Keji Wei

Last updated: Jan 2025
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EDUCATION

Dartmouth College, Thayer School of Engineering *Hanover NH*
Ph.D. in Operations Research *2014 - 2019*
Co-advisors: Vikrant Vaze, Alexandre Jacquillat (MIT)

- Dissertation: Schedule Planning and Endogeneity of Travelers Decisions in Congested Large-Scale Transportation Networks
- Committee: Vikrant Vaze, Alexandre Jacquillat (MIT), Robert Shumsky (Tuck), Amro Farid

Xi'an Jiaotong University *Xi'an China*
BEng in Automation with Best Undergraduate Thesis Award *2007 - 2011*

POSITIONS

Assistant Professor *Apr 2023 - present*
School of Economics and Management, Tongji University, Shanghai

Research Scientist *Apr 2022 - Apr 2024*
Civil Flight Services CAE, Irving, TX

Senior Operations Research Engineer *Sep 2019- Mar 2022*
Sabre Labs & Product Strategy, Southlake, TX

Operations Research Intern *Summer 2018*
Sabre Airline Solutions, Southlake, TX 🎓: Xiaodong Luo

TEACHING

01112201: Discrete Mathematics (undergrads) *Spring 2024, Spring 2025*
School of Economics and Management, Tongji University, Shanghai

SELECTED JOURNAL PUBLICATIONS

IN REVERSE CHRONOLOGICAL ORDER

[1] Navid Rashedi, Nolan Sankey, Vikrant Vaze, and **Wei, Keji***. A machine learning approach for solution space reduction in aircraft disruption recovery. *European Journal of Operational Research*, 323(1):297–308, 2025

[2] **Wei, Keji**, Vikrant Vaze, and Alexandre Jacquillat. Transit planning optimization under ride-hailing competition and traffic congestion. *Transportation Science*, 56(3):725–749, 2022
- Featured in media *OR/MS Today*.

[3] **Wei, Keji**, Vikrant Vaze, and Alexandre Jacquillat. Airline timetable development and fleet assignment incorporating passenger choice. *Transportation Science*, 54(1):139–163, 2020
- Winner, AGIFORS Anna Valicek Award for Innovative Research in Airline Operations Research, 2019.

[4] Reed Harder, **Keji Wei**, Vikrant Vaze, and James E. Stahl. Simulation analysis and comparison of point of care testing and central laboratory testing. *MDM Policy & Practice*, 4(1), 2019

[5] **Wei, Keji** and Vikrant Vaze. Modeling crew itineraries and delays in the national air transportation system. *Transportation Science*, 52(5):1276–1296, 2018
- Second Place Winner, AGIFORS Anna Valicek Award for Innovative Research in Airline Operations Research, 2017.
- Featured in media like *ScienceDaily*.

[6] Wuhua Hu, Jianfeng Mao, and **Keji Wei**. Energy-efficient rail guided vehicle routing for two-sided loading/unloading automated freight handling system. *European Journal of Operational Research*, 258(3):943 – 957, 2017

WORK IN PROGRESS

- Graph Attention Networks for Efficient Construction of Arc-Based Transportation Network Models with V. Vaze, Major Revision at Transportation Science.
- Airline Fleet Assignment and Timetabling with Context-dependent Choice model with X. Niu, Y.Cao, Work in Progress.
- Bike lanes reduce and equalize urban transport emissions: Evidence from Chicago with L. Liu, X. Niu, J. Zhang, Submitted to Nature Communication.
- Dynamic Discretization Discovery for Large-scale Airline Schedule Design model with R. Ojha1, L.Marshall, Work in Progress.
- Optimization of Courier-Order Matching and Delivery Performance for In-Time Delivery Systems Y.Fan, Y.Cao and X.Xiong Work in Progress. Finalist for INFORMS TSL Data-Driven Research Challenge

RESEARCH FUNDING

- NSFC Research Funding (Excellent Young Scientists Overseas), Airline Network Operations Management. (Principal Investigator). Total Amount: RMB. 2025-2029.
- NSFC Research Funding 72301197, *Machine Learning Based Aircraft Recovery Optimization.* (Principal Investigator). Total Amount 300,000 RMB. 2024 - 2026.
- NSFC Research Funding 72231006, *Integrated Aviation Operations Optimization and Innovation.* (Major Participant, Principal Investigator: Zhe Liang). Total Amount 2,000,000 RMB. 2023 - 2027.

HONORS & AWARDS

- Finalist for INFORMS TSL Data-Driven Research, INFOMRS *MAY 2025*
- Excellent Young Scientists Overseas, NSFC *Oct 2024*
- Transportation Science Meritorious Service Award, INFORMS *Oct 2022*
- Shanghai Oversea Talent Program, Shanghai Government *Nov 2021*
- First Place Best Dissertation Award, Aviation Application Section, INFORMS *Nov 2020*

- Anna Valicek Silver Medal for Innovative Research in Airline, AGIFORS *Oct 2019*
- Anna Valicek Bronze Medal for Innovative Research in Airline, AGIFORS *Oct 2017*
- Neukom Travel Grant, Dartmouth College *July 2017*
- GSC Conference Travel Grant, Dartmouth College *July 2017*
- XJTU Outstanding Bachelor Thesis (1%), Xian Jiaotong University *July 2011*
- Meritorious Winner, Mathematical Contest in Modeling (10%), *July 2010*
- Outstanding Student (10%), Xian Jiaotong University *July 2009*

CONFERENCE PRESENTATIONS

IN REVERSE CHRONOLOGICAL ORDER

AGIFORSRM 2025 *A Stochastic SBLP Optimizer for Network RM with Dependent Demands.* AGIFORS Revenue Management Study Group meeting. 04/2025.

POMS-HK 2025 *Optimizing Food Delivery Services: Reinforcement Learning for Enhanced Efficiency and Equity.* The 15th POMS-HK International Conference. Hong Kong, 01/2025.

AGIFORS 2024 *Airline Fleet Assignment and Timetabling with Context-dependent Choice model.* The 64th AGIFORS Annual Symposium. Cayman, UK, 11/2024.

INFORMS 2024 *Bike Lane Network Expansion: Traffic, Emissions, and Equity Implications.* INFORMS Annual Meeting. Seatle, WA, 10/2024.

ORDS 2024 *Bike Lane Network Expansion: Traffic, Emissions, and Equity Implications.* Chinese Society of Operations Research Data Science and Intelligent Operations 2024 Annual Conference. Beijing, 09/2024.

CTS 2024 *Bike Lane Network Expansion: Traffic, Emissions, and Equity Implications.* The 15th Workshop on Computational Transportation Science. Chengdu, 06/2024.

ITSO 2024 *Revolutionizing Aircraft Recovery: Graph Attention Networks for Efficient Transportation Network Modeling & Supervised Machine Learning Approach for Solution Space Reduction.* The 1th Workshop on Integrated Transport System Operation. Nanjing, 03/2024.

POMS-HK 2024 *Efficient Construction of Arc-Based Transportation Network Models using Graph Attention Networks.* The 14th POMS-HK International Conference. Hong Kong, 01/2024.

ATRS 2023 *Efficient Construction of Arc-Based Transportation Network Models using Graph Attention Networks.* The 5th Workshop on Transportation Research. Beijing, 11/2023.

CTS 2023 *Graph Attention Networks for Efficient Construction of Arc-Based Transportation Network Models.* The 14th Workshop on Computational Transportation Science. Shanghai, 09/2023.

AGIFORSOps 2022 *Machine Learning in Aircraft Recovery Problem with Dependent Connection Time.* Virtual AGIFORS Airline Operations & Aircraft Maintenance Conference. 05/2022.

INFORMS 2021 *Learning to Handling Connection based Turn Time in Flight Schedule Recovery Problem.* Virtual INFORMS Annual Meeting. 11/2021.

INFORMS 2019 *Optimal Transit Planning: Interactions with Ridehailing, Congestion and Passenger Choice.* INFORMS Annual Meeting. Seattle, WA, 11/2019.

INFORMS 2018 *Airline Timetable Development And Fleet Assignment Incorporating Passenger Choice.* INFORMS Annual Meeting. Phoenix, AZ, 11/2018.

INFORMS 2017 *Modeling and Quantifying Crew Itineraries and Delays.* INFORMS Annual Meeting. Houston, TX, 10/2017.

INFORMS 2017 *Integrated Timetable Development and Fleet Assignment Model Incorporating Passenger Choice.* INFORMS Annual Meeting. Houston, TX, 10/2017.

TSL 2017 *Airline Timetable Development and Fleet Assignment.* INFORMS Transportation and Logistics Society Conference. Chicago, IL, 07/2017.

INFORMS 2016 *Modeling and Understanding Crew Itineraries and Delays under Uncertainty.* INFORMS Annual Meeting. Nashville, TN, 11/2016.

INFORMS 2015 *Quantifying Delay Propagation Through Crew Connections.* INFORMS Annual Meeting. Philadelphia, PA, 11/2015.

CASE 2013 *Energy-efficient Dispatching Solution in an Automated Air Cargo Terminal.* IEEE International Conference on Automation Science and Engineering. Madison, WI, 07/2013.

INVITED TALKS

NUAA 2024 *Revolutionizing Aircraft Recovery: Graph Attention Networks for Efficient Transportation Network Modeling & Supervised Machine Learning Approach for Solution Space Reduction.* Internal seminar. Nanjing, China, 04/2024.

HKPolyU 2024 *Revolutionizing Aircraft Recovery: Graph Attention Networks for Efficient Transportation Network Modeling & Supervised Machine Learning Approach for Solution Space Reduction.* AAE Research seminar. Hong Kong, China, 01/2024.

SRIBD 2023 *Stochastic Nested Sales-Based Linear Program for Network Revenue Management Under Customer Choice.* Internal seminar. Shenzhen, China, 11/2023.

UT Arlington 2023 *Graph Attention Networks for Constructing Arc-Pair Dependent Connections Transportation Model.* Internal seminar. Arlington, TX, 01/2023.

Texas A&M 2022 *Model and Algorithmsfor Airline Planning- The case for Crew Pairing and Timetabling.* ETID seminar. College Station, TX, 09/2022.

SUFE 2020 *Planning and Endogeneity of Travelers Decisions in Congested Large-Scale Transportation Network.* Weekly Seminar. Virtually, 12/2020.

INFORMS 2020 *Schedule Planning and Endogeneity of Travelers Decisions in Congested Large-Scale Transportation Networks.* Virtual INFORMS Annual Meeting. 11/2020.

TSINGHUA 2019 *Modeling Crew Itineraries and Delayss in the National Air Transportation System.* Weekly Seminar. Beijing, CHN, 12/2019.

AGIFORS 2019 *Airline Timetable Development and Fleet Assignment Incorporating Passenger Choice.* The 59th AGIFORS Annual Symposium. Seatle, WA, 10/2019.

SABRE 2018 *Large Scale Fleet Assignment with Infeasibility Finder.* Sabre Airline Solutions. Dallas, TX, 08/2018.

AGIFORS 2017 *Modeling Crew Itineraries and Delays in the National Air Transportation System.* The 57th AGIFORS Annual Symposium. London, UK, 10/2017.

SKILLS

Languages Chinese Mandarin (Native), English (Full Professional Proficiency)
Office Software Git, Linux, CPLEX, LaTex, Vim

RELEVANT COURSEWORK

Core Courses
Foundation of Biostatistics I
Optimization Methods for Engineering Applications
Machine Learning and Statistical Data Analysis
Statistical Methods in Engineering
Operations Research
Topics in Probability: Game Theory
Probability Theory and Stochastic Processes
Data Structures and Algorithms
Discrete Mathematics
System Engineering

Other Courses
Communicating Science
Modern Control Theory
Decision-Making under Risk and Uncertainty
Advanced Topics in Machine Learning (*Audit*)
Workshop: Grammar in Academic Writing
Convex Optimization (*Audit*)
Java Programming
Mathematical Modeling
Databases
Object Oriented Programming

PROFESSIONAL EXPERIENCE

IN REVERSE CHRONOLOGICAL ORDER

Senior Operations Research Engineer, Civil Flight Services, CAE *Apr 2022 - Present*
Airline Aircraft Recovery Module (RMOPS) 🎓: Norbert Lingaya

- Delivery Aircraft recovery product to multiple airline in the world.
- Lead a operations research team in design, development and maintenance of decision support systems.
- Cooperate with sales, product and delivery team to support airline recovery product regularly.

Senior Operations Research Engineer, Sabre Labs & Product Strategy *Sep 2019 - Mar 2022*
Airline Aircraft Recovery Module (RMOPS) 🎓: Sureshan Karichery

- Designed and implemented the operations research and machine learning techniques to improve the solution quality to serve more than +20 airlines in the world.

Airline Passenger Recovery Module (Reaccomm) 🎓: Sureshan Karichery

- Implement multiple constraints (Same Flight, Similar Flight and Max Co-terminal) to migrate schedule change product based on Passenger Recovery Product.

Research Assistant, Dartmouth College *Aug 2018 - Aug 2019*
Performance Improvement of Crew Trip (Pairing) Optimization for Airlines 🎓: Vikrant Vaze, Sujayandra Vaddagiri

- Designed a novelty solution approach to solve 1- month crew pairing problem (*14,888* Flights) in *85* mins with *0.06%* optimally gap.
- Implemented and tested the solution approach in Java with Cplex solver
- Cooperated with *Laminaar Aviation InfoTech* to disucss project details, wrote mid-term and final reports, delivered code and algorithm details.

Operations Research Intern, Sabre Airline Solutions *May 2018 - Aug 2018*
Large Scale Fleet Assignment with Infeasibility Finder 🎓: Xiaodong Luo

- Designed and implemented the operations research techniques to improve the solution quality and solution time of Sabre's flagship fleet assignment module (*34,651* Flights)
- Addressed numerical difficulties in Cplex which cann't be solved before
- Productized the Fleet Assignment module in Java for Alaska Airline

Research Assistant, Dartmouth College *Sep 2014 - Dec 2016*
Analyzing Flight Delay Propagation due to Crew Scheduling Constraints 🎓: Vikrant Vaze

- Selected the factors that influence the extent of crew propagated delays and disruptions and incorporate these factors into a robust crew scheduling model.
- Built learning hyper-models to generate crew pairings that are similar to those in the real world crew pairing samples.
- Presented the general approach to estimate crew-related delays and disruptions for any given network under a variety of data availability scenarios.
- Tested results to demonstrate the accuracy and stability of proposed modeling framework and algorithms.

Project Officer, Nanyang Technological University *Aug 2012 - July 2013*
Energy-efficient Rail Guided Vehicle Routing 🎓: Jianfeng Mao, Wuhua Hu

- An MILP model for the RGV dispatching problem in an arbitrary static scenario
- Investigation of the effect of using differently capacited RGV and meanwhile show the computational complexity

PROFESSIONAL AND LEADERSHIP ACTIVITIES

INFORMS, AVIATION APPLICATIONS SECTION

- Chair and Member of the Best Student Presentation Competition Committee, 2021,2022
- Cluster Chair, 2021
- Session Chair, 2016-present

Air Transport Research Society China Chapter

- Liaison Committee Tongji University, 2023 - 2026

International Workshop on Computational Transportation Science,

- Session Chair, 2024

Reviewer Ad hoc referee for *Transportation Science*, *INFORMS Journal on Computing*, *Transportation Research B and C, Computers & Industrial Engineering*, *Omega*, *OR Spectrum*, *Journal of Big Data Analytics in Transportation*, *Journal of Transportation Engineering and Information*, AGIFORS Anna Valicek Award (2022 - 2024),

Membership: Institute for Operations Research and the Management Sciences (INFORMS), Airline Group of the Int. Fed. of Operational Research Societies (AGIFORS)

MEDIA COVERAGE

- "*Dartmouth Engineering Study Shows Machine Learning Can Help Airlines Recover Faster After Disruptions*" Dartmouth College, Dec 15, 2024.
- "*Optimizing transportation scheduling for a win, win, win situation for all* ", ORMS Today, May 21, 2021.
- "*Research Shows Millions of Dollars Saved Daily When Transit Schedules Align with Commuter Preferences* " Dartmouth College, JUL 20, 2021.
- "*Featured Article* ", AAS Newsletter, MAY 2021.
- "*Dartmouth Receives Eight 2020 CASE Awards* ", Dartmouth News, JAN 2021.
- "*Flying In The Face of Danger Keji Wei Th'19 is re-designing the technology of Airline travel*", Dartmouth Engineer Magazine, Summer 2020.
- "*No flights when you want them? Throw some math at the problem!* ", ConcordMonitor, FEB 03, 2020.
- "*Thayer Engineers and MIT Create New Airline Scheduling Tools*", Dartmouth College, JAN 24, 2020.
- "*Xi'an Jiaotong University Alumni Honored with Airline Research Award* ", Xi'an Jiaotong University, OCT 18, 2019.
- "*Dartmouth Engineering Student Honored with Airline Research Award* ", Dartmouth College, OCT 4, 2019.
- "*Engineering PhD Student Wins Anna Valicek Bronze Medal* ", Dartmouth College, JAN 17, 2018.
- "*Airlines and Passengers Save Billions through Crew Planning*", ScienceDaily, JUN 6, 2018 .

PH.D. STUDENTS

- Xiaoyun Niu, Tongji University, Management Science and Engineering. *Oct 2023-*
  2024 Ken Wang Scholars, Agifors

MASTERS STUDENTS

- Binbin Chen, Tongji University, Management Science and Engineering. *June 2023-*
- Shizhe Wang, Tongji University, Management Science and Engineering. *Sept 2024-*
- Yiheng Kang, Tongji University, Management Science and Engineering. *Sept 2024-*

PERSONAL

Citizenship: Chinese
Interests: Tennis, Frisbee, Ski, Swimming, History

EXTRACURRICULAR ACTIVITIES

Upper Valley Frisbee League, NH *May 2015 - 2019*
Frisbee training twice a week and play summer league (3rd in 6 teams)
After School Science & Engineering, Lyme, NH *May 2016 - 2019*
Help lead fun, hands-on science activities with elementary school students
Dartmouth Admissions Ambassador Program, Dallas, TX *Nov 2019 - Present*
The primary responsibility is as an interviewer to communicate with applicants, and Dartmouth.