Centre for Transportation and Logistics

INDIAN INSTITUTE of MANAGEMENT AHMEDABAD

विद्याविनियोगाद्विकास:

NEWSLETTER

April - June 2024

CTL Thought Article

Mobility and Employment: Insights from India

In roughly 15% of American households with more adults than cars in their homes, intra-household competition for car access is common (Ruggles et al., 2017). Likewise (Dobbs, 2005) reveals that while 87.6% of households in North England owned private vehicles, 16.7% of women were secondary users whose access to the vehicle remained contingent upon the requirements of the male household member. However, there is a dearth of literature from other countries investigating the same. A study by (Blumenberg et al., 2022) based in America elucidate that a spouse's earning potential shapes his/her ability to use the household vehicle, regardless of sex. Employment and high-paying jobs thus become crucial for women to become primary users of household vehicles.

However, in the case of India, an increase in the employment or pay rate of women does not necessarily make women primary users of household vehicles, a privilege often associated with high-paying jobs. This is corroborated by Mahambare and Dhanaraj (2022) in their study based in Chennai, where a higher proportion of men have been found using their personal vehicles to commute to work. Men with lesser incomes used two-wheelers, whereas those with greater incomes typically used four-wheelers. Although, the scenario was different in the case of women. Women with higher incomes chose faster transportation options like taxis or cabs and bore a high commute cost. Meanwhile, women with lower income levels endured lengthy and inconvenient commutes due to their dependency on public transportation.

It thus becomes imperative to interrogate the reasons behind the lack of correlation between the rising income levels of women and their status as primary users of household vehicles. One plausible explanation could be attributed to the fact that women are mostly bounded by household and childcare activities, while men are primarily operating in the labor market. This division assigns women a secondary status in the labor market (Dobbs, 2007). Therefore, in an attempt to balance their personal and professional lives, women often opt for part-time job roles or, in many cases, opt out of the job market, rendering them secondary supporters of the economic affairs of the household. Data from 2017–2020 reveal that in rural India, approximately 23-24% of working-age women (15+ years) held part-time positions, compared to only 7-8% of men. Urban areas showed a similar pattern, with 15–16% of women in part-time roles versus 3–4% of men.

Numerous studies indicate that mobility is a critical determinant in improving women's job opportunities (Martinez et al., 2020; Pickup, 1984), one of which can be through improvement in the public transport system. Anecdotal evidence from Delhi (Anand & Tiwari, 2006) and Chennai (Mahambare & Dhanaraj, 2022) bolsters this argument. In both studies, women were found to be captive users of public transport systems or opting for active modes of transport due to the lack of access to personal vehicles, longer work commutes, and economic constraints.

An efficient public transport system with a broader reach thus becomes necessary to facilitate a more robust female labor force participation (FLFP) rate. India's FLFP rate stands at a dismal 26.2% as of 2020-21 (World Bank, 2023). Additionally, 84% of women rely on public, non-motorized, and intermediate public transport modes (World Bank, 2022) as they often combine their work, family, and household-related travel (Balachandran and Desai, 2024; Peters, 2001). However, many women struggle to access public transportation systems due to expensive fares, lengthy commutes, and inadequate reach and frequency. The International Labour Organization (ILO) found that lack of transportation was the biggest obstacle limiting women's labor force participation in developing countries, reducing it by 16.5% (Kurshitashvili et al., 2021). Balachandran and Desai (2024) reveal that enhancing the transport system's quality and size improves the female labor force participation rate, with findings highlighting that access to transportation impacts FLFP more than men.

Meanwhile, some steps toward improving accessibility and affordability of public transport for women have emerged in India in places like Delhi, Punjab, Tamil Nadu, Karnataka, and Telangana. Delhi introduced a free public bus pass scheme for women called the 'Pink Ticket.' Dasgupta and Datta (2023) found that the pink pass scheme raised women's work time by 30 to 50 minutes. Additionally, the scheme raised the employment rate of women from the marginalized sections by 24%. Moreover, women made up the maximum number of passengers in the Delhi Transport Corporation buses by March 2021, after the scheme was implemented in 2019 (Goswami, 2021). A similar study was conducted by The Fiscal Policy Institute, which examined the influence of the 'Shakti Scheme,' offering free rides to women in Karnataka. The study indicated a 5% increase in female labor force participation rate, directly attributable to the Shakti scheme (Sangondimath, 2024).

In conclusion, inequitable access to personal vehicles and public transportation poses significant barriers to seeking high-paying employment opportunities for women. Adequate measures to enhance their inclusion in the public transportation system are essential to accelerate their participation in the labor market. The World Bank (2024) highlighted that restricted mobility remains a formidable impediment to realizing this aspiration. If women attain employment opportunities equivalent to their male counterparts, the annual global GDP could increase by 25% (25 trillion dollars) by 2025.

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CTL Events-Research Seminar

1. Recent Machine Learning and Data Science Applications in Transportation and Logistics

The Centre for Transportation and Logistics, IIMA hosted a research seminar titled '**Recent Machine Learning and Data Science Applications in Transportation and Logistics**' by **Dr. Samrat Roy**, Assistant Professor, Operations and Decision Sciences, Indian Institute of Management Ahmedabad on June 05, 2024. The seminar was moderated by **Dr. Debjit Roy**.

Talk Summary

Dr. Samrat Roy commenced the seminar by highlighting that although AI systems, such as ChatGPT, are proficient at providing solutions, the primary duty of researchers and practitioners lies in discerning the objectives(what), timing(when), and rationale(why) behind their actions. The methodology of implementation should be considered only after these fundamental questions are addressed.

Machine learning, data science, and other statistical techniques can be applied to various optimization and prediction techniques. The seminar primarily focused on arrival time prediction and demand forecasting in transportation and logistics.

Dr. Samrat Roy discussed the method of Classification and Regression Tree (CART) used for arrival time prediction. Additionally, he explored the various variables that can predict the arrival time of containers using multimodal freight transportation, applying ML methods. Subsequently, Dr. Samrat elaborated on several notable machine-learning methodologies, including bagging, random forest, extremely randomised trees, adaptive boosting, gradient boosting, and support vector regression.

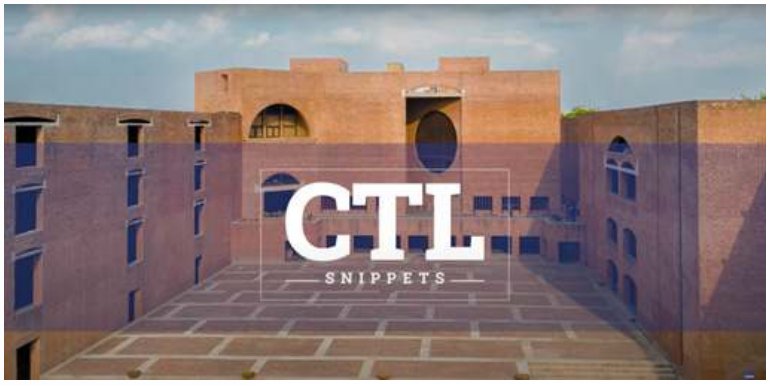
He highlighted how random forest is a theoretically improved version of bagging since random forest involves multiple decision trees, thereby reducing the chances of an error. Dr. Samrat explained that extremely randomized trees improve upon random forest by selecting random cut-off points rather than optimal ones. He emphasized that boosting is akin to bagging but differs in its approach. He also discussed gradient boosting, where models are added sequentially. However, Dr. Samrat cautioned against the use of complex techniques for arrival time prediction since simpler methods like linear or logistic regression can often perform better.

He further discussed research involving advanced machine learning techniques like discrete wavelet transform and artificial neural networks to forecast demand, where the focus lies on temporal dependence. He also briefed on the application of time series forecasting techniques like SARIMA and GMDH. He concluded the seminar by discussing regularized methods, spatiotemporal demand structures, and multidimensional data in transportation and logistics.




To watch visit: https://www.youtube.com/watch?v=HgOh1jJDMzQ or scan

CTL Snippet



CTL Snippets E7: Designing Contingent Free Shipping policy to maximize profits and minimize returns

Interaction with: Dr. Ashish Kabra, Assistant Professor, University of Maryland - Robert H. Smith School of Business

Dr. Ashish Kabra

Assistant Professor
University of Maryland - Robert H. Smith School of Business

Prof. Kabra discusses the role of the returns environment in designing Contingent Free Shipping (CFS) policies for e-commerce players. He begins the discussion by explaining the importance of a shipping policy for e-commerce retailers and how it affects consumer demand and seller's profitability. The discussion moves to the different types of shipping policies, like free shipping, CFS and subscription-based shipping policies among others. A contingent free shipping (CFS) policy offers free shipment of an order only if it satisfies a pre-specified threshold amount. Customer behavior should drive the design of an optimal CFS policy. The threshold amount should be carefully determined since a high threshold may deter customers from purchasing while a low threshold may make it unable to recoup shipping costs. He also highlights the importance of analyzing bubble purchases, return process and returns hassle in designing a CFS policy. The primary challenges in designing optimal CFS remain determining the right amount of threshold and fee amount. He recommends formulating lenient CFS terms when the return process is convenient, while stringent CFS terms should be applied when the return process is inconvenient

To watch visit: https://www.linkedin.com/feed/update/urn:li:ugcPost:7212317105046622209/
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CTL Faculty Research

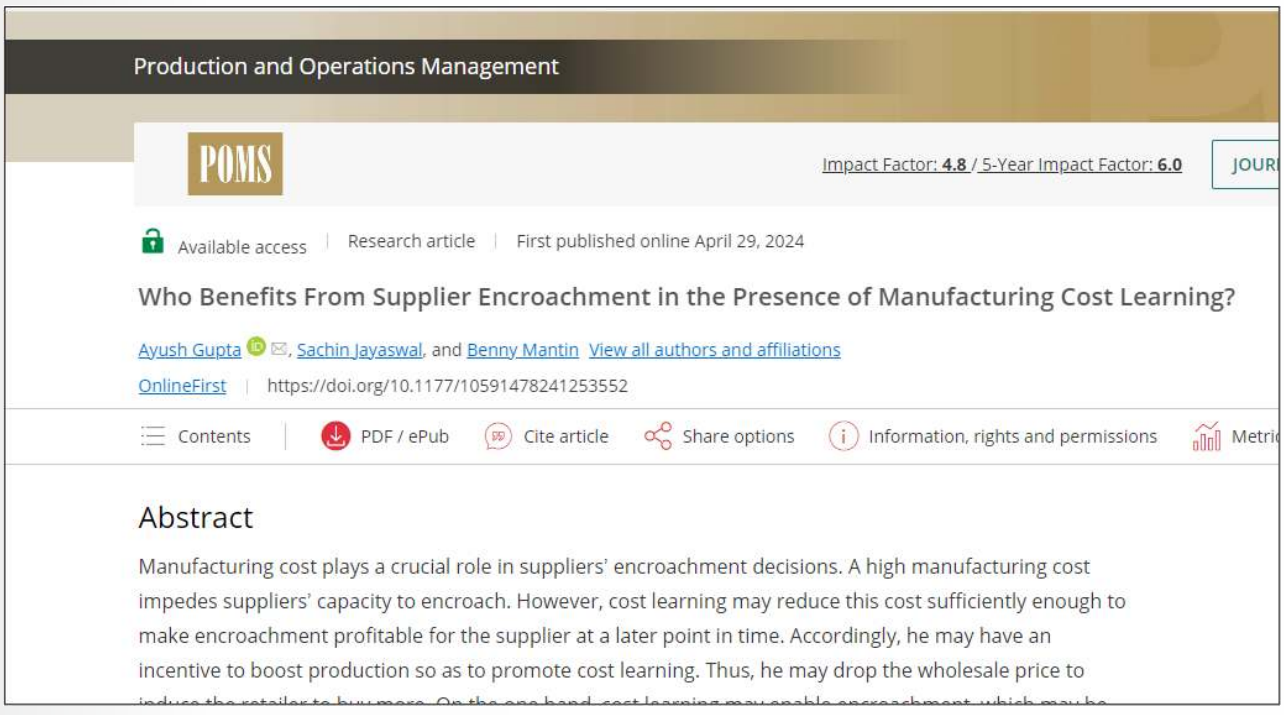
1. Who Benefits From Supplier Encroachment in the Presence of Manufacturing Cost Learning?

Prof. Sachin Jayaswal, along with Prof. Benny Mantin & IIMA doctoral student Mr. Ayush Gupta, published a research article titled '**Who Benefits From Supplier Encroachment in the Presence of Manufacturing Cost Learning?**'

Abstract

Manufacturing cost plays a crucial role in suppliers' encroachment decisions. A high manufacturing cost impedes suppliers' capacity to encroach. However, cost learning may reduce this cost sufficiently enough to make encroachment profitable for the supplier at a later point in time. Accordingly, he may have an incentive to boost production so as to promote cost learning. Thus, he may drop the wholesale price to induce the retailer to buy more. On the one hand, cost learning may enable encroachment, which may be detrimental to the retailer. On the other hand, cost learning results in a lower manufacturing cost which may translate into a lower future wholesale price, benefiting the retailer. Therefore, the retailer faces a dilemma: should she increase her order quantity to advance cost learning or not? As the retailer may order fewer units in the initial period to limit future direct channel sales, the supplier faces a challenge: should he, instead of dropping his initial wholesale price, raise it to signal his intention of not encroaching so as to induce the retailer to sell a higher quantity in the first period? We model the supplier–retailer interaction as a two-period Stackelberg game to address the retailer's dilemma and to identify the optimal supplier response. We uncover a new outcome, which arises in the presence of cost learning, where the supplier encroaches but decides not to sell anything through the direct channel. In addition, we find that supplier encroachment may reduce or eliminate the retailer's incentive to advance cost learning. This results in lower sales by the retailer, which impedes cost learning, leading to a higher future manufacturing cost (compared to the no encroachment setting). As a result, encroachment, which is typically viewed as advantageous for the supplier, may become detrimental to him. Surprisingly, the supplier continues to encroach and sell directly unless he can credibly assure the retailer that he will not encroach in the future.

To read the complete research paper, visit: https://doi.org/10.1177/10591478241253552



2. In the driver's seat: the role of transformational leadership in safe and productive truck cargo transport

Prof. Debjit Roy, along with Prof. René de Koster, Prof. Jelle de Vries & Mr. Alexandros Pasparakis, published a research article titled '**In the driver's seat: the role of transformational leadership in safe and productive truck cargo transport**'.

Abstract

This study investigates the effect of safety-specific transformational leadership (SSTL) on the performance outcomes of safe driving and driving productivity in both long and short-haul truck cargo transport. We conduct our study in the context of a hazardous material (HAZMAT) Indian transport company using a sample of 1,196 trips across 104 unique routes, and driven by 71 truck drivers over a 30-month span. We establish that SSTL is beneficial for truck driving productivity as it positively influences driving productivity in long-haul trips. There is no conclusive evidence of a negative effect on the productivity in short-haul trips. Furthermore, our results show that more experienced drivers are also more likely to indulge in risky driving behavior. Our findings have immediate practical applications for transport companies that wish to promote operational safety, while safeguarding and even improving operational productivity.

To read the complete research paper, visit: https://link.springer.com/article/10.1007/s10696-024-09539-9

CTL Faculty Engagements

1. Inaugural Senior Member of INFORMS

Prof. Sundarvalli Narayanaswami received commendation and was acknowledged as one of the first 264 cohorts as a Senior INFORMS member from the global community of 12,000 OR Professionals. This Senior Member distinction is conferred to individuals who demonstrate exceptional commitment to the community.

To know more: https://doi.org/10.1287/orms.2024.01.25n

2. Scientific Advisor for the Global Cold Chain Alliance (GCCA)

Prof. Debjit Roy has been designated as the new member of the Council of Scientific Advisors (CSA) for the Global Cold Chain Alliance (GCCA). The CSA is committed to providing advanced research and insights to cold chain industry stakeholders.

To know more: https://www.gcca.org/news-announcements/the-global-cold-chain-foundation-announces-two-new-csa-members/

3. Large Scale Optimization (LSO) Summer School 2024

Prof. Sachin Jayaswal was part of the fourth edition of the Large Scale Optimization (LSO) Summer School and Conference, held at the Indian Institute of Technology Roorkee, from May 18-26, 2024.

4. 11th Supply Chain Management & Logistics Summit-2024

Prof. Debjit Roy was one of the trainers for Module 3 of the Masterclass on Supply Chain Digitization at the 11th Supply Chain Management & Logistics Summit-2024, which took place in New Delhi on June 28th, 2024.

News Watch

India gets its first Electric Vehicles Stock Index

Image credits: Ernest Ojeh & Nicholas Cappello

The National Stock Exchange of India Limited (NSE India), India's premiere stock exchange, launched India's first Nifty EV & New Age Automotive Index on May 30, 2024, to track the performance of companies engaged in the development of EVs and alternative automobile technologies like hydrogen, biofuels and hybrid. The Index currently comprises 33 companies dealing in EV and battery manufacturing, battery component manufacturers, manufacturers and service providers of new age autonomous vehicle technology among others.

The index uses Periodic Capped Free Float methodology for index construction, which means that it considers free float (excluding shares held by promoters and insiders) market capitalization with a cap on the maximum weight of a company in the index. The base date and base value of the index are fixed on April 02, 2018, and 1000, respectively. The index will be reconstituted (review of companies constituting the index) semi-annually every March and September and rebalanced (adjustment of company weights without changing the list of constituent companies) quarterly.

Find out more at: https://www.linkedin.com/feed/update/urn:li:share:7213209882693447680/

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