

Abstract

Cities are complex systems where more than half of the population of the world currently live and, moreover, they constitute the engine of the global economy. Nowadays, due to their complexity, cities tend to become “smarter” and that is why the smart city concept was rapidly developed across the globe. Besides, cities tend to become more resilient since they are also very fragile places because chronic stresses such as the effects of climate change and acute shocks considered as natural hazards such as earthquakes can seriously, constantly or suddenly, damage their structures. Indeed, the smart city concept and resilience, are topics that are discussed in many parts of the globe. In particular, Japan embraces both of them, since on the one hand is one of the most advanced countries in the world and on the other hand is characterized by natural and anthropogenic changes.

However, the smart city concept and resilience are two topics that are very little discussed as connected issues. Therefore, the main research question was posed: are smart cities resilient?. In order to answer this question, the research conducted focuses on the analysis of the evolution and the role for the resilience of the smart cities in the Japanese context, in particular, carrying out a comparative analysis of different case studies in the Greater Tokyo area. The methodology used is based on the review of the academic literature, the study of the various documents related to the issues analyzed, the interviews conducted, the meetings, workshops, and lectures attended and the visit to the case studies.

Accordingly, the aim of the research is to understand the evolutionary processes and the role that the smart cities in Tokyo have for the overall improvement of resilience. The structure of the research includes the theoretical framework of the topic, which is then contextualized in Japan and specifically in Tokyo where the different smart cities are analyzed. Concluding, a comparative analysis of the case studies is undertaken, and the results show a positive trend toward the improvement of resilience. However, tech and traditional solutions should be embraced by the smart cities in Tokyo and future developments should improve other sectors, beyond the energy one.

1. Introduction

The proposed Master's Thesis is the result of an extensive research conducted in Japan for a period of time of five months at the Department of Urban Engineering of The University of Tokyo. The research was carried out within the Urban Land Use Planning Unit through the crucial support of Prof. Akito Murayama and his research team.

The research abroad was characterized by a rich amount of activities personally conducted such as interviews with relevant stakeholders and visit to case studies, which were decisive to get to know to the issues analyzed, while the various lectures, meetings, and workshops attended gave different perspectives and enriched the research. Moreover, the academic collaboration with Professors and Researchers from the Georgia Institute of Technology, the KTH Royal Institute of Technology of Stockholm and The National Institute for Environmental Studies of Japan was fundamental to deepen the topic examined. Eventually, the literature reviewed, and the documents analyzed were the references useful to comprehensively conduct the analysis.

The activities shortly introduced represented the foundation of the Master's Thesis, which concerns the study of the evolution of the smart cities in Tokyo which tend toward the improvement of resilience. Therefore, a comparative analysis of different case studies in Tokyo is undertaken. From this point of view, Japan provides an interesting context where to carry out the analysis since both smart cities and resilience are issues generally discussed in the country. Indeed, in relation to smart cities, Japan has always been characterized by innovation and therefore the development of smart city projects has always been implemented since the beginning of the development of the smart city concept. Moreover, in relation to resilience, the natural shocks in the country such as earthquakes and the effects of the global anthropogenic variations related to climate change such as heatwaves and flooding are concerns that have been always carefully examined. Accordingly, the main research question was posed: are the smart cities in Tokyo resilient? The relation between smart cities and resilience is a concern very little

discussed in the literature and that is why this topic was chosen. Therefore, the aim of this Master's Thesis is to analyze the evolution of the smart city concept and its role towards the improvement of resilience in cities. In order to do that, a comparative analysis of various case studies in the Greater Tokyo area is made.

Indeed, the research constitutes a source useful to contribute to explain the relationship between the smart city concept and resilience in the Japanese context, specifically in Tokyo.

The foundations cited, which characterize the research, were useful to divide into three main parts the thesis. The first part can be considered as a theoretical framework composed by two chapters in which the discussion focus on the issues of smart cities and resilience from a general perspective and then contextualizing the topics in Japan. Instead, the second part is related to the analysis of case studies in Tokyo, which is discussed in two chapters where the analysis of existing and on-going smart cities is carried out and a consequent comparative analysis is made. The third part instead is related to the conclusions which discuss how the smart city concept should be considered, making reflections and discussing future developments.

In particular, the first chapter is developed through the review of the academic literature and the analysis of various documents related to the topic. This allowed to discuss about the smart city concept and the different definitions that try to define it and then the discussion move on the topic related to resilience starting from its evolution to its complex structure. Eventually, the discussion focuses on the relation between the smart city concept and resilience, examining its characteristics.

The second chapter is based on the analysis of documents and lectures attended and it introduces the issues discussed about the discourse on smart cities in Japan, from the perspectives of the Japanese government, the Japanese companies and criticizing their approach introducing the Urban System Design concept. From this analysis, the link with resilience in Japan is discussed through a comprehensive framework about the need for

resilience in the country, starting from the analysis of earthquakes to the climate change effects.

From the possible relation discussed between the smart city concept and resilience, the third chapter describes the evolution of the smart cities in Tokyo and their role for the resilience, introducing different existing case studies and an on-going one. The analysis is based on the different documents examined and the interviews conducted with the stakeholders involved in the case studies. Moreover, the different meetings and workshops attended and the visit to the case studies allowed to have a better understanding of the projects.

The fourth chapter is based on the previous chapter, since it introduces a comparative analysis of the case studies from their evolutionary processes and their role for the resilience, synthesizing both of them.

In conclusion, the fifth chapter discusses the importance to consider the various smart city projects as laboratories and experiments useful to generate an interconnected system of smart cities where every smart city project can learn from each other for the overall improvement of resilience. Besides, some reflections from the overall analysis and future developments about the smart city projects are proposed.