Deniz Berfin KARAKOC

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RESEARCH INTERESTS

Scientific Methods

- Network science
- Multi-criteria decision-making
- Geographic information science
- Optimization
- Data analytics
- Econometrics

Application Areas

- Food trade networks
- Interdependent infrastructures
- Transportation systems

My research vision is addressing the 21st century challenges against resilient, equitable, and sustainable cyber-physical-social systems. I am especially interested in ***enhancing the multi-dimensional resilience of agri-food trade networks, transportation systems, and interdependent infrastructures***. Please see my Google Scholar page for more details.

EDUCATION

Aug 2019 – Present (May 2024 exp. grad.)	**Ph.D., Civil and Environmental Engineering** Sustainable and Resilient Infrastructure Systems University of Illinois Urbana-Champaign, Urbana, Illinois USA Thesis: Resilience of food flow networks across spatial scales CGPA: 3.95/4.00
Aug 2017 – May 2019	**M.S., Industrial and Systems Engineering** University of Oklahoma, Norman, Oklahoma USA Thesis: Community vulnerability perspectives on infrastructure network resilience decision-making CGPA: 4.00/4.00
Aug 2017 – May 2019	**Grad.Cert, Geographic Information Science** University of Oklahoma, Norman, Oklahoma USA CGPA: 4.00/4.00
Sept 2012 – July 2016	**B.S., Industrial Engineering** Bilkent University, Ankara, TURKEY Senior Project: Hot Sales Delivery System Logistics Optimization and Cost Analysis CGPA: 3.19/4.00

EXPERIENCE

Aug 2019 - Present	**Graduate Research Assistant**, University of Illinois Urbana-Champaign
Aug 2017 – May 2019	**Graduate Research Assistant**, University of Oklahoma
Aug 2017 – May 2019	**Graduate Teaching Assistant**, University of Oklahoma ISE 3293/5013 - Fundamentals of Engineering Statistical Analysis ISE 3293/5013 - Applied Engineering Statistics ISE 4553/5553 - Data-Driven Decision Making I
Jan 2015 – June 2015	**Undergraduate Teaching Assistant**, Bilkent University IE 375 - Production Planning

AWARDS and HONORS

Nature Food Cover Theme – Volume 4 Issue 7, July 2023
Structural chokepoints determine the resilience of agri-food supply chains in the United States

Dissertation Completion Fellowship – University of Illinois Urbana-Champaign Graduate College, 2023-2024
The only awarded senior Ph.D. candidate from the Department of Civil and Environmental Engineering

CEE Rising Stars (invitee) - Massachusetts Institute of Technology, 2023

ACDIS Summer Fellowship – University of Illinois Urbana-Champaign College of Liberal Arts & Sciences, 2023

Best Thesis Award - University of Oklahoma School of Industrial and Systems Engineering, 2019
The only awarded senior M.S. student from the School of Industrial and Systems Engineering

14th Industrial Engineering Senior Design Project Contest and Fair Winner - Bilkent University, 2016
The only awarded B.S. senior design project from the Department of Industrial Engineering

Undergraduate Operations Research Prize Finalist - INFORMS Annual Meeting, 2016

Future BAProf (invitee) – University of Iowa Tippie College of Business, 2023

WiNS Collabathon (invitee) - Women in Network Science (WiNS) Society, 2023

PUBLICATIONS

Peer-reviewed Journal Articles (published)

1. **Karakoc, D.B.,** Konar, M., Puma, M.J., Varshney, L.V. 2023. Structural chokepoints determine the resilience of agri-food supply chains in the United States, *Nature Food*, 4: 607–615. **(Impact Factor: 20.974) (Nature Food July 2023 Cover)**
2. Pandit, A., **Karakoc D. B.,** Konar M. 2023. Spatially detailed agricultural and food trade between China and the United States, *Environmental Research Letters*, 18: 084031. **(Impact Factor: 6.947)**
3. **Karakoc, D. B.,** Barker K. and González A. 2023. Analyzing the tradeoff between vulnerability and recoverability investments for interdependent infrastructure networks, *Socio-Economic Planning Sciences*, 87: 101508. **(Impact Factor: 4.641)**
4. Maraqa, S. N., **Karakoc D. B.,** Ghorbani-Renani N., Barker K. and González A. 2022. Project schedule compression for the efficient restoration of interdependent infrastructure systems, *Computers & Industrial Engineering*, 170: 108342. **(Impact Factor: 7.18)**
5. Wang, J. **Karakoc D. B.,** Konar M. 2022. The Carbon Footprint of Cold Chain Food Flows in the United States, *Environmental Research: Infrastructure and Sustainability*, 2: 021002.
6. **Karakoc, D. B.,** Wang J., Konar M. 2022. Food flows between counties in the United States from 2007 to 2017, *Environmental Research Letters*, 17: 034035. **(Impact Factor: 6.947)**
7. **Karakoc, D. B.,** Konar M. 2021. A Complex Network Framework for the Efficiency and Resilience Trade-off in Global Food Trade, *Environmental Research Letters*, 16: 105003. **(Impact Factor: 6.947)**
8. **Karakoc, D. B.,** Barker K., Zobel C. and Almoghathawi Y. 2020. Social-Vulnerability and Equity Perspectives on Interdependent Infrastructure Network Component Importance, *Sustainable Cities and Society*, 57: 102072. **(Impact Factor: 10.969)**
9. **Karakoc, D. B.,** Almoghathawi Y., Barker K., González A. and Mohebbi S. 2019. Community-Resilience Driven Restoration Model for Interdependent Infrastructure Networks, *International Journal of Disaster Risk Reduction*, 38: 101228. **(Impact Factor: 4.842)**

Peer-reviewed Conference Articles (published)

1. **Karakoc, D. B.,** Barker K. and Almoghathawi Y. 2019. Interdependent Infrastructure Network Restoration Optimization Problem from Community and Spatial Resilience Perspective, In INOC 2019 *Proceedings of International Network Optimization Conference, Avignon, France.*
2. Barker, K., **Karakoc D.B.** and Almoghathawi Y. 2018. Interdependent Infrastructure Network Restoration Problem from Community-Resilience Perspective, In ESREL 2018 *Proceedings of European Safety and Reliability Conference, Trondheim, Norway*.

Peer-reviewed Journal Articles (submitted and in preparation)

1. **Karakoc, D. B.**, Konar M. 2023. Mapping food flows on critical transportation infrastructure in the United States. In progress. Targeted to: *Nature Food*.
2. **Karakoc, D. B.**, Konar M. 2023. Optimization of national grain imports to balance risk and return: A portfolio theory approach. Submitted to: *Environmental Research Letters*.

ACADEMIC SERVICES

Leadership Services

- Presentation Judge, Undergraduate Research Symposium, University of Illinois Urbana-Champaign, 2023
- Session Chair, Empirical analysis for food supply chain decision-making, INFORMS Annual Meeting, 2023
- Session Convener, Affordable, sustainable, and resilient food supply chains, AGU Fall Meeting, 2023

Mentorship Services

- Mentor, WiNS Mentorship Program, Women in Network Science Society, 2023

Outreach Services

- Data production and preparation, "Food flows between U.S. counties in 2007, 2012, and 2017", foodflows.org
- K-12 instructor, "Resilient food supply chains", CEE Summer Camp 2023, wyse.engineering.illinois.edu
- Blog post preparation, "Mapping Food Flow Networks and the Food Supply Chain", farmdocdaily.illinois.edu

Peer-review Services

Journal of Industrial Ecology (2023), Nature Food (2022- 2023), Nature Scientific Reports (2022), Food Policy (2022), Water Resources Research (2021), Economic System Research (2020), PLoS ONE (2020)

SELECTED PRESENTATIONS

Conference Talks

1. Carbon footprint of cold-chain food flows between counties in the United States, Production and Operations Management Society, **POMS Annual Conference 2023**.
2. Food flows between U.S. counties through time, The American Geophysical Union, **AGU Fall Meeting 2021**.
3. Resilience and efficiency in food trade networks, The American Geophysical Union, **AGU Fall Meeting 2020**.
4. Community-resilience driven trade-off analysis between the pre- and post-event investments for interdependent infrastructure networks, Institute of Industrial and Systems Engineers, **IISE Annual Conference & Expo 2019**.
5. A social-vulnerability driven component importance measure for interdependent infrastructure networks, The Institute for Operations Research and the Management Sciences, **INFORMS Annual Meeting 2018.**
6. Interdependent Infrastructure Network Restoration Problem from Multiple Community-Resilience Approaches, Institute of Industrial and Systems Engineers, **IISE Annual Conference & Expo 2018**.

7. Hot Sales Delivery System Logistics Optimization and Cost Analysis, The Institute for Operations Research and the Management Sciences, **INFORMS Annual Meeting 2016**.

Invited Talks

1. Community resilience perspective on interdependent infrastructure network restoration planning and component importance analysis, Disaster Resilience Analytics Center Seminar Series, 2022, **Wichita State University**.
2. Food supply chain bottlenecks, 2022, **The MITRE Corporation**.
3. Network analysis of food supply chains, Sustainability & Resistant Infrastructure Systems Seminar Series, 2021, **University of Illinois Urbana-Champaign**.

CERTIFICATES and SKILLS

Workshops and Certificates	UIUC Women@NCSA: Countering Imposter Syndrome, 2023 Rutgers Business School: Teaching Supply Chain Management via Games, 2023 We-CU: Challenging Racism in Service Learning Integrating an Anti-Racist Approach, 2023 Peer Review Excellence: IOP Training and Certification, 2021
Technical Skills	Python, MATLAB, R Studio, Minitab, ANOVA, Gurobi Optimization, FICO Xpress Optimization, GAMS, Julia Optimization, ArcGIS, QGIS, WindPRO, MapInfo, LaTeX

MEDIA COVERAGE

American Council on Science and Health: "**From Farm to Fork: Our Food Supply Chain**", by Chuck Dinerstein, 01 August 2023. https://www.acsh.org/news/

New Food Magazine: "**How resilient are US food supply chains?**" by Grace Galler, 24 July 2023. https://www.newfoodmagazine.com/news/

Nature Food: "**Logistics hubs hold food supply chains together**", News & Views by Graham K. MacDonald, 20 July 2023. https://www.nature.com/articles/

Department News: "**Researchers illuminate resilience of U.S. supply chains**", by UIUC Civil and Environmental Engineering. 20 July 2023. https://cee.illinois.edu/news/

REFERENCES

Dr. Megan Konar (Ph.D. Advisor)
Department of Civil and Environmental Engineering
University of Illinois Urbana-Champaign
E-mail: mkonar@illinois.edu

Dr. Kash Barker (M.S. Advisor)
School of Industrial and Systems Engineering
University of Oklahoma
E-mail: kashbarker@ou.edu

Dr. Lei Zhao (Ph.D. Committee Member)
Department of Civil and Environmental Engineering
University of Illinois Urbana-Champaign
E-mail: leizhao@illinois.edu

Dr. Michael Puma (Ph.D. Committee Member)
Center for Climate Systems Research
Columbia University
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Dr. Lav Varshney (Ph.D. Committee Member)
Department of Electrical and Computer Engineering
University of Illinois Urbana-Champaign
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