
# Honors thesis

COURSE OF ARCHITECTURE FOR SUSTAINABLE DESIGN

*Abstract*

## A NEW DECISION MAKING METHOD TO SELECT PRIORITY INTERVENTIONS AFTER EXTREME EVENTS

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This research was aimed at developing a resilience quantification model at different scales. To do so, firstly an evaluation of resilience at the state level was conducted, followed by a more specific evaluation of the efforts taken by New York City and its post hurricane Sandy recovery projects, that is why part of the work was conducted at the City College of New York.

The objectives were met by using local and national data combined with the Hyogo Framework for Action for the first part. Firstly, the work presents a review of the concept of resilience and its emerging importance throughout various disciplines. Afterwards, five countries for each of the five continents were chosen to quantify their progress in resilience.

Afterwards, this study proposes the implementation of decision making tools in quantifying and ranking resilience initiatives. The objective of this study was to build a flexible model capable of assessing and ranking any resilience dimension, like initiatives, projects and indexes. The model used is in the study is called Simple Multi-Attribute Technique (SMART), the simplest form of Multi-Attribute Utility Theory. SMART offers a simplified and easy to use approach.

The benefit of the SMART model lies in the simplicity of how the criteria for scoring alternatives and weights of these criteria are established. They can be defined by the decision maker by building a hierarchy and then assigning scores to each of them. Otherwise, a set of formulas exist to compare or help the decision maker asses these weights based on the same hierarchy (importance) he previously built. Three criteria were used in the SMART model: Time (the amount of months required or planned to complete a project), Cost (budget for each intervention) and Phase (if the project is either completed or still in planning, design or construction).

After evaluating these projects with the SMART model, a comparison was made by assessing the same projects through their functionality curve, which is described by the drop in functionality (the cost of projects was used to describe this value) and the time required to complete a specific project.

The study highlights the difference between these two seemingly similar models and their different results to then add a third component of calculation, the Social Impact of these projects. This dimension was added because it was recognized that the output of the previous models only took into consideration the performance of the projects, the impact they would have in the quality of the urban space was not part of the model and by default, part of the decision making. By adding this component to the results of the SMART model and the functionality curves, a new ranking was obtained that reflected the combination of the performance of the project and their “importance” to the community.

The case study for this approach was New York City and its ongoing recovery projects. The projects are part of four main Initiatives: Infrastructure, Buildings, Coastal Defense and Neighborhoods.

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