

Chapter 3

Maintenance in Critical Infrastructures: The Need for Public–Private Partnerships

Patricia Maraña

University of Navarra, Spain

Leire Labaka

University of Navarra, Spain

Jose Mari Sarriegi

University of Navarra, Spain

ABSTRACT

The increase in the frequency of disastrous events and society's dependence on Critical Infrastructures (CIs) has led to greater concern about the need to increase resilience in order to improve Critical Infrastructure Protection. CIs are basic service providers for society and they need to be effectively protected against hazards. Nowadays, CIs can be owned by private entities. However, although they can be privately owned or managed, they provide a public service that directly affects the whole society. Consequently, those activities that increase the overall resilience level of CIs need to be under the supervision of public entities. Increasing resilience requires special attention be paid to correct infrastructure and crisis response equipment maintenance. This chapter explains why effective Public-Private Partnerships (PPP) are valuable for correctly maintaining CIs and illustrates examples of real situations that demonstrate the need for effective PPPs in maintenance activities.

INTRODUCTION

Since September 11th, 2001, the threat of terrorism has raised concerns in many countries about the urgent need to improve the level of protection for their critical infrastructures. Subsequent events—such as the Asian tsunami in 2004, Hurricane Katrina in 2005, and the Fukushima Earthquake and subsequent tsunami in 2011—and their inestimable scope only emphasized this concern. The increase in the fre-

DOI: 10.4018/978-1-5225-0651-5.ch003

quency of crisis occurrence, the difficulty of foreseeing when the next critical event is going to happen, and society's dependence on CIs represent relevant challenges for public decision makers. However, they are not independent challenges and in fact, they are closely related.

When an unexpected critical event occurs, recovery to the normal state becomes more difficult if CIs have been affected, as the impacts of crisis, affecting CIs are significantly bigger. To make this challenge even more critical, the complex interrelationships between CIs and cascading effects (Lorenz, 2009) make it difficult to foresee how a crisis will evolve. Consequently, anticipating the occurrence of these events is critical. This research focuses on the prevention activities that are required to anticipate or reduce the impact of critical events affecting CIs.

Resilience refers to the capacity of a system to prevent a crisis occurrence, to mitigate the impact generated in the case that a triggering event occurs, and to reduce the recovery time needed to bounce back to the initial situation. In fact, it is in CI disruptions when the overall resilience level of a company could make a difference. The difference will be positive when the resilience level is high and negative when the resilience level is low (Maraña, Labaka, Hernantes, & Sarriegi, 2015).

Although we may believe that it is the government's responsibility to protect and maintain the welfare of people living in an area, when we consider how complex society is, we see how it is virtually impossible for just one party to undertake such a difficult task. Given that CIs are required for society's welfare and they are usually managed by private entities (Alexander, 2005; J. Chen, T. H. Y. Chen, Vertinsky, Yumagulova, & Park 2013; Hodge & Greve, 2007), cooperation between public and private companies is valuable for improving the resilience level of CIs and eventually increasing Critical Infrastructure Protection (CIP).

Increasing resilience requires paying special attention to the appropriate maintenance of infrastructures and crisis response equipment. Thus, the main objective of this chapter is to explain the main reasons why Public-Private Partnerships (PPP) are sometimes valuable for ensuring that CIs are correctly maintained. The aim of PPPs is to promote the sharing of resources and information between partners involved. Sharing resources and information among public and private entities enhances the overall resilience level of CIs because the more resources and information are available the better is the quality of the decisions taken by CI managers. To that end, examples of real situations that illustrate the need for an effective PPP in CI maintenance activities will be presented, followed by an explanation of three different types of PPPs that can help to make sure maintenance is performed correctly.

METHODOLOGY

The methodology followed during the development of this book chapter starts with a literature review about Critical Infrastructures (CIs), crisis impacts and resilience. Afterwards, a framework that includes a set of resilience building policies and sub-policies is presented. Some of the policies identified in that framework are directly related to maintenance what justifies the importance of conducting maintenance activities properly in order to increase the overall resilience level of any CI.

Next, the information gathered from a set of semi-structured interviews conducted with experts is explained. The main goals of these semi-structured interviews were the following ones:

- Validate the literature review previously done
- Understand the role of all the partners involved in CIP

19 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/maintenance-in-critical-infrastructures/164046

Related Content

Application of Data Mining Techniques in Clinical Decision Making: A Literature Review and Classification

Hakimeh Ameri, Somayeh Alizadehand Elham Akhond Zadeh Noughabi (2017). *Handbook of Research on Data Science for Effective Healthcare Practice and Administration* (pp. 257-295).

www.irma-international.org/chapter/application-of-data-mining-techniques-in-clinical-decision-making/186942

Context-Based Methodology for Decision Making: Application to Car Driving

Patrick Brezillon, Juliette Brezillon and Jean-Charles Pomerol (2009). *International Journal of Decision Support System Technology* (pp. 1-20).

www.irma-international.org/article/context-based-methodology-decision-making/3902

Decision Support for Collaboration of Carriers Based on Clustering, Swarm Intelligence and Shapley Value

Fu-Shiung Hsieh (2020). *International Journal of Decision Support System Technology* (pp. 25-45).

www.irma-international.org/article/decision-support-for-collaboration-of-carriers-based-on-clustering-swarm-intelligence-and-shapley-value/240591

A Hybrid Integration of PLS-SEM, AHP, and FAHP Methods to Evaluate the Factors That Influence the Use of an LMS

Evgjeni Xhafaj, Daniela Halidini Qendraj, Alban Xhafaj and Neime Gjika (2022). *International Journal of Decision Support System Technology* (pp. 1-17).

www.irma-international.org/article/a-hybrid-integration-of-pls-sem-ahp-and-fahp-methods-to-evaluate-the-factors-that-influence-the-use-of-an-lms/286697

Causal Modelling and Analysis Evaluation of Online Reputation Management Using Fuzzy Delphi and DEMATEL

Anil Kumar and Manoj Kumar Dash (2017). *International Journal of Strategic Decision Sciences* (pp. 27-45).

www.irma-international.org/article/causal-modelling-and-analysis-evaluation-of-online-reputation-management-using-fuzzy-delphi-and-dematel/181062