



Brij Disa Centre for  
Data Science and  
Artificial Intelligence  
INDIAN INSTITUTE OF MANAGEMENT AHMEDABAD

विद्याविनियोगादिकाः



Ahmedabad  
Chapter

# IIMA/CDSA-ORSI EXCELLENCE IN Management Science and Analytics Practice Award

## INFORMATION HANDBOOK



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Brij Disa Centre for Data Science and AI



# Ankur Sinha

Co-Chairperson Brij Disa Centre for Data Science and Artificial Intelligence, IIMA

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The Brij Disa Centre for Data Science and Artificial Intelligence (CDSA) is proud to support the inaugural IIMA/CDSA-ORSI Excellence in Management Science and Analytics Practice Award. This award, initiated by the Operational Research Society of India (ORSI), Ahmedabad Chapter, aims to recognize and reward outstanding industry projects that demonstrate the practical application of management science and analytics to solve real-world problems. Operations research and analytics continue to play a pivotal role in enhancing decision-making across various sectors.

The award underscores the importance of bridging the gap between academic research and industry practice. By honoring exemplary projects, the award encourages innovation, promotes collaboration, and highlights the transformative power of data-driven methodologies in real world projects.

The evaluation and selection process for the award is led by a distinguished jury consisting of practitioners from industry and academia. The selection emphasizes practical contributions, scalability, novelty, implementation in the real world, and measurable impact. We are thankful to Prof. Goutam Dutta for associating with the centre on this activity and for taking a lead in identifying and evaluating submissions. The shortlisted projects undergo rigorous assessment to ensure they meet the highest standards of excellence in implementation and outcomes and will be published in OPSEARCH, the journal of ORSI.

The plan is to institutionalize this award as an annual recognition of excellence in operations research, management science and analytics in practice. By doing so, the award aspires to build a robust community of practitioners who drive meaningful change through innovative analytics and optimization solutions. We extend our gratitude to all participants, jury members, and collaborators for their invaluable contributions. The ORSI-CDSA Excellence in Operations Management Science and Analytics Practice Award signifies our collective commitment to advancing the field and its applications for the betterment of society.



# Dr. Sanjay K. Prasad

IBM Distinguished Engineer  
Chair of the Prize

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In today's dynamic landscape, analytics has emerged as a cornerstone for driving innovation, decision-making, and measurable impact across industries. The IIMA/CDSA-ORSI Practice Award represents a unique platform to celebrate the application of analytics in solving real-world problems, bridging the gap between theoretical frameworks and tangible outcomes. I am consistently inspired by the ingenuity and resilience of professionals who harness the power of data to address pressing challenges.

This award not only recognizes excellence in analytics but also underscores the importance of collaboration, creativity, and strategic thinking in transforming insights into action. With its focus on India, this award is also an important step toward raising awareness of analytics in the country and further boosting its practice.

The submissions for this award highlight the breadth and depth of analytics' potential—ranging from optimizing supply chains and enhancing customer experiences to fostering sustainable practices and advancing societal goals. Each project tells a story of perseverance, ingenuity, and the relentless pursuit of better solutions.

It is my privilege to contribute to this initiative and witness the extraordinary talent that continues to shape the future of analytics. I extend my heartfelt congratulations to all finalist companies, whose dedication and innovation inspire us to push boundaries and envision new possibilities.

May this recognition fuel further exploration and excellence in the practice of analytics, contributing to a more informed, efficient, and equitable world.



# Goutam Dutta

Editor of Special Issues

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It is a great honor to serve as the Editor for the Special Issues on the “IIMA/CDSA-ORSI Practice Prize Contest.” I would like to thank the ORSI-Ahmedabad chapter for allowing us to conduct this event. I would also like to extend my gratitude to Prof. Ankur Sinha and Prof. Sriram Sankarnarayanan, co-Chairpersons of the Brij Disa Centre of Data Science and AI, and Prof. Bharat Bhaskar, Director of IIMA, for their encouragement and support in organizing this event, as well as Springer for their collaboration in publishing the selected papers.

The concept of a practice-oriented competition is not new. Its roots can be traced back to 1972, when the Institute of Management Sciences (TIMS) in the USA launched the *Interfaces* journal to promote practical applications of management science. Similarly, in 2005, EURO introduced the European Excellence in Practice Award.

In India, the idea of bridging theory and practice was first championed by Prof. P.C. Mahalanobis, the founding president of ORSI. Although he recognized the importance of applied research, a structured process to showcase real-world applications of operations research was not established during his tenure.

Recognizing this gap, members of our editorial team and jury proposed the idea of a competition to highlight and celebrate practical applications of management science and analytics. The Practice Prize Contest was launched in 2018 during the National Convention of ORSI at IIT Bombay. It continued in 2019 at IIM Ahmedabad but faced interruptions due to the COVID-19 pandemic.

The motivation to revive this contest stemmed from the lack of accessible case studies demonstrating impactful applications of management science in the Indian industry. In 2024, we decided to not only host the competition again but also produce academic outputs with significant classroom value, showcasing management science as an applied discipline.

As India’s economy continues to grow, the demand for efficient systems and processes has never been greater. With ORSI’s commitment to advancing the practice of management science in India, this competition focuses exclusively on domestic applications. This year, we are proud to feature five outstanding papers, covering diverse domains: Banking (SBI), Military Planning (IAF), Manufacturing, Raw Materials Preparation (Tata Steel), Ferro-alloy Optimization in Steel Industry (JSW), and Manufacturing (John Deere, India).

These applications have delivered measurable financial benefits to their respective organizations, ranging from tens to hundreds of crores. We hope these cases will inspire discussions in educational institutions, particularly in science, engineering, and business schools across India.

Looking ahead, we aspire to see greater participation from industry, government, and academia to elevate this event further. Together, we can reinforce the role of management science as a transformative, applied discipline in India.



# Sundaravalli Narayanaswami

Associate Professor of Public Systems Group, IIMA  
President, Operations Research Society of India, Ahmedabad  
Chapter

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The Operations Research Society of India (ORSI) Ahmedabad Chapter has initiated an Award for Excellence in Operations Research and Analytics Practice. The ORSI, as a community of strong researchers and academicians in the field of Operations Research and Management Sciences is committed to promote practice-oriented research; in particular, the society intends to facilitate and foster industry – academia connect from the Indian context. As a society, we recognize the importance of scientific modelling of industrial functions and developing formal approaches to real world and large-scale problems of practice significance.

In current times, advancements in data analytics and machine learning have confirmed this perspective, and it has become more important than ever to apply Operations research models for organizations to stay competitive and attain leadership position in their domains. Also addressing industrial issues in academic research makes the models more grounded and verifiable.

The award for excellence constituted by ORSI is aimed at highlighting research of impact from the Indian context. We are committed to encourage rigorous research models and methodologies that are creative and impactful, from a managerial, and academic perspective.

The award intimation was communicated through several outlets to invite good quality research; submissions are evaluated by eminent jury members drawn from all over the world. Prof Goutam Dutta has been instrumental in driving the award initiative and his continued interests in promoting academia-industry collaboration is inspiring.

ORSI Ahmedabad chapter extends gratitude to all enthusiastic participants, industry leaders, academicians and jury members for their continued support and engagement in this unique initiative as part of the Indian OR community.

The IIMA/CDSA-ORSI Excellence in Operations Research and Analytics Practice Award would be an annual initiative that underscores our commitment to advancements in promoting OR for a better managerial practice and social growth.

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# FINALISTS

# Armed Forces of India

## Operations Research Driven Air Mobility Optimization for Enhanced Deployment Efficiency in Military Exercises in Armed Forces in India.

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### Abstract

In this study effort has been made to optimize Aviation Turbine Fuel (ATF) consumption by heavy-lift transport aircraft during operational mobilization of fighter squadrons during military exercises within India. The primary mission of Armed Forces is to secure a nation's sovereignty towards safeguarding National Security.

A need was felt to optimize the utilization of scarce resources. Systems thinking approach was adopted to identify the various causal relationships between influencing factors and analyze the system holistically. The points of leverage within the system were identified. These leverage points could be addressed to accrue significant gains.

A Linear Programming model was made which evaluates solutions concerning quantitative data with an objective function consisting of 60 decision variables and 66 constraint inequalities. Constraints in terms of weight and volume restrictions along with aerodynamic stability requirements of the transport aircraft were analyzed in this model. The results were evaluated using sensitivity analysis and binding/non-binding constraints were studied towards their impact of the optimal solution and objective function value.

### Impact Statement

The analysis indicated possibility of achieving an optimal fuel consumption resulting in substantial cost savings and several secondary advantages accrued due to savings in aircraft flying hours and intangibles effects including reduction of crew fatigue.

The implementation of the LP model has led to cost savings of approximately Rs 2000 Crores. The developed model provides a new framework to plan and execute frequent military exercises in a more effective and efficient environment with significant enhancement in operational preparedness of the armed forces.

### Keywords

National Security, OR in Military, Optimal Fuel Planning, Systems Thinking, Optimization, Operational Preparedness



# State Bank of India

## Analytics Based End to End Digital Pre-Approved Personal Loan for Non-Salaried Customers at State Bank of India

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### Abstract

The State Bank of India is the country's largest Bank by Assets Under Management (AUM), customer base and network. It was established by the Government of India in 1955 to meet the twin needs of funding nation-building initiatives and promoting financial inclusion. In March 2023, the bank launched an end-to-end digital pre-approved personal loan product for non-salaried customers, using AI/ML based credit risk modelling.

Prior to this, non-salaried customers did not have a consistently maintained personal loan product. To enable this, an AI/ML model was built using customer transaction behavior data, cash flow characteristics and demographics to predict credit default probability.

The methodology used was Two-Step Clustering, to handle the large volume of data and the lack of substantial credit history. Further, clustering was conducted twice, with riskier clusters being eliminated in each phase based on delinquency concentration and expert insight. The findings suggest that cluster analysis can effectively flag credit risk even in cases with complex and inconsistent cash flows.

### Impact Statement

The findings of this study contribute to the existing literature on credit risk assessment and provide valuable insights for bankers and financial institutions.

This approach was able to reduce the processing time, manpower cost and risk of the product. This was achieved while extending formal credit to a previously underserved customer base. During the period March 2023 to October 2024, the product had (created) additional loan disbursements worth ₹8,400 Cr. (USD 1 Billion) spread across 5.36 Lakh account holders, which were all sanctioned digitally, with no branch visit or manual intervention.

### Keywords

Cash Flow Based Lending, Two Step Clustering, Credit Risk Assessment, Cluster Analysis, Banking, AI/ML in Banking

# John Deere India Private Limited

## A Mixed Integer Non-Linear Programming Model to Optimize Inventory Parameters for Supply Chain at John Deere India Tractor Business Unit

### Authors

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**Gaurav Thombare** (John Deere Enterprise Technology & Engineering Center, India.)

**Abhijit Nalawade** (John Deere Factory Business Unit, India.)

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### Abstract

This work discusses a problem related to optimizing crucial inventory parameters like Minimum Order Quantity (MOQ), lot-size and ordering frequency for John Deere India supply chain specific to tractor business unit. Through operations research principles, a simple construct of mixed-integer nonlinear programming (MINLP) is framed to determine optimal inventory parameters by balancing inventory holding and ordering costs with respect to part level time-varying demand and supplier ordering restrictions like MOQ, rounding value, and ordering price. The comparison of numerical experiments with literature relevant methods confirms the efficacy of the constructed MINLP model.

### Impact Statement

The business deployment success story of this model on 9000 parts, in John Deere India Pune factory, is equivalent to a strategic cost benefit of \$1,34,000 ( $\approx$  11,15,00,000 INR).

### Keywords

Batch ordering frequency, Dynamic lot-sizing, Inventory policy, Minimum-order quantity, Mixed-integer nonlinear programming,

# Tata Steel India

## Image Analytics Enabled Real-time Decision Making in Iron Ore Processing at Tata Steel India

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### Abstract

Mining and beneficiation are critical links in the supply chain of integrated steel manufacturing.

During iron ore mining, on account of the natural variation in the rock deposits, the fragments generated by blasting often consists of oversized boulders. While feeding the excavated material to crushers for further processing, the oversized boulders cause crusher jamming resulting in delay and under-utilization of crushing plant. Further, removal of jamming is a manual process and a high safety hazard.

To address this problem, an AI based imaging solution has been developed which captures the image of each scoop of material loaded to dumpers and processes the images using advanced Deep Learning Algorithms to identify presence of oversize boulders in it. Once a boulder is detected in a particular dump load, automatic alert is sent to the dumper driver intimating material to be stacked on ground for special pre-processing before crushing. Given the challenges associated with high vibration, uncontrolled illumination and dusty environment, the solution had to be designed to ensure robustness.

The solution has been deployed on all the shovels at Noamundi mines. The deployment of the system not only reduces the crusher jamming delay but also eliminates hazard of man-machine interaction associated with boulder removal from the crusher. The prevention of crusher jamming has resulted in delay avoidance by hundreds of hours and hence savings to the tune of millions of dollars in FY'24 alone. Subsequently, solution has been rolled out into other two iron ore mines of Tata Steel India.

### Impact Statement

The Project is a testimony to Tata Steel's pioneering spirit and collaborative work culture. Since implementation, the solution has drastically reduced the plant outage on account of crusher jams caused by oversized boulders and has resulted in an audited savings of Rs. 9.36 crores in the FY'24 alone at Noamundi Iron Ore Mines of Tata Steel. Additionally, it reduces to a great extent the safety risk associated with manual removal of boulders jamming the crushers. Subsequently this solution has been rolled out in more mine locations and is paying rich dividends in terms of plant throughput and safe operations.

# JSW Group, India

## Data-Driven Optimization of Ferro Alloys Usage for Enhanced Efficiency and Cost Reduction in Steelmaking.

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## Abstract

Achieving precise chemical composition in the manufacturing of steel is critical for meeting quality standards and customer specifications. During the steelmaking process, Ferro-alloys are added to adjust levels of elements like carbon, manganese, and silicon to reach the targeted aim composition. Previously, operators relied on experience or basic spreadsheet based solvers, leading to inconsistent final chemistry, excessive use of costlier alloys, and longer production times.

This lack of standardization caused variability in product quality, increasing costs and risking customer satisfaction. The issue impacted production efficiency significantly, making it essential to standardize and optimize the Ferro-alloy addition process for cost-effective steel production. To minimize Ferro-alloy costs while achieving desired chemistry, a Data Science model using a Linear Optimization methodology was implemented. This optimization model determines optimal alloy quantities based on recovery rates, chemistry specifications, and alloy prices.

A Python-based application built with Flask (web based application) integrates this solver for real-time analysis and recommendations of live heats deployed in the operators control areas.

A Dashboard provides key insights into Ferro-alloy consumption, cost savings, inventory, and chemistry details. Data from multiple data sources are standardized and integrated, ensuring a seamless flow to the dashboard for visualization and monitoring.

The solution employs a Linear Optimization Solver to calculate precise Ferro-alloy quantities, achieving target chemistry efficiently with minimal adjustments. A Dashboard on Azure provides real-time insights into alloy consumption, costs, and compliance.



## Impact Statement

This work resulted in reduced Ferro alloy consumption of 96 Crores (11.2 Million USD) at our Dolvi Steel Plant, 6.9 Crores at BPSL and 8.44 Vijayanagar Steel Plant. For the current year, the savings are 22.3 Crores at the Dolvi Plant in the current year till October 2024. The cumulative savings from these projects are 133.64 crores for the financial year 2023-24 and 2024-25 (till date).

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**Tanya Gauni**, IIMA



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