Title: Resource Allocation under Income Disparity and Valuation Heterogeneity: Redesigning the Community Solar Business Model
(This is joint work with Owen Wu, from the Kelley School of Business at Indiana University)

Speaker: Siddharth Singh, UCL School of Management

Area: POM

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Abstract:

The challenge of optimally allocating a limited resource and its associated cost/benefit among consumers with heterogeneous income levels and private resource valuations arises in many situations. This paper tackles this challenge in the context of utility-led community solar (CS). Traditionally, CS participants supported solar projects by sharing solar capacity and its associated costs. With the falling cost of solar, CS now yields net savings, rather than incurring a net cost. Retaining their original design, CS programs pass savings onto participating consumers, who are only a small fraction of the residents. Consequently, CS programs (i) are unable to distribute the gains among the broader community; and (ii) can no longer tap into the willingness-to-pay of green-conscious participants. The program design needs to be rethought. We model heterogeneity in consumers' incomes and green energy valuations. We study various alternative program designs. The most sophisticated one offers consumers income-dependent menus of subscription capacity and rate options. This approach improves social welfare significantly, closing over 90% of the gap between the current approach and a theoretical first-best. It achieves this by ensuring that CS capacity is accessible to everyone who wants it and restoring the opportunity for highly green-conscious consumers to support solar energy. We further illustrate the usefulness of our proposed design using numerical studies calibrated by data from actual CS programs. We also endogenize the CS program sizing decision and find that our proposed design leads to larger CS projects. In sum, carefully redesigning CS programs can create significant welfare improvements. More generally, in resource allocation problems with income and valuation heterogeneity, there is significant value to be gained from explicitly using income information in deciding allocations.

Speaker Profile:

Dr. Siddharth Singh is an Assistant Professor in the Operations & Technology group in the University College London School of Management. He joined UCL after completing his PhD in Operations Management at the Tepper School of Business at Carnegie Mellon University. Prior to his Ph.D, Siddharth was an Associate at the Boston Consulting Group. Siddharth's research focuses on studying how technological advancements are shaping the way we think about business, and the role that regulators should play to promote responsible technology deployment. His research is in the domains of sustainable operations and service operations, and uses methodologies from game theory, optimization, and queueing theory. His research appears in Manufacturing & Service Operations Management and Production and Operations Management. Siddharth was a finalist for the 2016 IBM Service Science Best Student Paper Award, and his work was adjudged the runner-up of the 2019 POMS College of Sustainable Operations Best Student Paper Competition. Outside of work, Siddharth enjoys music, particularly classic rock. He has recently begun collecting vinyl.

Webpage Link: https://www.mgmt.ucl.ac.uk/people/siddharthsingh