IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

Project Title: **Route planning of parcel tankers**

Project Number **IMURA0373**

TATA CONSULTANCY SERVICES
Experience certainty.

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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 objective is to analyze the parcel tanker industry and to develop qualitative business models and quantitative approaches for the best tactical and operational route plans and fleet deployments together with order management so as to generate sustained profit.

The study will cover heterogeneous fleets that are deployed in both commercially-advertised trade lanes as also as tramps. The problem is to generate plans that maximize profit when deploying such fleets of parcel tankers.

The inputs and study will include strategic plan (e.g. where operate, what to carry and what not to carry, fleet size, alliances, etc.), the impacts of contracted and spot business, the nature of the contracts, OD demands (constrained or un-constrained) & freight charges by commodity type, competitor supply, OD travel time & ship operating costs, port & handling costs and delays, bunkering and fuel costs, chemical transportation constraints, regulations and risks.

The complexity of this problem is in both phases:

1) to be able to forecast the shipping demands of highly diverse commodities
2) to create the optimal predictive and reactive plans in a combinatorial search space that is very large, non-linear (as profits are considered) and highly constrained. Additional complexities will arise when covering alliances of 3PLs if prevalent.

Models can be evaluated with historical data or in parallel runs to establish their validity

Ref: http://brage.bibsys.no/nhh/bitstream/URN:NBN:no-bibsys_brage_23045/1/dp2007-1.pdf
http://www.sciencedirect.com/science/article/pii/S2092521211800064

Project aims

Define the aims of the project

The project aims to understand the issues plaguing the parcel tanker industry and to develop processes and methodologies for profit maximizing tactical and operational planning in real world environments.

While fleet management in several modes of transportation have been widely studied, the parcel tanker industry has not received due attention. However, with the growing importance of chemicals and its globalized trading in bulk, this industry has gained importance over the last several decades. As liner (container ship) planning is substantially different from liquid parcel shipping, this mode of transport requires special attention.

The aim is to pioneer a study of this specialized but critical industry.

Expected outcomes

Highlight the expected outcomes of the project

Business models for parcel tanker 3PLs – collaboration & competition
Demand (volume & price) forecasts by commodity
Tactical planning models for fleet deployment
Operational planning models for fleet deployment
Models for order management
Methods and techniques to solve some of the quantitative models

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.

It is expected that the project will involve advanced computational engineering and simulation to give quantitative realization to the approaches to tactical and operational planning described above.

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.

Engineering Graduate or Science Post-graduate with a mathematical content.
Skills and capabilities (desirable) in algorithm development, coding algorithms, operations research
It is also desirable that candidate have an appreciation and awareness of real world business issues.