Disaster risk mitigation through capital investment in enhanced building resilience

Maria João Falcão Silva[1], Filipa Salvado[1], Nuno Almeida[2]

Abstract The recognition of the high costs of the vulnerabilities of cities and communities due to various types of disaster risks have helped build the business case for investments improving the quality and resilience of buildings and civil engineering works. This important issue has attracted the attention of several stakeholders, including engineering professionals from different fields, scientists, standardization bodies, investors and financial institutions, regulatory agencies, user groups of several, as well as administrative services at national and regional level. This paper discusses the application of a resilience rating system to show the impacts of capital investment in building refurbishment and renewal. It highlights aspects in building renovation programs that efficiently and quickly increase their resilience in face of extreme events. The work presented builds on previous discussions on ways to measure the resilience of built assets, namely based on a rating system composed by different dimensions, several indicators, and parameters. It covers not only the building's intrinsic qualities, but also its interdependence with the community, surroundings, and users in the post-disaster context.

1 Introduction

The resilience of buildings and engineering works has awakened institutions from various stakeholders, including engineering professionals from different areas, scientists and financial standardization bodies, regulators, as well as administrative services at national and regional level and management entities. of assets (AM). This interest in correcting the broader vision of resilience is a key issue for achieving the ONU Sustainable Development Goals (SDGs), regarding economic issues and the need to provide the public, including groups, an environment that can better adapt to the risks of future disasters (Sarhosis et al 2019). The World Bank estimates that the cost of the vulnerabilities of cities and communities due to these types of disaster risks could reach more than USD 300 billion per year by 2030. On the other hand, these estimated costs can be reduced through capital investments for improving the quality and resilience of engineered physical assets that are the backbone of modern societies (e.g., infrastructure, industrial facilities, and buildings).

This paper addresses the resilience of Portuguese public-school buildings against different risks from an engineering standpoint, namely regarding to building structural safety and serviceability. These school buildings, constructed through the