ASIA-PACIFIC NETWORK FOR
GLOBAL CHANGE RESEARCH

FINAL REPORT

CRRP2019-03SY-Sharifi

2021

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Assessment of the Actual and Potential Contributions of Smart City Projects to Climate Resilience in Selected Asia-Pacific Cities

1. Project information

1.1 Project duration
18 months

1.2 Funding, collaborators and key organizations involved
1.2.1 Funding
US$ 33,520 (total amount); about US$ 17,000 (spent), Over US$100,000 (in kind)

1.2.1 Key organizations involved
Hiroshima University, Japan (Shinji Kaneko), (University of Oregon, the United States (Yekang Ko) , Hong Kong University of Science and Technology, China (Masaru Yarime), RMIT University, Australia (Leila Irajifar), KAIST, South Korea (Youngchul Kim), Universiti Malaya, Malaysia (Melasutra Md Dali), National Taiwan Normal University, Chinese Taipei (Nei-Wen Kuo), National Institute for Environmental Studies, Japan (Yoshiki Yamagata), Ahmedabad University, India (Minal Pathak).

2. Project summary
Please summarize the original goals and objectives of the project and what has been achieved in relation to these (200 words)

The main objective was to investigate actual and/or potential contributions of smart city initiatives to resilience in selected cities by designing and implementing a science-based and policy-relevant toolkit. The sub-objectives are: i) To examine cases in the participating countries using the toolkit; ii) To compare performance of the selected cases, explore potential disparities, and identify potential ways of knowledge transfer from developed to less developed countries; iii) To explore opportunities to enhance resilience by using ICT-based solutions and big-data analytics; iv) To identify prioritized actions for better integration of resilience thinking into smart city planning/design and to discuss barriers and opportunities for their implementation; v) To establish a network for transdisciplinary research on smart city resilience.
The overall objective of the project has been achieved. A comprehensive list of smart city indicators has been developed and their linkages to resilience abilities and characteristics have been explored. Several cases from Australia, Malaysia, Chinese Taipei, India, South Korea, and the United States have been examined to see how smart cities can contribute to resilience. The cases also show how ICT-based solutions can be used to enhance resilience and identify context-specific prioritized actions. Finally, a network for further activities has been established.

Please indicate the project's current status:

☐ Complete
☐ Proceeding according to work plan and logical framework matrix
☐ Ahead of schedule
☐ Behind schedule
■ Proceeding with some modifications (Please specify): Some collaborators have asked for more time to finalize their case study analyses. Final synthesis analysis will be done after all case studies are submitted.

2.1 Comprehensive indicator framework for smart city assessment
A comprehensive indicator toolkit for smart city assessment is developed and linkages between smart city indicators and resilience have been elaborated. The toolkit can be used to not only evaluate performance of smart cities, but also to examine their potentials to contribute to resilience

2.2 Selected cases from the Asia-Pacific regions have been evaluated
Cases from Australia, Malaysia, Chinese Taipei, India, South Korea, and the United States have been examined using the assessment framework. The case reports elaborate on how smart cities can provide opportunities for enhancing resilience and what are specific contributions of ICT-enabled solutions. In addition, the case reports identify prioritized areas for action and future development.

2.3 Establishment of a network for further work on smart cities
A network has been developed to continue working on the nexus between smart cities and resilience. In addition to researchers, the network also involves practitioner and policy makers through the channel of ICLEI. The main future work of the network will be creating an extensive database of smart city projects around the world.

3. Project activities

Reporting period: September 2019 – February 2020

3.1 Activities completed

3.1.1 Development of assessment toolkit
As mentioned above an assessment toolkit has been developed. Some of the outputs have been published as journal papers. The rest are under preparation.

3.1.2 Case study analyses
Case studies from different countries in the region have been conducted. Drafts of the outputs are ready and will be published in an edited book volume.

3.1.3 Workshops on smart cities
Two online workshops related to smart cities were organized.

1- ZeroCarbon x Digital: Urban Decarbonization in the post-Covid-19 era https://www.cger.nies.go.jp/gcp/news/20201221.html
2- Workshop on contributions of smart city projects to climate resilience https://www.cger.nies.go.jp/gcp/pdf/20201221/Program.pdf

The Workshop on ZeroCarbon x Digital: Urban Decarbonization in the post-Covid-19 era was organized online on December 14 and 15 and had a major focus on using smart solutions for enhancing climate resilience and facilitating decarbonization. Researchers and policy makers with expertise on different issues related to resilience and decarbonization participated and shared their knowledge.

The Workshop on Contributions of Smart City Projects to Climate Resilience was organized online on December 16-18, 2020. This was a collaborative effort between Hiroshima University (Network for Education and Research on Peace and Sustainability), Global Carbon Project-Tsukuba International Office, Future Earth, and the Asia-Pacific Network for Global Change Research (APN). The first day was allocated to presentations by authors who have submitted their works to be considered for publication in a special issue of Environment and Planning B on titled: Smart Cities and Climate-Resilient Urban Planning. Speakers presented their analytical works on how smart city projects across building and transportation sectors can contribute to resilience. The remaining days were allocated to discussing various issues related to actual and/or potential contributions of smart cities to resilience. Collaborators from different countries including India, Japan, Malaysia, South Korea, Taiwan, the United States reported insights from case studies. In addition, discussions were made on the structure and contents of a pilot toolkit that can evaluate resilience of smart cities.

Outputs of these two workshops will be published as a special issue in Environment and Planning B (https://journals.sagepub.com/pb-assets/cmscontent/EPB/Special%20issue%20EPB_Final-Updated.pdf) and also an edited book volume that will be published by Springer. In addition, a global database of smart city projects is set to be prepared as the collaborations will continue.

3.2 Adjustments or changes to the timeline of activities (if any)

3.2.1 Timeline adjustment

Due to issues caused by the COVID-19 pandemic the project was extended for 5 months. It was originally supposed to end in September 2020. However, we asked for an extension because the collaborators had difficulties completing the case studies because of COVID-related issues (lockdown, additional workload, academic burnout, additional mental health issues, etc.).

3.3 Challenges or issues

3.3.1 Inability to travel and meet in person

Travel was a major component of the original proposal. We were hoping to have field visits for data collection. However, this became impossible as the pandemic broke out. Instead, we relied on data available online for the case studies and, in some cases, we also collected data online using surveys. We also had plans to organize physical science-policy workshops. Instead, we organized two online workshops in December 2020. Both workshops were very successful, but we believe they would have been more productive if we had the opportunity to meet in person.

4. List of project deliverables to date

Referring to the logical framework matrix in your project contract, please state whether the expected deliverables have been met.

4.1 Project products delivered or completed

- **A user-friendly smart city resilience assessment toolkit**: Completed. A comprehensive toolkit has been developed. Details are available as two journal papers published in Sustainable Cities and Society and Data in Brief (submitted as attachments). More outcomes related to this would be published in due course.
- **Case reports assessing smart city resilience performance and outlining contributions of smart city to resilience**: Drafts ready. Cases from Australia, Malaysia, Chinee Taipe, India, South Korea, and the United States have been studied (Drafts of some are attached. Collaborators will submit others soon). All cases will be published as a book volume to be published by Springer (table of contents attached) titled: Resilient Smart Cities - Theoretical and Empirical Insights.
- **Case study reports exploring the opportunities for enhancing climate resilience using ICTs**: This has also been conducted as part of the case studies and will be published in Resilient Smart Cities - Theoretical and Empirical Insights. (drafts of some cases attached)
- **Planning guidelines, policy briefs, and policy paper that outline priority actions for integration of resilience into smart city planning**: This has also been conducted as part of the case studies and will be published in Resilient Smart Cities - Theoretical and Empirical Insights. Some case report drafts attached.
- **Detailed case-specific roadmaps and action plans for integration of resilience into smart city planning are developed**: This has also been conducted as part of the case studies and will be published in Resilient Smart Cities - Theoretical and Empirical Insights. Some case report drafts attached.
- **An extended network for education and research on smart city resilience that will sustain beyond the lifetime of the project**: A network has already been established. The next major effort to be done by the network is to create a comprehensive database of smart city projects around the world and explore their contributions to resilience.

5. List of pending project deliverables

- **A peer-reviewed article based on comparative analysis of the case reports**: This was supposed to be a journal article. However, we have now decided to publish it as a book chapter. After revising all drafts, this will also be published as a book chapter in : Resilient Smart Cities - Theoretical and Empirical Insights.
- **One synthesis peer-reviewed paper that will explain the opportunities for enhancing resilience using ICTs**: Completed. A draft has been prepared and submitted for review. It is currently under review and will be shared with APN upon acceptance.

- **Additional output**: Agreement has been made with Elsevier to publish a volume titled: “Urban Climate Change Adaptation and Mitigation: Contributions of Smart Solutions and Technologies”. We hope some of the remaining budget (originally allocated to travel) can be reallocated to research so that we can hire RAs to help us with completing this project. This is mainly based on additional data collected during the project.
- **Additional output:** another journal article on the links between smart city indicators and resilience indicators is currently under preparation. I expect it to be ready for submission within 2-3 months.

6. Future directions

The network created during the project will continue working on the nexus of smart city and resilience. In the short term (1-2 years), we will work on completing the edited volumes and the special issue. Also, in the long term we will work on a smart city database that is hoped to be comprehensive and gradually updated. We will also seek funding that can help us hire researchers.

Acknowledgement

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Appendices

- All project products produced.
- List of young scientists involved in the project. Include their name, institution and contact details.
- Awards and honours received as a result of the project.

References

Sharifi, A. (2020). A typology of smart city assessment tools and indicator sets. *Sustainable Cities and Society, 53*, 101936. doi:https://doi.org/10.1016/j.scs.2019.101936

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