

# Deniz Berfin KARAKOC

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## RESEARCH INTERESTS

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### Scientific Methods

- Network science
- Multi-criteria decision-making
- Geographic information science

- Optimization
- Data analytics
- Econometrics

### Application Areas

- Food trade networks
- Transportation systems
- Interdependent infrastructures

My research vision is addressing the 21<sup>st</sup> 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.

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## EDUCATION

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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

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## EXPERIENCE

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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

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## AWARDS and HONORS

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**Nature Food Cover** – 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 at 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

**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*

**14<sup>th</sup> 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

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

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

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

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## PUBLICATIONS

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### Peer-reviewed Journal Articles (published)

9. **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](#))
8. 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)**
7. **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)**
6. 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.
4. **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)**
3. **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)**
2. **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)**
1. **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)

2. **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*.
1. 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)

3. **Karakoc, D. B.**, Konar M. 2023. Multi-objective optimization of multi-modal and multi-commodity agri-food flows in the United States. In progress.
2. **Karakoc, D. B.**, Konar M. 2023. Mapping food flows on critical transportation infrastructure in the United States. Submitted to: *Nature Food*.
1. **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*.

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## ACADEMIC SERVICES

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### 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](http://foodflows.org)
- K-12 instructor, “Resilient food supply chains”, CEE Summer Camp 2023, [wyse.engineering.illinois.edu](http://wyse.engineering.illinois.edu)
- Blog post preparation, “Mapping Food Flow Networks and the Food Supply Chain”, [farmdocdaily.illinois.edu](http://farmdocdaily.illinois.edu)

### Peer-review Services

Earth’s Future (2023), 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)

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## SELECTED PRESENTATIONS

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### Conference Talks

8. Optimization of national grain imports to balance risk vs. return: A portfolio theory approach, The Institute for Operations Research and the Management Sciences, **INFORMS Annual Meeting 2023**.
7. Carbon footprint of cold-chain food flows between counties in the United States, Production and Operations Management Society, **POMS Annual Conference 2023**.
6. Food flows between U.S. counties through time, The American Geophysical Union, **AGU Fall Meeting 2021**.
5. 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**.

3. A social-vulnerability driven component importance measure for interdependent infrastructure networks, The Institute for Operations Research and the Management Sciences, **INFORMS Annual Meeting 2018**.
2. Interdependent Infrastructure Network Restoration Problem from Multiple Community-Resilience Approaches, Institute of Industrial and Systems Engineers, **IISE Annual Conference & Expo 2018**.
1. Hot Sales Delivery System Logistics Optimization and Cost Analysis, The Institute for Operations Research and the Management Sciences, **INFORMS Annual Meeting 2016**.

### Invited Talks

3. 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**.
1. Network analysis of food supply chains, Sustainability & Resistant Infrastructure Systems Seminar Series, 2021, **University of Illinois Urbana-Champaign**.

## CERTIFICATES and SKILLS

<b>Workshop and Certificates</b>	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
<b>Technical Skills</b>	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](mailto:mkonar@illinois.edu)

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

**Dr. Michael Puma (Ph.D. Committee Member)**  
 Center for Climate Systems Research  
 Columbia University  
 E-mail: [mjp38@columbia.edu](mailto:mjp38@columbia.edu)

**Dr. Lav Varshney (Ph.D. Committee Member)**  
 Department of Electrical and Computer Engineering  
 University of Illinois Urbana-Champaign  
 E-mail: [varshney@illinois.edu](mailto:varshney@illinois.edu)