

Dissertation Defense
Doctor of Philosophy in Information Sciences (Telecommunications)

“Localizing the United Nations Sustainable Development Goals: An AI-Assisted Policy Recommender Framework for U.S. Cities” by Alekhya Velagapudi

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Committee:

- David Tipper, Advisor and Professor, Department of Informatics and Networked Systems, School of Computing and Information
- Martin Weiss, Professor, Department of Informatics and Networked Systems, School of Computing and Information
- Angela Stewart, Assistant Professor, Department of Informatics and Networked Systems, School of Computing and Information
- Katrina Kelly-Pitou, Principal Energy Systems Strategist, Smithgroup
- Daqing He, Professor, Department of Informatics and Networked Systems, School of Computing and Information

Abstract:

Localizing global and national frameworks of sustainable development remains a persistent challenge for cities. Existing global and national indicators often fail to reflect the specific contexts, priorities, and governance structures of municipalities. Previous research has underscored that meaningful progress toward the United Nations Sustainable Development Goals (UN SDGs) requires effective localization at the city level. However, the inherent complexity and interdependencies among SDG targets, global indicators, and national priorities complicate efforts to align local sustainability initiatives with national and international agendas.

This dissertation proposes an AI-assisted analytical framework that enables local governments to systematically align their sustainability plans with global UN SDGs, with a particular focus on SDG 11: Sustainable Cities and Communities. The framework employs natural language processing (NLP) and network analysis to examine city planning documents and related datasets, identifying associations between local policy efforts and global sustainability targets with key performance indicators (KPIs). These computational methods reveal the interrelated structure of SDG targets and provide an empirical foundation for mapping local objectives to broader international frameworks.

Drawing upon socio-technical systems theory and polycentric governance, this research examines the intersection of urban sustainability, KPIs, U.S. national critical infrastructure sectors, and municipal development plans from 105 cities across the United States. A mixed-methods dataset integrating qualitative and quantitative attribute, including thematic content, relational scores, socioeconomic indicators, governance structure, and census data is utilized to capture the multifaceted nature of local sustainability planning. Through thematic, contextual, and cluster analyses, this study identifies groups of cities exhibiting similar sustainability priorities and exposes structural gaps in local planning relative to global sustainability objectives. The proposed AI-assisted policy recommender framework can serve as a decision-support tool for urban planners and policymakers, offering evidence-based recommendations to strengthen alignment between local development strategies and the UN SDGs.



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