Kashish Arora

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Academic Positions

Indian School of Business (ISB) Hyderabad, India
Assistant Professor, Operations Management 2022-

Education

Cornell University, S.C. Johnson Graduate School Of Management Ithaca, New York
Ph.D. in Management 2022
Masters in Management 2021
Thesis Committee: Vishal Gaur (Chair), Fanyin Zheng, Nagesh Gavirneni, Shane Henderson

INSEAD Fontainebleau, France
M.Sc. in Management (Technology and Operations Management) 2017

Indian Institute of Technology New Delhi, India
Bachelors of Technology, Industrial and Production Engineering 2013

Publications and Pre-Prints

Journal Articles

1. A Structural Model for Operating Cash Flow Management with Applications
   - Outlet: **Forthcoming** at **Management Science**, https://ssrn.com/abstract=3870888
   - Coauthor: Vishal Gaur
   - Accepted at the MSOM Supply Chain SIG, 2022
   - Accepted at the Wharton Empirical Workshop, 2021

2. Private Vs. Pooled Transport: Customer Preference & Green Transport Policy Design
   - Outlet: **M&SOM**, 2023, vol. 26, no. 2, pp. 594-611, https://doi.org/10.1287/msom.2022.0569
   - Coauthors: Fanyin Zheng and Karan Girotra
   - Honorable Mention: POMS College of Sustainable Operations Best Paper Award, 2021
   - Winner: INFORMS Conference on Service Science Best Student Paper award, 2020
   - Accepted at the Marketplace Innovation Workshop, 2021
   - Accepted at the Wharton Empirical Workshop, 2020

Other Publications

3. Reproducibility in Management Science**
   - **Management Science**, 2023, 70(3), pp. 1343-1356. https://doi.org/10.1287/mnsc.2023.03556
   - Coauthors: Fisar, M., Greiner, B., Huber, C., Katok, E., Ozkes, A.I. and M.S. Reproducibility Collaboration

   ** Contributed as a member of the Management Science Reproducibility Collaboration

Working Papers

4. A Structural Analysis of Freight Delays in the Indian Railway Network
   - **Major Revision** at **Operations Research**, 2024, https://ssrn.com/abstract=4631346
   - Coauthors: Himanshu Arha, Milind Sohoni and Raja Gopalakrishnan

5. Vertical Integration and Market Power in Supply Networks
   - **Under Review** at **M&SOM**, 2024, https://ssrn.com/abstract=4826945
   - Coauthors: Amandeep Singh and Mamta Sahare

6. An Unsupervised Learning Framework for Improving Sales Forecasts
   - Preparing Submission at **Management Science**, 2024,
   - Coauthor: Vishal Gaur

7. An Endogenous Model of Private Equity Network Formation
   - Preparing Submission at **Management Science**, 2024,
   - Coauthor: Mamta Sahare

8. Supply Network Formation Under Reputational Risk
   - Work in Progress, 2024,
   - Coauthors: Vibhuti Dhingra and Sripad Devalkar

9. Crossfire Commerce: Analyzing the impact of the US-China Trade War on Global Supply Chains
   - Work in Progress, 2024,
   - Coauthors: Shekhar Tomar and Mohit Saharan

Teaching Experience

Statistical Methods for Managerial Decisions, Indian School of Business — Hyderabad, India
Classroom Instructor for MBA core course (4× 5 × 2 hr sessions) — 2023-
Evaluations: Quality of the instructor (out of 7)
(2023) - **6.42, 6.37, 6.30, 6.26**
(2024) - **6.80, 6.59, 6.57, 6.53**

Analytics for Marketplace and Retail, Indian School of Business — Hyderabad, India
Classroom Instructor for MBA elective course (2× 10 × 2 hr sessions) — 2022-
Evaluations: Quality of the instructor (out of 7)
(2022) - **6.70, 6.82**
(2023) - **6.50, 6.42**

Introduction to SQL and Tableau, Cornell University — Ithaca, New York
Classroom Instructor for MBA elective course (14 × 1.15 hr zoom sessions) — Fall 2020
Evaluations: Quality of the instructor (out of 5)
(2020) - **4.25, 4.19**

Managing Operations, Cornell University — New York, New York
Classroom Instructor for tutorials (24 × 1.5 hr sessions) — Fall 2018

Production and Operations Management, INSEAD — Fontainebleau, France
Classroom Instructor for core course tutorials (4 ×2×1.5 hr sessions)
Evaluations: Quality of the instructor (out of 5)
(2016) - **4.80**, Awarded Best tutor
(2017) - **4.57**, Awarded Best tutor

Service and Professional Affiliations

External Service

Editorial Responsibilities
- Associate Editor, MSOM Special Issue on Responsible Retail Operations, 2024-

Refereeing
- Management Science
- Manufacturing & Service Operations Management
- Production and Operations Management
- MSOM iForm SIG
- MSOM Sustainaiblity SIG
- Management Science Reproducibility Project

Competition Judging
- Public Sector Operations Research Competition, 2024

Organizing Sessions
- Session Chair, INFORMS 2023
- Session Chair, POMS 2023
- Workshop faculty, Asian Empirical Research Workshop

Internal Service

Student Advising
- Mamta Sahare (Postdoc, ISB)

Committe Work
- Co-ordinator, OM recruiting
- Member, ISB Honor Code Committee

Professional Membership
- Econometric Society, Institute for Operations Research and Management Sciences (INFORMS),

- Production and Operations Management Society (POMS), Revenue Management and Pricing Society (RMP)
- Manufacturing and Service Operations Management Society (M&SOM)

Selected Awards and Grants

IIDS Research Grant (INR 10,00,000)	2024
Byron E. Grote MS'77 PhD'81 Cornell Johnson Professional Scholarship	2021
Honorable Mention, POMS College of Sustainable Operations Best Paper Award	2021
1st Place, INFORMS Service Science Conference Best Student Paper award	2021
Business of Food Grant, Cornell (USD 8,000)	2021
Bartholomew Family Charitable Fund PhD Scholarship, Cornell University	2019
Selected for Colman Leadership Program, Cornell University	2019
Cornell University Doctoral Fellowship	2018-2021
INSEAD Best Tutor award for excellence in MBA teaching	2016 and 2017
National Talent Search Exam Scholarship	2007-2013

Invited Talks and Presentations

1. Private Vs. Pooled Transport: Customer Preference & Green Transport Policy Design 2019-2023
   - Stanford GSB IO Seminar
   - Chicago Booth
   - UCL London
   - Indian School of Business
   - McDononough School of Business, Georgetown University
   - S.C. Johnson School of Business, Cornell
   - Baruch College
   - RMP Workshop
   - Marketplace Innovation Workshop
   - Early Career Sustainable Workshop
   - Wharton Empirical Workshop
   - INFORMS, MSOM and POMS Annual Conferences
2. A Structural model for Operating Cash flow Management 2021-2023
   - Stanford GSB
   - NUS Business School
   - CUHK Business School
   - Tilburg University
   - Boston College
   - Indian School of Business
   - U.C. Riverside
   - Carlson School of Management, U. Minnesota
   - S.C. Johnson School of Business, Cornell
   - MSOM Supply Chain SIG
   - Wharton Empirical Workshop
   - INFORMS and POMS Annual Conferences
3. Improving Freight throughput in Indian Railway Network: A Structural Analysis 2023-
   - POMS India Conference
   - Workshop on Empirical Operations Management, Hong Kong

Professional Experience

Pilota, Technical Advisor 2018-2021

Pilota was a Cornell Tech incubated start-up that predicted delays for flights. I helped develop their delay prediction IP. Total raised capital - $400K, now acquired by Hopper.

Credit-Suisse, Investment Analyst 2013-2015, Mumbai

Investment Analyst

As an analyst at the flow trading desk, I helped optimize the securities lending process.

IBM Research Lab, Research Intern 2012, New Delhi

Research Intern

Implemented a manpower staffing strategy for the IBM call center in the QED queuing regime.

References

Available on request

Selected Abstracts

A Structural Model of a Firm's Operating Cash Flow with Applications (**Forthcoming at Management Science**)

Effective management of a firm's operating cash flow is essential for supporting growth, servicing debt, and maintaining overall financial health. Mismanagement of cash flows can result in severe liquidity challenges and even business failure. However, managing operating cash flow is complex due to its intricate, endogenous relationships with operational variables like sales, operating costs, inventory, payables, and the impact of exogenous macroeconomic factors on a firm. In this paper, we present a structural model of operating cash flow that untangles this endogeneity, allows us to estimate causal relationships among these variables, and provides a valuable tool for evaluating cash flow management policies. Applying our model to quarterly financial data from S&P's Compustat database spanning from 1990 to 2020, along with macroeconomic indicators, we provide empirical evidence of the endogenous nature of cash flow with other operational variables. We then showcase the practical value of our model by (i) identifying the characteristics of structural shocks and the new equilibria they induce within the system, (ii) offering a tool for evaluating alternative managerial actions or policy decisions to counteract these shocks, (iii) predicting the impacts of macroeconomic events, such as global recessions and fluctuations in economic sentiment, on firm performance, and (iv) demonstrating superior forecasting performance compared to traditional univariate models. In summary, our structural model of operating cash flow enhances our understanding of its dynamics, enabling better-informed decision-making and more effective cash flow management in firms.

Private vs. Pooled Transportation: Customer Preference and Design of Green Transport Policy (**Published at M&SOM**)

Problem definition: Large cities around the globe are facing an alarming growth in traffic congestion and greenhouse gas emissions, to which a significant contributor in recent years are on-demand cabs operated by ride-hailing platforms. Newly emerged pooled transportation options like shuttle services are cheaper and greener alternatives. However, those alternatives are still new to many customers and policy makers. The design of their promotion policies demands careful investigation. This paper studies how we can reduce the number of on-demand cabs on the road and, therefore, their GHG emissions by promoting pooled transportation such as shuttle services. Methodology/Results: In this work, we use detailed usage data and build a structural model to study customer preferences of price and service features when choosing between private cabs and a scheduled shuttle service. Using the estimated model, we identify and evaluate the efficacy of improving service features like reducing the walking distance to shuttle stops on customers choices of transport and, therefore, the number of ride-hailing vehicles on the road. We find that a 20% decrease in walking distance can achieve 40% of the benefits of commonly adopted congestion surcharge policies. It can also reduce up to 4.8 thousand tonnes of GHG emissions, which is worth over a million dollars per year. In addition, we demonstrate the implementability of walking distance reduction policies by adding stops on existing shuttle routes. Managerial implications: Reducing the number of ride-hailing vehicles on the road has become an important goal in many cities green transport policy design. For example, cities like New York have implemented congestion surcharge policies targeting ride-hailing vehicles in recent years. Our findings suggest that, by changing operations levers such as service features of pooled transport, cities can achieve a substantial amount of benefits from reducing congestion compared with congestion surcharge policies with essentially zero cost, leading to much more efficient green transport policies.

Reproducibility in Management Science (**Published at Management Science**) With the help of more than 700 reviewers, we assess the reproducibility of nearly 500 articles published in the journal Management Science before and after the introduction of a new Data and Code Disclosure policy in 2019. When considering only articles for which data accessibility and hardware and software requirements were not an obstacle for reviewers, the results of more than 95% of articles under the new disclosure policy could be fully or largely computationally reproduced. However, for 29% of articles, at least part of the data set was not accessible to the reviewer. Considering all articles in our sample reduces the share of reproduced articles to 68%. These figures represent a significant increase compared with the period before the introduction of the disclosure policy, where only 12% of articles voluntarily provided replication materials, of which 55% could be (largely) reproduced. Substantial heterogeneity in reproducibility rates across different fields is mainly driven by differences in data set accessibility. Other reasons for unsuccessful reproduction attempts include missing code, unresolvable code errors, weak or missing documentation, and software and hardware requirements and code complexity. Our findings highlight the importance of journal code and data disclosure policies and suggest potential avenues for enhancing their effectiveness.

A Structural Analysis of Freight Delays in the Indian Railway Network (**Major Revision at Operations Research**)

Despite being one of the most cost-effective and sustainable modes for transporting freight, railways globally have been rapidly losing market share in the in-land freight transportation sector. One of the salient reasons for this is the extremely slow speed of freight trains in many parts of the world. For example, in Indian Railways, the world's fourth-largest in size, the average freight train speed is only around 25 kmph and has remained constant for the past few decades. The slow pace of freight trains is because passenger trains, which share the same infrastructure, get prioritized in dispatch by railway traffic managers (also known as section controllers). In this paper, we empirically study freight delays in the Indian railway setting by analyzing how section controllers make freight train stop and hold decisions while managing the movement of freight trains. Subsequently, we propose policies to reduce freight delays and, thus, increase trains' speed through the network. We use detailed high-frequency network congestion data and estimate a structural model to estimate the key parameters underlying the controllers' decisions. The estimated parameters provide empirical evidence for (i) the priority accorded to passenger trains over freight trains, (ii) the push effects in the freight train queue, and (iii) the strategic behavior of section controllers in holding trains at larger stations. Using the estimated model, we conduct a set of counterfactual analyses to address the problem of slow freight train speeds. First, we evaluate the impact of constructing Freight Only Corridors (FOCs), high-capacity corridors reserved for freight transport. We find that the FOCs lead to about a 29% reduction in freight train delays and a 12% improvement in train speeds. Then, we also evaluate non-capacity-investment-based alternatives to FOCs, like (i) threshold-based releases for freight trains dwelling longer than a specified time limit and (ii) freight capacity consolidation by using vertically stacked trains. Interestingly, we find that our non-capacity interventions can provide benefits similar to those of FOCs while being considerably cheaper. Specifically, a 45-minute threshold release policy leads to around 31% reduction in dwell times and 9% increase in speeds. Similarly, vertically consolidating freight capacity by about 25% leads to around a 10% increase in speed, comparable to the improvement achievable with the FOC. Our policy recommendations for improving freight speeds could enhance the overall efficiency of India's transportation infrastructure, benefiting the country's economic and social development.

Vertical Integration and Market Power in Supply Networks (**Under review at M&SOM**) Vertical integration, a strategic approach where firms control multiple stages of production and distribution, offers potential operational efficiencies and market power. While the operations management literature emphasizes its benefits for supply chain coordination, reduced transaction costs, and risk mitigation from informational asymmetries, certain antitrust studies concern how vertical mergers may enable dominant firms to limit competition by creating entry barriers and causing input or market foreclosure. There is some evidence of the potential supply chain benefits of vertical integration across a few industries. However, empirical evidence on its anti-competitive effects remains scarce. This paper contributes to closing this gap by examining vertical integration's impact on firms' market power, as measured by their price-marginal cost markups. Our research investigates pre- and post-integration markups to determine whether firms gain anti-competitive market power after integration, diverging from competitive market pricing. Since firms' marginal costs are not usually observed in data, we estimate markups using production function estimations, following recent advances in empirical industrial organization. We compile a novel dataset on vertical integration cases using the FactSet Revere and the SDC platinum databases. Specifically, we identify 213 vertical mergers between firms with existing buyer-supplier relationships from 2003 to 2022. Methodologically, we employ a staggered difference-in-difference approach in conjunction with instrumental variables (constructed using mutual fund stock outflow events) that cause an exogenous variation in firms' decisions to integrate vertically. Our analysis reveals that vertical integration increases acquiring firms' markups by 13%. We also report a steady increase in post-integration markups since 2003, which suggests growing market power and industry concentration in the last two decades and implies a need for stricter antitrust enforcement. Interestingly, we find that the increase in firms' market power post-integration does not come from improved operational or cost efficiencies but rather from higher than competitive prices. Our paper offers causal evidence of vertical integrations anti-competitive and welfare-reducing outcomes. The insights from our paper contribute to the ongoing operations and antitrust discussions and are relevant for high-profile vertical merger cases.