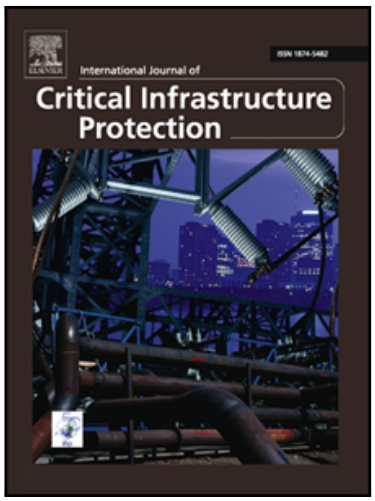

Cascading Impact Assessment in a Critical Infrastructure System

David Rehak , Pavel Senovsky , Martin Hromada ,
Tomas Lovecek , Petr Novotny

PII: S1874-5482(15)30025-1
DOI: 10.1016/j.ijcip.2018.06.004
Reference: IJCIP 257

To appear in: *International Journal of Critical Infrastructure Protection*

Received date: 16 September 2015
Revised date: 27 September 2016
Accepted date: 20 June 2018

Please cite this article as: David Rehak , Pavel Senovsky , Martin Hromada , Tomas Lovecek , Petr Novotny , Cascading Impact Assessment in a Critical Infrastructure System, *International Journal of Critical Infrastructure Protection* (2018), doi: 10.1016/j.ijcip.2018.06.004

Cascading Impact Assessment in a Critical Infrastructure System

David Rehak[a,*], Pavel Senovsky[a], Martin Hromada[b], Tomas Lovecek[c], Petr Novotny[a]
[a] *VSB – Technical University of Ostrava, Faculty of Safety Engineering, Czech Republic*
[b] *Tomas Bata University in Zlín, Faculty of Applied Informatics, Czech Republic*
[c] *University of Žilina, Faculty of Security Engineering, Slovakia*

Abstract

Research into disruptions to, or failures in, the Critical Infrastructure (further only CI), represents an important area of investigations into the phenomena in (a) Critical Infrastructure System (further only CIS). The results arising from the prediction of the intensity of problems - and the line(s) of their impacts spread–patterns, are an important part of any decision-making process carried out by the involved parties for the early and effective realization of Safety and Security Measures. Therefore, this article´s aim is to assess cascading effects in a CI system. The first part of the article deals with the typology of impacts - the aspects that form their nature; and the ways these impacts spread in a CI structure. Furthermore, the current approaches to the assessment of such cascading impacts are also described. Based on these facts, the authors define the principles and framework for assessing cascading impacts in a CI system. The CIA Method (Cascading Impact Assessment) –further only CAI), which serves for the quantification of the spread of cascading impacts in a CIS, is the most important part of this article. The essence of this method lies in its assessment of all lines of business occurring in the chosen area, as well as an assessment of their resilience and links; subsequent to this, a structural map of the risk of the spread of cascading impacts was created.

Keywords

Critical infrastructure; Czech Republic; Disruption; Failure; Impacts; Cascading effect

1. Introduction

Society is traditionally dependent on a whole range of infrastructures. Over the course of time, some of them - or some of their parts, which are of vital importance for society, began to be designated as Critical [1]. However, the understanding of what the CI is can differ in various countries. While infrastructures like energy, water supply, transport, etc. are understood to be critical in all countries; while some others can be considered critical only in some states, e.g. monuments of national significance are considered critical in Australia and the USA - but not in Austria. The study by the Centre for Security Studies [2], can be taken as the formation of the basic material for the comparison of approaches to protecting the CI in various countries.

Between various infrastructures, there can be dependencies that can spread after a disruption of the functionality of one infrastructure and its co-dependent infrastructures - which subsequently deteriorate due to the impacts of the emergencies. Here, we can mention - for

* Corresponding author
E-mail address: david.rehak@vsb.cz (D. Rehak).