The 17th Annual Workshop on Supply Chain and Logistics

Sustainability & Operations

May 31, 2024

Bilkent University
Department of Industrial Engineering
Ankara, Türkiye

Program Schedule

09:00 - 09:30	Registration and breakfast
09:30 - 09:45	Opening remarks
09:45 - 10:45	"Collaborate for good: Orchestrating sustainability in supply chains," Tarkan Tan, University of Zurich
10:45 - 11:00	Coffee break
11:00 - 12:00	"Optimal procurement in remanufacturing systems with uncertain used-item condition," Emre Nadar, Bilkent University
12:00 - 13:00	Lunch break
13:00 - 14:00	"Renewable energy and circularity: An operations perspective," Atalay Atasu, INSEAD
14:00 - 14:15	Coffee break
14:15 - 15:15	"Servitization as an alternative business model and its implications on product durability, profitability & environmental impact," Özgen Karaer, Middle East Technical University
15:15 - 15:30	Coffee break
15:30 - 16:15	Practice session: "Sustainability and Industrial Engineering: Cross-cutting areas and opportunities," Kubilay Kavak, Escarus
16:15 - 16:30	Break
16:30 - 17:30	Panel discussion: "Sustainability as an academic research topic for IE and OR," Panelists: Atalay Atasu, Özgen Karaer, Kubilay Kavak, Tarkan Tan, Moderator: Emre Nadar

Place: Mithat Çoruh Auditorium (EB Building). Please register through the following link: https://www.eventbrite.com/e/17th-annual-workshop-on-supply-chain-and-logistics-tickets-902969595367

Collaborate for good: Orchestrating sustainability in supply chains
Tarkan Tan, University of Zurich

Abstract: Firms are under increasing pressure from their stakeholders to adopt sustainability measures. However, the risks and opportunities associated with sustainability go beyond a firm's own operations and extend to their supply chain partners. In this talk, we will explore ways in which firms can enhance sustainability in their supply chains through collaboration.

Tarkan Tan is a professor of Sustainable Operations Management at the University of Zurich since September 2022. Prior to that, he worked at Eindhoven University of Technology and TIAS Business School in the Netherlands. He received his Ph.D. from Middle East Technical University in Ankara and was a Fulbright scholar at Columbia University, New York. Additionally, he was a visiting scholar at the University of California, Los Angeles and the University of Sydney Business School. His research interests include inventory theory, capacity management, spare parts management, and supply chain management, with a focus on sustainability. He has served as guest and associate editor for several journals. He has collaborated intensively with the industry and has acquired funds for industry projects. He co-edited a book entitled "Sustainable Supply Chains: A Research-based Textbook on Operations and Strategy."

Optimal procurement in remanufacturing systems with uncertain used-item condition
Emre Nadar, Bilkent University

Abstract: We consider a single-product remanufacture-to-order system with multiple uncertain quality levels for used items, random procurement lead times, and lost sales. The quality level of a used item is revealed only after it is acquired and inspected; the remanufacturing cost is lower for a higher-quality item. We model this system as a Markov decision process and seek an optimal policy that specifies when a used item should be procured, whether an arriving demand for the remanufactured product should be satisfied, and which available item should be remanufactured to meet this demand. We characterize the optimal procurement policy as following a new type of strategy: state-dependent noncongestive acquisition. This strategy makes decisions, taking into account the system congestion level measured as the number of available items and their quality levels. We also show that it is always optimal to meet

the demand with the highest-quality item among the available ones. We conclude with extensions of our model to limited cases when the used-item condition is known a priori (for two quality levels) and remanufacture-to-stock systems in which the standard push strategy is optimal in the remanufacturing stage.

Emre Nadar is an assistant professor in the Department of Industrial Engineering at Bilkent University. He holds a Ph.D. degree in Operations Management from Carnegie Mellon University and a B.S. degree in Industrial Engineering from Bilkent University. His research interests include supply chain management and sustainable operations. His research focuses on inventory control in multi-item supply chains, new-product diffusion in closed-loop supply chains, and integration of renewable sources and storage systems in energy supply chains. Dr. Nadar employs the theory of Markov decision processes to model and analyze such problems. His doctoral work on assemble-to-order production systems received the POMS College of Supply Chain Management Best Student Paper Award, and became a finalist in the INFORMS George Nicholson Student Paper Competition and the MSOM Society Student Paper Competition.

Renewable energy and circularity: An operations perspective
Atalay Atasu, INSEAD

Abstract: We discuss the evolution of renewable energy technologies and how life-cycle thinking combined with circularity is fundamental to maintaining the renewable energy momentum.

Atalay Atasu is the Bianca and James Pitt Endowed Chair in Environmental Sustainability and Professor of Technology and Operations Management at INSEAD. Atalay Atasu (PhD INSEAD, 2007) focuses on sustainable operations management in his research. His publications appeared in *Management Science*, *Manufacturing and Service Operations Management, Production and Operations Management* and *Journal of Industrial Ecology*. He also publishes in practitioner outlets such as *Harvard Business Review*, *Sloan Management Review* and *California Management Review*. His research has received a number of research awards, including the Wickham Skinner Best Paper Award (winner 2007, runner up 2014), Wickham Skinner Early Career Research Award (2012), Paul Kleindorfer Award in Sustainability (2013), MSOM Responsible Research Award (2019) and MSOM Best OM

Paper Award (2021). His research on circularity has been recognized by *Harvard Business Review* as a McKinsey Best Article Award finalist in 2022. Atalay served as president of the Manufacturing and Service Operations Society and as Department Editor for POMS. He is currently an Associate/Senior Editor for *Manufacturing and Service Operations Management*, *Management Science*, and *Production and Operations Management*. Atalay co-founded and co-directs the INSEAD Business Sustainability Program and the INSEAD Sustainable Business Initiative.

Servitization as an alternative business model and its implications on product durability, profitability & environmental impact

Özgen Karaer, Middle East Technical University

Abstract: In this talk we will be discussing a monopolist manufacturer's performance under servitization compared to selling. Servitization is the activity of selling the services provided by the product rather than the product itself. It is a business model that might be environmentally superior to conventional selling. Servitization promises accessibility to the product's functionality, pooling of consumer use, and potentially products of better design. However, it can also inflate consumption and result in a bigger environmental impact overall. In this paper, we compare servitization with traditional selling for a monopolist durable goods manufacturer from both an economic and environmental perspective. In this comparison, we define the durability of a product as the use capacity; that is, how many usages it can endure before reaching end of life. We study the firm's durability decision, followed by the price/fee decision, and the consequent usage in the market under each model. We find that servitization produces durability levels that are robust to customer heterogeneity, and higher than selling. Overall, environmental superiority of servitization hinges on product related costs, customer heterogeneity, and market composition. It is, however, robust to varying environmental factors in the use and manufacturing phases. When we compare environmental preferability with the economic incentives of the firm, we observe that they are not always aligned. In the second part of the talk, we will briefly discuss a potentially closed-loop two-tier supply chain where the downstream business model may be selling or servitization. The first part is joint work with Mehmet Ali Kanatlı. The second part is joint work with Mehmet Alegoz.

Özgen Karaer is an Associate Professor in the Department of Industrial Engineering at METU. She holds a B.S. degree from Department of Industrial Engineering at METU, and M.S. and Ph.D. degrees from Department of Management Science and Engineering at Stanford University. Prior to joining METU, she worked as a (data) scientist at the Operating Strategy department at Gap Inc. Her research is in strategic interactions in supply chains and sustainable operations management.

Practice session: Sustainability and Industrial Engineering: Cross-cutting areas and opportunities

Kubilay Kavak, Escarus

Abstract: Sustainability is a frame concept that mainly calls for a better world, i.e., liveable, clean, peaceful, and flourished planet. By definition and intrinsically it refers to enhancing environmentally friendly and socially inclusive alternatives which mostly entail allocating huge financial resources. Those intertwined axes often require the search for optimal solutions. Not only the delicate elaboration but also the decision-support systems allowing thorough analysis and surgical precision are needed to tackle the problems arising. On the other hand, even though sustainability evokes constructing a better future, one needs to know a future-oriented contemplation cannot start without a proper reckoning with the past, which brings us to data analysis (even data mining), baseline settings and statistics. From resource efficiency to energy saving projects, from ESG ratings to sustainability management systems, even from carbon footprint calculation to LCA reports, the mindset and analytical tools of industrial engineering are widely used. Portraying a comprehensive picture to exhibit maverick examples from industry, finance, and services is likely to inspire academics and students in industrial engineering to move the studies forward. In the presentation, real examples from the business world are envisaged to be exemplified.

Kubilay Kavak holds a bachelor's degree (Bilkent University) and a master's degree (Gazi University) in industrial engineering. He obtained another master's degree (Cornell University) in public policy and holds a doctoral degree (Gazi University) in public administration. Prior to joining the Escarus family, Kavak initially worked in the private sector, then at the Turkish Prime Ministry, State Planning Organization, Ministry of Development, and the United Nations. In his professional life, he mainly focused on topics and fields such as national development, projection and modelling, energy policies,

industrial policies, infrastructure investments, public administration, public policies, investment finance, project analysis and project management. Kavak has published a myriad of articles, reports and studies on energy, climate change, public policy, urbanization, and industrialization as well as a book on energy efficiency, and edited four books on optimization in industrial systems. Kavak also has working experience at various levels with international and development finance institutions.

Panel discussion: Sustainability as an academic research topic for IE and OR

Panelists: Atalay Atasu, Özgen Karaer, Kubilay Kavak, Tarkan Tan
Moderator: Emre Nadar

Discussion questions: Sustainability is an interdisciplinary topic that bonds research areas with new concepts. What can the role of an academic researcher in our field be in this spectrum? How should young researchers approach to contribute to the area? What are the challenges? What are the required skills? What are the potential areas of work?

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