IITB-Monash Research Academy

An Indian-Australian research partnership

Indian Institute of Technology Bombay

MONASH University

Project Title:	Application of Decision Making Models in Practice: Opportunities and Challenges	
Project Number	**IMURA0346**	
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Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?
(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. Advanced computational engineering, simulation and manufacture
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

Define the problem

The project entails understanding the real-world application of classic operations management/operations research models.

To take an example, the Newsvendor model is one of the oldest and most well-researched topics in Operations/Supply Chain Management (OSCM) field. The model captures the inherent trade-off between stocking too much and ending up with unsold inventory on the one hand, and stocking too less and facing stockouts on the other hand, when the final demand is stochastic. The model has been widely adopted to analyze supply chains involving perishable and seasonal products and a search of major research portals will find thousands of theoretical research papers based on this model. The underlying dynamics apply to situations in managerial decisions in general, beyond OSCM.

It is not clear to what extent the model (and solutions based on it) has been applied to real life problems though. A model with such a rich history and maturity ought to have extensive application in real world, which however does not seem to be the case. One problem with the model could be that human decision makers do not make decisions as rational profit maximisers, but have decision making biases, both unintentional and intentional. It is important to understand what those are.

This project will study the impact, the challenges and opportunities for applicability of the newsvendor and other similar models such as the travelling salesman problem. Such models are essentially characterised (1) as easy to understand, (2) by the fact that they do not have many people in the real-world clamouring for applications, (3) there are not too many implementations of these in the real-world.

Project aims

The project will aim to study how Newsvendor models and other such inventory management models and scheduling/routing models apply in the real world. At a more general level, similar trade-offs and biases apply to several management problems, even those outside inventory management, such as capacity decisions for one-off events. The study will aim to generalize the findings to human decision making in uncertain environments.

Similarly, the study will consider other classical OM/OR model for empirical validation.

The methodology will involve talking to many real-world decision makers in Australia and India with a view to understanding how
- models are built,
- data are gathered,
- decisions are made,
And
- whether these decisions are implemented,
- what some of the opportunities, difficulties and challenges might be.

Successful applications/adoption such as airlines, rostering, timetabling, and machine scheduling etc. can serve as case studies to learn why these implementations have been successful.

Expected outcomes

Highlight the expected outcomes of the project

- Contribution to literature by way of enhanced understanding of the real-world application of OM/OR models
- Contribution to decision-making literature, in particular, to the body of behavioural operations management literature
- Contribution to practice by making the models more relevant and useable.

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.
The project will contribute to the computational science and computational modelling theme and will assist in the understanding of how decisions are implemented in the real-world using decision models.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

The project will require sound analytical/quantitative skills (to understand the modelling aspects) as well as excellent oral and written communication skills in order to effectively carry out field work, interact with practitioners, and successfully disseminate the findings through scholarly and practitioner outlets.

In addition to meeting the eligibility norms as laid out, an ideal candidate for this project would have a strong first degree in Engineering or an MBA from a premier institute, a GMAT score of over 700, and some relevant business experience.