

# 11

## SUSTAINABLE CITIES AND COMMUNITIES



2019-2023  
Publications

278



2019-2023  
Percentage of all  
Taiwan Publications

6.1%



Course Units

547



Student Engagements  
with Units on SDG 11

10,961

## Research

### Balancing Supply and Demand for Shared Bicycles

As a green, environmentally friendly, and healthy mode of transportation, shared bicycles play a key role in alleviating traffic congestion and reducing carbon emissions. Professor Tzu-Hui Yen from our university's Department of Transportation and Logistics Management conducted a case study on Taipei City to explore the supply and demand of YouBike, the city's shared bicycle system. The study compared the demand and supply across over 400 regions or neighborhoods to identify service gaps and areas of imbalance. The results show that YouBike effectively provides first-mile and last-mile services for the MRT network. However, evidence of service mismatches was found within the study area, such as areas with high service supply but low demand. These findings can help cities interested in introducing bicycle-sharing systems improve their first-mile and last-mile transportation services. The study has been published in the international journal *Journal of Transport Geography*.

### Constructing Intelligent Transportation with Deep Learning Methods

The development of intelligent transportation systems has effectively reduced energy consumption and greenhouse gas emissions throughout the transportation process. Professor Ming-Feng Zhang and his research team from our university's Graduate Institute of Computer Science and Engineering have proposed a new deep learning method called Bidirectional Isometric Gated Recurrent Unit (BDIGRU). This method is used to predict travel time and plan routes. Empirical results using big transportation data show that this method significantly improves the accuracy of travel time predictions and identifies the optimal vehicle routes with the shortest travel times. The findings can help drivers plan low-carbon routes, achieving energy savings and carbon reduction goals. This research has been published in the international journal *Annals of Operations Research*.

## Social Impact

### Showcasing Hakka Cultural Heritage

In May 2023, our university's College of Hakka Studies hosted two exhibitions: the "Uematsu Archive Static Exhibition" and "Between Ritual and Collection: The Xianglin Liu Family Ancient Artifacts Special Exhibition." These exhibitions highlighted the results of the college's years of cross-national and interdisciplinary collaborations. While the exhibitions were open to faculty and students, they were also extended to the public, particularly those interested in Hakka history and culture. After receiving the field research notes and visual records of the late Japanese scholar Uematsu Akira from northern Taiwan's Hakka regions in 2017, the university established the "Uematsu Archive." Students from the College of Hakka Studies assisted in organizing, cataloging, and correcting the archive's materials. The Liu Family Artifacts Exhibition not only displayed items from the Liu family of Xianglin Township, Hsinchu, but also, for the first time, showcased a replica of a portrait of their ancestors.

### Creating Human-Centered Smart Green Transportation

The Department of Transportation and Logistics Management at our university, in collaboration with the Chinese Institute of Transportation and the Department of Civil Engineering at National Taiwan University, organized the "112th Academic Year Transportation Roots Competition for High School Students." The competition centered on the theme "Designing Friendly Urban Transportation: From the Perspective of Pedestrians and Public Transport Users," encouraging high school students to reflect on their everyday experiences and observations of the surrounding traffic environment. The goal was to inspire creative solutions or technological applications that could make transportation safer, more environmentally friendly, and sustainable, ultimately creating a human-centered smart green transportation system. In addition to the competition, a youth transportation camp was organized, featuring field visits and training to cultivate young talents and inspire more ideas and attention towards transportation services in their daily lives.



## Education & Cultivation

### Introducing Technology for Inclusive Rural Experiences

Associate Professor Sirirat Sae Lin from our university's Graduate Institute of Technology Management is leading the "2023 University Rural Practice Co-Creation Project." As part of this project, he developed a course module titled "Introducing Technology for Inclusive Rural Experiences." The module is based on creative thinking and problem-solving, with field exploration as its core concept. It integrates design thinking and co-creation with business partnerships to propose inclusive rural experience products or services enhanced by technology, aiming to balance technological innovation and commercial viability. Through innovative teaching and industry collaboration, the program leads students into rural environments to help them understand the importance of friendly tourism. It encourages them to create inclusive rural tourism products or services from a youth perspective, with the goal of mutual benefit for rural communities. This initiative is not only significant for people with disabilities but also introduces innovative and creative product ideas into rural areas, injecting new energy and opportunities for rural development.

### Promoting Local Revitalization in Southeast Asia

In August 2023, our university's College of Hakka Studies led twenty students to Kuching, Serian, and Siburan in Sarawak, Malaysia, for the "Southeast Asia Hakka Villages Local Revitalization Exchange" and an on-site teaching program. This activity focused on the theme of "Local Revitalization," where our university's team shared the theories and practices of local revitalization in Taiwan's Hakka communities. They also conducted initial discussions and exchanges on the possibilities of local revitalization activities between Taiwan and Malaysia. The on-site teaching program, themed "Chinese Society and Culture in Southeast Asia," allowed students to conduct a three-week field study in Malaysia, exploring how local revitalization can drive and address local livelihood issues.





## Stewardship

### Sustainable Action: Bamboo Cubed

Bamboo, known for its rapid growth, is a highly eco-friendly, carbon-negative material. Bamboo holds great potential for application in the pursuit of net-zero carbon emissions and environmental sustainability. Bamboo is also a symbol of our university, representing the school's spirit. "Bamboo Cubed" refers to the combination of Hsinchu, NYCU, and bamboo. Through events such as the World Bamboo Forum, bamboo construction projects, and the International Bamboo Business Expo, global experts and businesses are brought together to promote technical exchange and collaboration, showcasing and implementing bamboo in living environments to improve industry efficiency while reducing environmental impact. These activities also serve as examples of sustainable action for the public and campus users, spreading knowledge about bamboo and incorporating innovative carbon-negative bamboo structures into the campus environment, thus promoting sustainable development. The initiative includes:

- World Bamboo Forum: An international academic forum focused on bamboo, covering topics such as the green economy, manufacturing processes, and design applications of bamboo.
- Bamboo Construction and Design Exhibition: Six construction works on campus, along with two related design exhibitions.
- International Bamboo Business Expo: Showcase of domestic and international products, craftsmanship, and technologies related to bamboo utilization and manufacturing.
- Campus Bamboo Utilization: Bamboo from the campus is used to create booths for exhibition events.
- Supporting Actions: A documentary on campus bamboo usage, bamboo cuisine, and a "Miniature Bamboo Garden" project.