NATIONAL UNIVERSITY OF SINGAPORE
NUS Business School
Department of Analytics & Operations

DBA4812 Supply Chain Analytics

Time: Semester II, 2022/2023

Lecturer: Adjunct Associate Professor Xue-Ming YUAN

Prerequisite

DAO2703 Operations and Technology Management

Course Objective

Supply Chain Analytics refers to data-driven supply chain management wherein crucial decisions for companies to gain competitive edges in their respective businesses are supported by scientific decision making methodologies using analytics.

This course applies Business Analytics techniques to formulate supply chain models for evaluating and optimizing supply chain performances. Emphasis will be placed on drawing practical perspectives and managerial insights from analytical solutions. It will equip students with versatile analytical skills in modelling, analysing and solving supply chain management problems from various industries, and provide practical hands-on experience in planning for customer demands, inventory consumption, production capacities, material requirements, etc.

With the advancement of Industry 4.0 technologies, more and more data are becoming available for making the right decisions and creating business values across supply chains. Students will learn how to use the available data to understand what has happened in the past and what is currently happening, as well as to predict what will happen in the future and to make optimal decisions. These analytical skills are crucial for helping companies to gain competitive edges in their respective businesses.

The course covers the whole spectrum of supply chains from customers to distributors, warehouses, plants and suppliers. Students will be equipped with versatile analytical skills in modelling, analyzing and solving Supply Chain Management problems from various industries. Students will also have the opportunity to work with an intelligent forecasting system to gain practical hands-on experience in forecasting and planning for customer demands, inventory consumption, production capacities, material requirements, etc.

Course Outline

1. Supply Chain Analytics: Overview
2. Data Driven Analytics Basics: Events and Probability, Random Variables, Functions of Random Variables, Inequalities, Limit Theorems
3. Statistical Sampling: Distribution Estimates, Sample Mean and Variance, Confidence Intervals, Proportion Estimates, Experimental Design
4. Supply Chain Simulation Modelling: Discrete Event Simulation, Simulation Modelling, Simulation Applications
5. Regression Models and Analysis: Linear Regression Models, Multiple Linear Regression Models, Logistic Regression Models
6. Demand Forecasting Techniques with Applications: Importance of Demand Forecasting, Forecasting Methods, Forecasting Accuracy Evaluation
7. Optimal Forecast and Intelligent Forecasting System: Forecasting Case Study, Optimal Forecasting Method, Intelligent Forecasting System, Industry Success Cases
8. Supply Chain Demand Planning and Management: Aggregate Planning, Aggregate Planning Strategies, Managing Demand
9. Supply Chain Inventory Models: Stochastic Inventory Models with and without Fixed Ordering Cost, Multi-period Inventory Models
10. Supply Network Optimization: Network Concepts, Network Shortest Path, Optimal Supply Network
11. Integrated Supply Chain Decision Modelling: Integrated Models in Airline Industry, Integrated Models in Emergency Medical Service

First Lecture

The students who are considering to sign up for this course should not miss the first lecture. The first lecture will give you a good idea about this course. You can then make an informed decision on whether to take the course in this semester.

Reference Books

[1] Chopra, S. and P. Meindl, *Supply Chain Management: Strategy, Planning, and Operation*, 6th Edition, Pearson Education, 2016

[2] Simchi-Levi, D., P. Kaminsky and E. Simchi-Levi, *Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies*, McGraw-Hill/Irwin, 2007

[3] Bertsimas, D. and R. M. Freund, *Data, Models, and Decisions: The Fundamentals of Management Science*, 2nd Edition, Dynamic Ideas Publisher, 2004

[4] Hillier, F. S. and M. S. Hillier, *Introduction to Management Science: A Modelling and Case Studies Approach with Spreadsheets*, 5th Edition, McGraw Hill Publisher, 2013

Assessment Method (tentative)

Assessment will be based on the following components:

Class Participation	10%
Assignments	20%
Project	30%
Test	40%

Other Information

Weekly three-hour sessions (combination of lectures and tutorials).

LumiNUS

All lecture notes will be posted in LumiNUS two days before the lectures.