FACULTY OF ENGINEERING

DEPARTMENT OF MANAGEMENT SCIENCE AND ENGINEERING

The Discard Problem in Deceased Donor Organ Transplantation

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Abstract: Organ transplantation is life saving, but demand for organs far exceeds the supply. Despite efforts to increase the supply of donated organs for transplantation, organ shortages persist. On the flip side, about 15% of organs recovered for transplantation in the U.S. are discarded. Using a queueing-theoretic framework, we argue that self-interested individuals set their utilization levels more conservatively in equilibrium than the socially efficient level, resulting in the observed discard problem. To reduce the resulting gap, we offer an incentive mechanism that recompenses candidates returning to the waitlist for retransplantation, who have accepted a predefined set of organs, for giving up their position in the waitlist and show that it increases the equilibrium utilization of organs while also improving social welfare. Furthermore, the degree of improvement increases monotonically with the level of this nonmonetary compensation provided by the mechanism. We also present detailed simulation results calibrated with real life transplant data, quantifying the magnitude of impact of this incentive mechanism for the U.S. kidney transplant system.

Bio: Burhaneddin Sandıkçı is a prominent figure in the academic and administrative spheres of higher education in Türkiye. Currently serving as the Dean of the Faculty of Management at Istanbul Technical University (ITU), he is also a distinguished member of the Council of Higher Education (YÖK) and a member of the Board of Directors in the Health Institutes of Türkiye (TÜSEB). Prior to joining ITU, he was on the faculty of the University of Chicago Booth School of Business from 2008 through 2020. His formal training includes a BS in industrial engineering from Marmara University, an MS in industrial engineering from Bilkent University, an MS in operations research from the University of North Carolina at Chapel Hill, and a PhD in industrial engineering from the University of Pittsburgh.

His research interests span decision-making problems under uncertainty with particular focus on problems in medical decision-making and healthcare operations. He specializes in decision-analytic aspects of organ transplantation systems, where he combines his expertise in data analytics and operations research in solving practically relevant complex problems. He emphasizes rigorous and data-based research and uses state of the art large databases to build detailed computer simulations to complement his theoretical models. His research collaborations have resulted in 30+ papers including those that are published in leading academic journals such as Operations Research, Management Science, Manufacturing & Service Operations Management, Mathematical Programming, SIAM Journal on Optimization, Hepatology, and American Journal of Transplantation. He serves as an Associate Editor for the journal Health Care Management Science.