disaster risk areas, and higher insurance premiums creating a trend which is increasingly seeing higher levels of poor site selection and development planning (Comerio 2004). Conversely, Spence (2004) argues that there is considerable potential for insurance schemes to enforce codes and legislations by requiring these items as preconditions for insurance.

An in depth and integrated approach is required within the construction decision making process, and resilience needs to be built in to planning, design and construction processes.
Bosher et al. (2007) argued that in order to reduce the destruction of disasters, greater emphasis and awareness needs to be added to systematically building in resilience into construction. Similarly, the planning of disaster relief efforts is a vital component of the projects success. As effective relief and recovery from disaster requires a more comprehensive and quicker response than is required for traditional projects, planning the efforts before they are undertaken is vital, as ‘failing to plan is planning to fail’ (Rapp, 2009, p.19).

To date there have been various methods introduced to coordinate disaster recovery methods. There is a consensus within disaster management organisations that collaborative and coordinate approaches are necessary for successful recovery but there is little agreement at present to the means of achievement. It is argued that Habraken’s theory of a hierarchical control model provides a sound basis for the development of an approach to disaster management (Hewitt et al. 2008). According to Hewitt et al. (2008, p. 2), Habraken’s hierarchical control model defines the hierarchy of “the physical structure of the urban environment” whereas “built form and human agency exert control over the process of change, with the degree of control corresponding to their level within the hierarchy”.

To minimize the effect of disasters in terms of monetary costs, it is vital to ensure that the built environments ability to withstand disasters is maximised, and that they are resilient. Gingie et al. (2010) highlighted the importance of highlighting gaps where the built environment is weakened in order to ascertain where enhancements are necessary. Through disaster risk assessment, training, framework and developing skill and knowledge in disaster mitigation and reconstruction, these gaps can be found and lessened. The common gaps found by Gingie et al. (2010) include deficiencies and complexities in legislation, inadequate funds, and lack of community participation.

**RESEARCH METHODOLOGY**

The purpose of this study is to investigate the disaster recovery process from the replanning and temporary housing perspective. The surveys were distributed to organisations operating within the following fields:

- Government
- Non-Government Organisations
- Consultants – Architectural and Engineering
- Contractors
- Planners
- Industry Bodies
Emergency Recovery Authorities
Disaster Recovery Authorities

The survey questionnaires were distributed to those in charge of the organisation in the first instance, general manager/managing director or similar for their allocation to relevant personnel at their discretion. The organisations selected were based on their experience with reconstruction and recovery projects. In particular experience with temporary housing, and or pre-planning activities and government legislation was preferable. Survey questions were generally closed, with further questions for explanation and further information provided. Initial contact to participant organisations was made through telephone and email. Follow up emails and phone calls were required to encourage the responses. 120 questionnaires were sent out and 42 were received.

RESULTS

Community involvement in temporary housing

The amount and type of community involvement within temporary housing projects is a vital aspect, and will contribute to the amount of success the project experiences. Respondents were asked to rank the levels of involvement as they felt appropriate. Results were shown in Table 1. Majority of respondents stated there should be some community involvement to some degree. The vast majority believed the involvement would need to be dependent on the circumstances of the project and for it to be successful needed to be purposeful.

Table 1 – Community involvement in temporary housing

<table>
<thead>
<tr>
<th></th>
<th>Responses</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Purposeful</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Dependent on individual circumstances of the project</td>
<td>25</td>
<td>1</td>
</tr>
</tbody>
</table>

According to respondents, the location for the temporary housing is as an area that requires involvement from the local community and council; however it is vital for the coordinating authority in charge to get the temporary housing established as quickly as possible in most instances. Therefore the amount of community involvement may be limited due to this factor. Comments made by respondents in the questionnaire are:

‘local input to living conditions is vital to ensure acceptance and longevity of the project’;
‘hands on by affected person’s aids in both the physical and personal recovery aspects’; and
in extreme circumstances the community may be unable to make decisions, and in these extreme circumstances the Government needs to step up and take over the decision making’.

Management of temporary housing projects

Good management of any construction project is vital to its success, when considering the importance of time as in temporary housing projects, this is amplified severely.

Table 2 – Management approaches

<table>
<thead>
<tr>
<th>Management Approach</th>
<th>Responses</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralizing Management Approach</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>Ad Hoc Organisational Structure</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Habrakens Hierarchical Control Model</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Owner Driven Management</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

As shown in Table 2, there were mixed views as to which management system is best for temporary housing projects. There were certain approaches that were however clearly favoured by the respondents with centralizing seen as the preferred approach and an ad hoc model as least preferred. An owner driven approach was also regarded as an appropriate management method for temporary housing to allow the future inhabitants to take ownership of their dwellings.

The extensiveness of the disaster can affect the ability of the community to make decisions immediately after the disaster. This was reflected in the majority of results, and the reasoning behind the respondent’s choices. There was a strong view amongst respondents that a centralizing approach should be preferred to ensure that administering procedures are tried, tested and proven, and can be refined with each disaster. Similarly to the level of community involvement, there was a belief between respondents that the management system should and will be determined by the actual incident; and that duration, weather, degree of damage, volume, geography, community resilience and capacity will affect the decision on management type.

Most respondents agreed that an ad-hoc arrangement was unsuitable and could potentially lead to the detriment of the project. Lessons learnt from previous projects should be incorporated in to the planning and management, that way with each project tried and tested methods can be incorporated within the management.

Re-use and recycling potential of temporary housing

There is general consensus from survey respondents that there is a great potential for the recycling and or re-use of temporary housing. There were a variety of views on how best to go about this and what steps needed to be taken to allow for it.
As shown in Table 3, respondents viewed rehabilitating for re-use and relocation as the most suitable approaches to deal with temporary housing. In contrary, salvaging materials and their subsequent reuse is not a preferred option. Respondents explained in the questionnaire that the temporary housing units are often not designed to last for a long time frame.

<table>
<thead>
<tr>
<th>Reuse alternatives</th>
<th>Responses</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salvage and re-use materials</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Upgrade to be used as permanent housing</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Relocation for similar usage</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Rehabilitation of the housing for re-use</td>
<td>14</td>
<td>2</td>
</tr>
</tbody>
</table>

An example was provided by one respondent whereby historically America has re-used and upgraded its temporary housing stocks to be used as permanent housing for low socio-economical housing in housing estates. Potentially if the temporary housing is at a standard that is compliant it could be re-used in this type of situation as it would make sense to re-use it in this instance.

**Government legislations and preplanning**

Generally there was a common theme amongst survey respondents that the amount and complexity of Government Legislation was a hindrance on reconstruction projects. It was suggested that there is a requirement for more pre planning for disaster, particularly bushfires as one survey respondent stated ‘more pre-planning by the Government for bushfires is essential, as indications suggest they will become more frequent.

Table 4 highlighted the effect of Government Legislation and pre planning efforts on the reconstruction process. Respondents are of the view that the complexities of Government Legislation often causes the delay of the overall project, and that pre-planning will greatly improve and expedite the reconstruction project. Further studies is required to identify the direct examples where legislation as a hindrance to a recovery response through a qualitative approach.

Again there was an idea that the amount of government legislation should be dependent on the individual circumstances of the disaster and resulting reconstruction project requirements. Furthermore one survey respondent highlighted the approval and procurement stages as ones in which Government Legislation is typically a hindrance, and stated ‘emergency procedures should allow people charged with building temporary housing to waive (within reason) the normal procurement approval processes’.
### Table 4 – Complexities of government legislation

<table>
<thead>
<tr>
<th>Statement</th>
<th>Response</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>The complexities of Government Legislation hinder the reconstruction process.</td>
<td>Strongly Disagree</td>
<td>0%</td>
</tr>
<tr>
<td>Approval and certification for reconstruction projects should not be subjected to the same requirements as regular projects are to allow for speedy recovery.</td>
<td>Disagree</td>
<td>40%</td>
</tr>
<tr>
<td>The current legislation is inadequate in terms of pre-planning and mitigation of disasters.</td>
<td>Neutral</td>
<td>0%</td>
</tr>
<tr>
<td>Failing to plan is planning to fail in reconstruction projects.</td>
<td>Agree</td>
<td>40%</td>
</tr>
<tr>
<td>A well thought out and thorough plan will contribute to a successful reconstruction project.</td>
<td>Strongly Agree</td>
<td>20%</td>
</tr>
<tr>
<td>Planning for disasters should be implemented throughout all types of construction in a more meaningful way.</td>
<td>Strongly Disagree</td>
<td>0%</td>
</tr>
<tr>
<td>Disaster risk reduction should have a more integrated role in construction professionals.</td>
<td>Disagree</td>
<td>0%</td>
</tr>
<tr>
<td>There should be separate legislation for reconstruction projects due to time constraints and urgency.</td>
<td>Neutral</td>
<td>0%</td>
</tr>
<tr>
<td>At current the level of integration of disaster risk reduction within construction is inadequate.</td>
<td>Agree</td>
<td>0%</td>
</tr>
</tbody>
</table>
There was a strong view from respondents that more legislation was required in the preplanning and mitigation of disasters. Further legislation like the BAL Ratings is required to allow home builders to mitigate against the risks of disasters. The Bushfire Attack Level (BAL) is the new building standard assessment which has six levels of risk, from low to flame-zone. The six levels of BAL ratings determine whether or not a temporary house is suitable for re-use as permanent housing. One respondent stated that ‘people and Government circumstances change, and we have very inflexible policies in regard to temporary housing which require review in the near future’. Therefore it may be prudent to conclude that rather than new legislation being implemented, a review of the parties involved may be the first step to improve the reconstruction process and remove the hindrances that exist in the current environment.

CONCLUSIONS
A disaster is an event which requires external system due to its overwhelming nature above and beyond that of the local capacity. Disasters can be natural; fire, landslide, floods, hurricanes etc. or manmade such as terrorism. They are capable of destroying the natural and built environment in a matter of minutes, leaving behind a long road to recovery. The recovery process is an arduous process, and the construction sector has an important role to play in this process. This research adopted a quantitative approach to investigate the role of temporary housing and preplanning in disaster recovery process. The results showed that there should be a certain level of community involvement in both temporary housing and preplanning. In terms of reuse and recycle potentials of temporary housing, rehabilitation for reuse and relocation for similar usage are perceived as most appropriate approaches. Similarly, there is room for improvement for the government legislation to avoid the delays of recovery process whereas preplanning plays a critical to make a community disaster resilient.

REFERENCES


