Role of construction in managing disasters in developing economies

Kaushal Keraminiyage, Dr. Dilanthi Amaratunga, Dr Richard Haigh

The Research Institute for the Built and Human Environment
The University of Salford
Salford
UK

Introduction

Recent large scale natural disasters such as Indian Ocean Tsunami of December 2004 reminded the world that the natural disasters can occur at any time any place and there are no “safe heavens” in the world. Moreover the devastation triggered through this natural disasters reminded us once again the strength of the link between the built environment and natural disasters. Despite the fact that the importance of the built environment and related disciplines towards successful post disaster recovery has been a significant body of research during the recent past (for example see: Karim 2004; Lizarralde and Boucher, 2004; Nikhileswarananda, 2004; Young, 2004) the recent natural disasters made the researchers and alike to review the existing body of knowledge related to post disaster recovery management and built environment as a matter of global importance and relevance.

Developing countries and Disasters

As the Royal Institution of Chartered Surveyors highlight, 24 out of 49 low-income developing countries face high levels of disaster risk (RICS, 2006) and they experience higher levels of mortality compared to developed countries in an event of a disaster. For an example, the earthquake which hit central California in 2003 with a magnitude of 6.5 in the Richter scale, took two lives and injured 40 people (NEIC, 2003), where as the earthquake which hit Iran four days later with a magnitude of 6.6 killed at least 26,000 people (NEIC, 2003, Chui, 2004). As one would suspect, this immense difference in the death toll is not uniquely related to the factors such as population densities, as both events took place in areas with high-density populations Not only the developing countries

experience higher levels of mortality during a disaster, they generally require longer periods for post disaster recovery. Even though the developing countries often receive financial and other humanitarian supports from international communities, non governmental organisations and donor agencies as immediate relief aids just after a disaster, generally long-term recovery has been identified primarily as a national, sub-national and local government-led matter. As such the donors and other organisations work towards humanitarian relieves pay lesser attention to the long term recovery aspect of disaster managements. Thus, not surprisingly, developing countries who witness disasters, fail to launch successful long term disaster recovery programmes especially due to lack of financial and intellectual resources.

Role of construction in Disaster Management

Although it may not very significant during immediate relief attempts, construction's role as an essential part of reconstruction activities following disasters, both natural and human-caused, is well documented. In particular, post-disaster reconstruction has been the subject of a continuous discussion with particular emphasis on developing countries that are less able to deal with the causes and impacts of disasters [for examples see: Karim, (2004), Lizarralde and Boucher (2004), Nikhileswarananda, (2004), Young, I (2004)]. Thus, the importance of improving the construction industries of developing nations is widely recognised, highlighting a need to equip them to manage the post-disaster scenario (Ofori, 2002). Construction is typically engaged in a range of critical activities: temporary shelter before and after the disaster; restoration of public services such as hospitals, schools, water supply, power, communications, and environmental infrastructure, and state administration; and, securing income earning opportunities for vulnerable people in the affected areas (World bank, 2001). Further, there is growing recognition that the engineering community has a valuable role to play in finding and promoting rational, balanced solutions to what remains an unbounded threat (Sevin and Little, 1998) and that the construction industry has a much broader role to anticipate, assess, prevent, prepare, respond and recover from disruptive challenges. Peña-Mora (2004) suggests construction professionals have a key role to play because they are involved in the construction of the infrastructure, and therefore should also be involved

when an event destroys that infrastructure. Specifically, he emphasises that construction engineers possess valuable information about their projects, and that information can be critical in disaster preparedness, as well as response and recovery. The information they posses, he argues, may be the difference between life and death. Sevin and Little (1998) further suggest that computerised building plans, structural analysis programs, and damage assessment models may all facilitate rapid rescue and recovery of victims in the aftermath of a disaster, and that these all require the active involvement of the construction professions.

Moreover, the impact of Built Environment related disciplines to the disaster recovery management do not limit to the so-called hard sciences. More managerial and strategic issues such as management of public and commercial infrastructure facilities require a fine mixture of knowledge with regard to the technological and human aspects of Built Environment. Even though the knowledge related to these aspects of Built Environment is significantly developed within western and European, developing countries such as Sri Lanka does not possess this knowledge at the desired level.

On the other hand, the available built environment knowledge around the world does not reflect adequate coverage required to address the current disaster recovery related issues. As an example, despite the fact that the most advanced Facilities Management (FM) curricula is available within the Europe today, those often show clear gaps related to specific disaster management issues, which can often be improved through the potential lessons to be learnt from current natural disaster related cases such as the Indian Ocean tsunami. In context, to address the current disaster recovery management requirements within a global scale, two mutually beneficial actions are required from the global built environment education point of view. Those are; to update the current global body of knowledge in built environment to address the current disaster management recovery issues, possibly by learning lessons from current global disaster recovery attempts such and to disseminate the related knowledge globally so that the desired local knowledge is available when and where required.

The Indian Ocean Tsunami and the case of Sri Lanka

The case of Sri Lanka provides a valuable insight to the link between built environment and disaster management. Before the Indian Ocean Tsunami, Sri Lanka was known to be a safe haven where outrages of nature scarcely occurred except for occasional floods and landslides during the rainy seasons. However, the Tsunami affected 75% of the coastline of Sri Lanka. It also resulted in the destruction of more than 100,000 houses (UNEP, 2005). The destruction of houses also resulted in discontinuance of several livelihoods such as fishing, farming, tourism and handicrafts-related activities. In addition to commercial and non-commercial property damage, the number of deaths apportioned to the Indian Ocean Tsunami is estimated to be in excess of 250,000, with at least 40,000 of those in Sri Lanka (BBC, 2005). A lack of awareness has been identified as a major reason behind the huge loss of life (Karim, 2005). Indeed, the term "Tsunami" was heard by most of the ordinary Sri Lankans only after this devastation. Both awareness and preventive steps are needed to prevent huge loss of human life in future. However, the problem continues beyond the pre– disaster stage into recovery, where Sri Lanka has again demonstrated the need for proper information and knowledge dissemination, as this has often been highlighted as the reason behind unsuccessful post– Tsunami recovery activities. A lack of prior knowledge and proper point of references have made most of the recovery plans guessing games, eventually failing without adding appropriate values to the recovery attempts (Banerjee, 2005).

Disaster Management, Capacity Building and the role of Education

The UNEP report (2005) highlights the context in which the current post - Tsunami rehabilitation (long term recovery) is operating. Within this report the factors such as pre-existence of very high densities of unplanned settlements in the Southern part of Sri Lanka have been highlighted as influential factors over the operation of the rehabilitation programs. Add to this, the post-Tsunami rehabilitation operations have been affected due to the lack of response capacities in local government institutions to address the needs of such a magnitude. This is mainly because, before the Tsunami, Sri Lanka was known to be a safe haven where outrages of nature scarcely and the strategic and operational level

capacities of the institutions responsible for public and commercial facilities were not expected to cater for a devastation of this nature or the scale. As such it has been identified that the capacities of relevant authorities in Sri Lanka need to be improved to launch successful post tsunami recovery progammes and to face any future challenges of the same nature (UNESCO, 2005; ADPC, 2005). As identified by Lagcao (2003), the primary goal of capacity building is to increase an organization's access to information and technical know-how by improving internal management structures, processes and procedures, as well as strengthening partnerships among the various players in the development process. Accordingly, within the context of post – tsunami recovery in Sri Lanka, the aim of providing access to information and technical know-how to the authorities responsible for public and commercial infrastructures, largely resides within the capacity and capability of Higher Education (HE) institutions in Sri Lanka.

Moreover, in order to achieve the desired capacity and the expertise for the re-creation, long term maintenance and management of public and commercial facilities; teaching, training and research related to the discipline will have to be strengthened within the country. While teaching and training sessions can be more appropriate in developing the required capacities in short term, development of a proper research base within the country is required to establish the capacity to ensure successful maintenance and management of these facilities continuously within the country. Thus, from an academic point of view, the post tsunami rehabilitation in Sri Lanka demands an established academic knowledgebase in facilities and infrastructure management.

However, within Sri Lanka, there are no universities with postgraduate degree programmes in this discipline. Despite the increasing recognition of the importance of establishing FM as an important knowledge area, it has been identified that the higher education institutions in Sri Lanka do not have the required capacities in delivering training, teaching and research extensively in the area of FM in terms of initial local expertise and knowledge. Thus, there is a clear and timely requirement to enhance the capacities and research profiles of Sri Lankan HE institutes to support re-creation and long term maintenance of the public and commercial facilities, and related infrastructure through the external (foreign) facilities management expertise.

However, the application of direct foreign knowledge within the given context is not appropriate as there may be mismatches in knowledge application within the Sri Lankan context due to some influential country specific characteristics such as economic condition, government policies and cultural sensitivity. Thus, it is important to make sure that the capacity building related to the facilities management discipline in Sri Lanka is an attempt to use the foreign knowledge on the subject matter to create appropriate knowledge to suite the values, requirements and demands of Sri Lanka.

On the other hand, the current global infrastructure and facilities management knowledge does not reflect adequate coverage required to address the current disaster recovery related issues. As an example, despite the fact that the most advanced Facilities Management (FM) curricula is available within the Europe today, those often show clear gaps related to specific disaster management issues. It is apparent that these gaps can be improved through the potential current natural disaster related cases such as the Indian Ocean tsunami. In context, to address the current disaster recovery management requirements within a global scale, two mutually beneficial actions are required from the global built environment education point of view. Those are; firstly, to update the current global body of knowledge in built environment to address the current disaster management recovery issues, possibly by learning lessons from current global disaster recovery attempts such and to disseminate the related knowledge globally so that the desired local knowledge is available when and where required. Secondly, to disseminate currently available knowledge in appropriate form to the areas in need such as to the counties affected by the recent disasters.

The EURASIA project

Addressing the above highlighted requirements at a manageable scale, an European Commission funded international collaborative research project, the EURopean and ASian Infrastrucuture Advantage (EURASIA) provides the required basic infrastructure. The EURopean and ASian Infrastrucuture Advantage (EURASIA) is an international collaborative research project with the specific aim of addressing the above highlighted requirement. Five project partners are working in collaboration within this project; three European higher education institutes and two Sri Lankan higher education institutes;

namely the University of Moratuwa and the University of Ruhuna. The two Sri Lankan partners are specifically the leading higher education institutions that produce construction specialists for the country. The three European partners are located within United Kingdom, Estonia and Lithuania namely, the University of Salford – United Kingdom, The Tallinn University of Technology - Estonia and Vilnius Gediminas Technical University – Lithuania. There have been a number of Facilities management (FM) developments since the early 1990s, with the University of Salford being the leading UK based institution. Over 95% of UK based FM courses are at a Postgraduate level. However, the problem at present is that current UK provision lacks contextual knowledge on facilities and infrastructure management (particularly in association with the natural disasters such as Tsunami) in the South Asian developing economy. Collaboration with Sri Lankan institutions will increase the relevance of such programmes with up-do-date embedded case studies. Both Sri Lankan partners are located within the tsunami affected areas; one being situated within the worst affected southern province will be able to contribute to the development of case study material in support of the programme. This will be a direct contribution towards support for implementation of capacity building.

Project Aims and Objectives of EUARSIA

The main aim of the project is to foster cooperation in Higher Education institutions in both Europe and Asia, improve reciprocal understanding of cultures, exchange best practice and strengthen mutual awareness of programs specifically related to disaster recovery management and capacity building. The specific objective of the project is to enhance the capacity of the partner institutions for training, teaching and research activities required for the creation and long-term management of public and commercial facilities and elements of infrastructure associated with post-Tsunami activities in Sri Lanka. The project will achieve this by: developing and improving the Sri Lankan and EU's staff and postgraduate students' professional and research skills associated with the creation and management of facilities and infrastructure utilising the teaching experience of the EU University partners to develop a curriculum on the creation and long term management of public and commercial facilities and elements of infrastructure;

improving and consolidating academic networks by encouraging systematic exchanges so as to establish a sustainable link between EU and Sri Lankan partner Universities; developing joint institutional systems and procedures for the provision and monitoring of training, teaching and research activities associated with the creation and management of facilities and infrastructure; providing career development opportunities to junior staff through postgraduate study and training programmes with partner Universities; and, disseminating knowledge and interpreting information through joint publications and by conducting lectures, seminars, workshops and conferences.

Impact to date

It is expected that the outcomes of this project will be beneficial to different groups in different ways and in varying degrees. Groups which are likely to receive the potential benefits of this research are identified as target groups. The impact on each target group is discussed below.

EURASIA is planned to create human resources capabilities of target groups towards the long term management of public and commercial facilities and elements of infrastructure to ensure the controlled and regulated development of facilities which meet a diversity of needs. It has been planned these aspects to be achieved mainly by means of professional skills development through knowledge transfer and exposure to professionally accredited postgraduate education programmes.

Education and knowledge posses power to generate the values and consciousness necessary to overcome many socio cultural issues and problems confronting the humankind today. However, education and knowledge cannot effectively and efficiently combat these issues unless they are understood and the knowledge and experiences shared, when creating the awareness and taking the necessary actions both locally and globally. Hence the need of the day is to create systems and programmes that enable this independent society to learn and act together for a shared future. In this context, this project helps beneficiaries not only to understand the issues and share knowledge but also help communities to mutually benefit. Accordingly, how the project has improved the situation of specific target groups so far are listed below:

Postgraduate students – The main impact on this group is expected through the introduction of the joint curricular for Facilities Management (FM) postgraduate programmes. The development of this joint curricular is expected to be completed in the near future. Once the joint curricular is fully developed, the students in Sri Lanka will benefit through curricular designed to match their specific requirements. European Unoin students will benefit through a deeper understanding of Asian FM applications particularly relating to business continuity management after natural disasters such as Tsunamis.

The intention of the project is to provide students from both EU and Asia with a more effective transfer of experience. New programmes and modules will be developed by building on the best practices available within the partnership and based on the live case studies in Sri Lanka with a more practical and international perspectives. The project is highly relevant to students as it provides additional skills and knowledge, and the ability to assess FM within specific contexts. However, up to date, significant progress has been demonstrated in the light of developing the joint curricular. Specifically;

18 module specifications were collected from partner institutions to be part of the joint curricular

The module comparison framework and skills audit frameworks are fully developed and ready to use for the purpose of creating the joint curricular

Thus, it is envisaged that the full impact of the project on this target group is to be achieved after the second year of the project, and the project is progressing as planned to achieve that milestone.

Teaching and administrative staff – staff from partner institutions were benefited, during past 12 months, from the exposure to cross cultural environments, programme development, updated teaching and learning activities and assessment procedures, and the arrangement of split site PhD training in a related field. The major direct impact on staff during this period was triggered through the staff exchanges with over 40 staff directly and indirectly linked and involved in aspects of knowledge transfer relating to FM at each institution.

Researchers – Over 30 researchers from the partner institutions were given access to the Virtual Environment for Built Environment Researchers, a virtual workspace developed

as a part of the EURASIA project (http://veber.buhu.salford.ac.uk). This virtual workspace was developed specifically with the Built Environment research needs in mind. This has gone through several evaluation cycles with online user feedback systems. From the most recent evaluation it is clear that VEBER has been serving the researchers as an information hub, actively creating a successful knowledge transfer among the researchers from Asia and Europe. Further, the more than 8 presentations made to date at various international conferences broadened the boundary of these benefits to include appropriate knowledge dissemination to research communities worldwide.

Public and private sector organisations – Project deliverables have been disseminated to additional bodies such as the European Commission, Royal Institution of Chartered Surveyors (RICS) and Institute of engineers Sri Lanka and Institute of Quantity Surveyors Sri Lanka during the last 12 months. These organisations were mainly benefited through the knowledge disseminated through the project website, various reports submitted, special discussion sessions and debates organised in various international conferences and special seminar and workshop sessions organised during the staff exchanges

REFERENCES AND BIBLIOGRAPHY

ADPC (2005) Report on Post Tsunami Rapid Assessment In Sri Lanka, ADPC, Bangkok Thailand

Atkin, B., Brooks, A. (2000), Total Facilities Management, Blackwell Science, London

Banerjee, A (2005) Tsunami Deaths. Current Science, Vol. 88, No. 9, 10 May 2005.

BBC (2005) [online]. [Date accessed: 20th February 2006]. Available from World Wide Web:http://news.bbc.co.uk/1/hi/world/asia-pacific/4126019.stm

Governing council (2005) RICS Presidential Commission on Disaster management Interim report, GOVC/P(05)55.

Jigyasu, R. (2002) From Marathwada to Gujarat – Emerging challenges in post-earthquake rehabilitation for sustainable eco-development in South Asia. Proceedings of the First International Conference on Post-disaster Reconstruction: Improving post-disaster reconstruction in developing countries, 23-25 May 2002, Universite de Montreal, Canada.

Karim, N (2004) Options for Floods and Drought Preparedness in Bangladesh. Proceedings of the Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April 2004, Coventry University, UK.

Lagcao, M (2003) Snakes and Ladders for Civil Society, One World UK [online] [Date accessed: 20th February 2006] Available from World Wide Web:http://uk.oneworld.net/article/view/47508

Lizarralde, G. and Boucher, M. (2004) Learning from post-disaster reconstruction for pre-disaster planning. Proceedings of the Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April 2004, Coventry University, UK.

Nikhileswarananda, S. (2004) Post Disaster Reconstruction work in Gujarat on behalf of Ramakrishna Mission. Proceedings of the Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April 2004, Coventry University, UK.

Ofori, G. (2002) Developing the construction industry to prevent and respond to disasters. Proceedings of the First International Conference on Post-disaster Reconstruction: Improving post-disaster reconstruction in developing countries, 23- 25 May 2002, Universite de Montreal, Canada.

Pena-Mora, W. (2005) Collaborative First Response to Disasters Involving Critical Physical Infrastructure. O'Neal Faculty Scholar Seminar from University of Illinois, September 19, 2005.

Sevin, E and Little, R. (1998) Mitigating Terrorist Hazards. Volume 28, Number 3 - Fall 1998.

UNEP (2005) Natural Rapid Environmental Assessment – Sri Lanka, UNEP Sri Lanka Country Report – 2005.

UNESCO (2005) Assessment of Capacity Building Requirements for an Effective and Durable Tsunami Warning and Mitigation System in the Indian Ocean, Consolidated Report for Countries Affected by the 26 December 2004 Tsunami, UNESCO, IOC/INF-1219, Paris

World Bank (2001). World Bank and Asian Development Bank Complete Preliminary Gujarat Earthquake Damage Assessment and Recovery Plan. http://www.worldbank.org/gujarat; http://www.adb.org/.

Young, I (2004) Monserrat: Post Volcano Reconstruction and Rehabiliation – A Case Study. Proceedings of the Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April 2004, Coventry University, UK.