

PUBLISHER'S CHOICE MANAGEMENT SCIENCE CASES

Cases, Exercises, Notes and Supplements for Management Sciences Courses

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Product Number: W28361

GD Labs: Scaling Swab Testing During COVID-19

Product Authors:

Bhavin J. Shah; Arvind Shroff

In early 2020, the rapid spread of COVID-19 across the world led the most highly affected countries, such as the United States and India, to focus on rapid testing and contact tracing to break the chain of transmission. By August 25, 2020, India had tested nearly 37 million cumulative COVID-19 samples as part of the government's "Test, Track, Treat" initiative. The efficient allocation of collected swabs with saliva samples to appropriate testing labs had become an urgent operational requirement. The senior consultant of GD Labs was appointed officer on special duty by the State Government of Chhattisgarh to devise a plan for the optimal allocation of swabs to government and private labs across the state. He decided to roll out a pilot study for two districts that had six labs—both government and private. The task required access to extensive data on the collection of swabs with saliva samples, previous backlogs, locations of labs, and the maximum capacity per lab. The goal of the project was to maximize the allocation of swabs for testing within budget constraints.

Learning Objective: The case is suitable for courses that discuss operations research and health care supply chain management at the undergraduate and graduate levels. It is also suitable for engineering courses that discuss decision modelling and industrial management and for postgraduate programs in management that cover topics such as introduction to quantitative decision-making and advanced mathematical modelling. The case also discusses optimization techniques for effective allocation of testing samples, which makes it suitable for courses that discuss capacity and process analysis in health care service delivery models. The case helps students devise a complex COVID-19 swab testing strategy to ensure timely results, with the goal of reducing the spread of the virus by identifying affected patients, who can then isolate to avoid spreading the virus. The case helps students devise a complex COVID-19 swab testing strategy to ensure timely results, with the goal of reducing the spread of the virus by identifying affected patients, who can then isolate to avoid spreading the virus. After completion of this case and

assignment questions, students will be able to accomplish the following objectives:

- Apply linear programming to health care services by meeting the challenges of complex real-life decision-making for swab allocation to help deal effectively with a crisis such as the COVID-19 pandemic.
- Use the Microsoft Excel Solver function for capacity allocation to understand the mathematical formulation of a capacity allocation problem by emphasizing cost constraints and solutions.
- Address supply chain resilience to identify the specific factors behind the disruptions caused in the testing procedures due to the impact of COVID-19 in the health care supply chain.

Discipline: Management Science; Operations Management;

Issues: COVID-19; swab testing; optimization; capacity allocation; mixed integer linear programming

Industry: Health Care Services;

Setting: India, Medium organization, 2021

Difficulty: Undergraduate/MBA

Date Published: October 03, 2022

Product Number: W29250

A Technical Note on Data Preparation and Model Building with a Real Estate Dataset

Product Authors:

Mehmet A. Begen; Cici Sun; Viola Qiu; Linke Bai

Data preparation is a necessary pre-processing step in analytics. It aims to clean the data from various resources and improve its quality for better productivity. This process includes many tasks such as fusion, cleaning, and augmentation of data. This teaching note will focus on illustrating data cleaning using the programming language Python, with all codes completed in Google Laboratory. Different solutions using the programming languages R and Microsoft Excel are also provided. To effectively illustrate the data preparation process, the relatively simple dataset Bengaluru House Prices is used. This is a relatively messy dataset with a few variables and many records, making it ideal for explaining data preparation steps.

Learning Objective: This technical note is suitable for undergraduate- and graduate-level courses on data science, finance, management science, operations,

accounting, marketing, statistics, economics, or any quantitative decision making courses. After working through this technical note, students will be able to

- understand the steps for data preparation;
- learn about the steps for model building; and
- review the data preparation and model building implementation steps using the programming tools Python, R, and Microsoft Excel with a real estate dataset.

Discipline: Management Science; Operations Management;
Issues: data cleaning; R; Python; Excel
Industry: Real Estate and Rental and Leasing;
Setting: India, 2022
Difficulty: Undergraduate/MBA

Date Published: August 08, 2022
Product Number: W28526

London Hydro Inc.: Evaluating Different Electricity Pricing Schemes

Product Authors:
Bissan Ghaddar; Tiffany Bayley; Jonathan Hu; Ibrahim Rana

London Hydro, Inc. (London Hydro) must forecast the electricity demand of the firm's clients. The Ontario Energy Board had just announced the results of a pilot program to introduce a new pricing scheme to residential energy consumers in Ontario. This was the origin of tiered pricing, which was based on overall monthly energy usage. In the past, consumers had all been on a time-of-use plan where energy was more expensive during peak hours and cheaper in lower-demand hours. Thus, London Hydro had to anticipate the potential change in client behaviour and predict the effects of the pricing shift. Using data it had gathered on individual household energy consumption, London Hydro hoped that by forecasting which consumers might shift to the new tiered pricing plan it could gain key insights that would help the firm understand what effects the plan might have on its revenues and on its clients' consumption behaviours.

Learning Objective: This exercise can be used in undergraduate and graduate-level courses that cover topics in machine learning and predictive analytics, specifically clustering techniques. The teaching note uses R, though Python can also be used following the same steps. This exercise provides students with the opportunity to leverage their knowledge of machine learning techniques (i.e., clustering) and exploratory analysis techniques to draw insights that can be applied to a real-world scenario. After working through the exercise and assignment questions, students will be able to

- interpret descriptive analytics output, such as data visualizations and summary statistics;
- use R programming language to apply clustering modelling techniques such as k-means clustering; and

- interpret model results to provide recommendations in a real-world scenario.

Discipline: Management Science;
Issues: machine learning; electricity pricing
Industry: Utilities;
Setting: Canada, Medium organization, 2019
Difficulty: Undergraduate/MBA

Date Published: July 13, 2022
Product Number: W27947

A Risk Versus Reward Approach to Market Research

Product Authors:
Sheri Lambert; Sara Honovich

King's Hawaiian Bakery, West Inc. (King's Hawaiian), a beloved and highly regarded company, produced a line of bread products dating back to the 1950s and was inspired by a Portuguese sweet bread. The business had grown over time, adding more production facilities and expanding from Hawaii to the mainland United States in 1977. King's Hawaiian had done minimal consumer research related to its development of new products before it hired Troy Figgins as its new head of consumer insights. In October 2018, Figgins was tasked with creating a new consumer insights department; what this department looked like and how it functioned were entirely up to him. He was eager to design a best-in-class insights team to work with new strategies, tools, and partners. King's Hawaiian knew it had to conduct market research to uncover insights to keep pace with evolving customer needs—but how? Figgins considered his problem and possible solutions to deliver great insights.

Learning Objective: This case is suitable for undergraduate- and graduate-level courses in marketing, market research, and the use of digital technology for learning. It focuses on identifying and implementing a marketing research program within a consumer packaged goods company, which would enable ongoing insights and learning about the brand. After working through the case and assignment questions, students will be able to do the following:

- Explain how to consider and secure access to innovative market research tools to enhance new product initiatives and strengthen a business.
- Identify the worthwhile trade-offs to gain reliable and accessible information about investment spending, time to obtain insights, and agility of implementation.
- Detail actions a company can take to connect with technology to build insights.
- Propose a course of action to implement a consumer insights department within a consumer packaged goods organization.

Discipline: Marketing; Management Science;
Issues: market research; consumer insights; online community; strategic management; consumer packaged goods; innovative market research;
Industry: Manufacturing;
Setting: United States, Large organization, 2019
Difficulty: Undergraduate/MBA

Date Published: June 23, 2022
Product Number: W28489

FilmCast: A Conjoint Analysis Exercise

Product Authors:
Srinivas Krishnamoorthy; Kyle Maclean

Maya Fonseca, the marketing analyst for video streaming service FilmCast, and her colleague Rupert Cruz had to interpret the results of a conjoint analysis conducted by their company. FilmCast was a large company, competing against Videosource and Webflickstream. The marketing analysts were debating whether it made sense to lower the price of their services and if the conjoint analysis results supported this idea.

Learning Objective: This exercise can be used in undergraduate marketing analytics courses with a component on conjoint analysis. This exercise could be used either as a take-home assignment or as a shorter discussion element after a lecture/reading. After working through the exercise and assignment questions, students will be able to do the following:

- Convert utility estimates to equivalent monetary values.
- Interpret utility estimates, and explain or justify estimates that are nonintuitive.
- Calculate estimated market shares using the output from a conjoint analysis.

Discipline: Management Science; Marketing;
Issues: Conjoint Analysis, Streaming Services
Industry: Information, Media & Telecommunications;
Setting: 2022
Difficulty: Undergraduate

Date Published: November 14, 2016
Product Number: 9B16E033

Food Truck Forecaster

Product Authors:
Mehmet A. Begen; Jen Littleton; Samantha Wong; Rob Yellin

In 2014, the owner of a food truck based in Hamilton, Ontario, was looking over the first year of her operations. In addition to working in Hamilton, she had tried to maximize her revenues by driving to several other cities and charging various prices for each burger, depending partly on the fresh ingredients available in each city. Besides location, the owner had collected data on a few other factors—the weather, the day of the week, the city's population, and whether a festival was going on—that had had an impact on the demand for her product. She wondered whether analytics could help her decide where to sell and how much to charge on a daily basis. The owner also wondered whether this decision-making and data-collection process could be automated since she would be using it every day.

Learning Objective:

- To use a mix of analytics techniques such as regression and simulation to build a spreadsheet model that can help the decision-maker
- To use Visual Basic for Applications (VBA) concepts to make the spreadsheet user-friendly and automate some of the tasks in the model

Discipline: Management Science;
Issues: regression, simulation, Excel VBA, prediction
Industry: Accommodation & Food Services;
Setting: Canada, Small organization, 2014
Difficulty: Undergraduate/MBA

Date Published: June 30, 2016
Product Number: 9B16E014

Descriptive Statistics in Microsoft Excel

Product Authors:
Kyle Maclean; Lauren E. Cipriano; Gregory S. Zaric

The purpose of this note is to illustrate the use of Microsoft Excel functions for generating descriptive statistics for continuous data. These functions are common when analyzing data to provide insights for decision making. The note includes practice exercises and their solutions, and a supporting Excel workbook for students.

Learning Objective: After completion of this note and its associated activities, students should be able to do the following:

- Use the Microsoft Excel functions that identify the minimum, maximum, rank, average, median, variance, and

standard deviation of a single continuous variable data set.
·Use the Microsoft Excel functions for computing the covariance and the correlation between two continuous variables in a data set.

Discipline: Management Science;

Issues: Excel, spreadsheet, modelling , analytics

Setting: 2016

Difficulty: Undergraduate/MBA

Date Published: June 30, 2016

Product Number: 9B16E009

Introduction to Microsoft Excel

Product Authors:

Lauren E. Cipriano; Gregory S. Zaric

The purpose of this note is to introduce students to the basic use and vocabulary of Microsoft Excel. Excel is commonly used to do quantitative analysis in business. Students will encounter Excel applications in just about every area of business, including finance, accounting, operations management, marketing, and analytics.

Learning Objective: Upon completion of this note, students will be able to:

- Understand some Excel specific vocabulary.
- Enter and format data in a spreadsheet.
- Use keyboard navigation in Excel.
- Copy and paste data.
- Sort data.

Discipline: Management Science;

Issues: Excel, spreadsheet, modelling, analytics

Setting: 2016

Difficulty: Undergraduate/MBA

Date Published: May 26, 2015

Product Number: 9B15E011

Vanderbilt University Medical Center: Elective Surgery Schedule

Product Authors:

Lauren E. Cipriano; Vikram Tiwari; Warren S. Sandberg; Gregory S. Zaric

In 2012, the newly appointed director of Surgical Business Analytics has been charged with the task of improving predictions of surgical case volume at Vanderbilt University Medical Center in Nashville, Tennessee. He is provided with 48 weeks of elective surgery schedule data that give the number of surgeries booked on specific dates prior to the surgery day and the actual number performed. Variation in daily operating room volumes is a major problem because of the mismatch in timing between when the staff schedules are made and when the final demand is known (usually the day before). This uncertainty creates staffing challenges for all support and ancillary services, including nurses, orderlies, anesthesiologists, the recovery room, pathology, radiology and the sterile cart centre. Can he develop a method to improve surgical case volume prediction that is actionable in a managerially useful time frame? How can he engage and approach stakeholders who may often consider “analytics,” “data analysis” and “computations” as a black hole?

Learning Objective: This case can be taught at the undergraduate or masters level in courses on operations management, human resources and planning. Within these areas, the key operational and management teaching objectives are that students will understand issues of:

- Staff scheduling and schedule flexibility.
- Real-time information sharing.
- Communication of business predictions and uncertainty in predictions.
- Effects of uncertainty on employee satisfaction and organizational management.

Discipline: Management Science;

Issues: Linear regression; dummy variables; data stratification

Industry: Health Care Services;

Setting: United States, Large organization, 2012

Difficulty: Undergraduate/MBA

Date Published: March 10, 2014

Product Number: 9B14E005

The Obamacare Website

Product Authors:

Derrick Neufeld; Ning Su; Brad Evans

In October 2013, the Health and Human Services Secretary of the United States is tasked with making decisions about a website project, Healthcare.gov, that is a critical component in delivering the Affordable Care Act, or “Obamacare,” to the American people. The act is a cornerstone but controversial policy of the Obama administration aimed at increasing access to health care services by providing health insurance to uninsured Americans. Unfortunately, the project is over budget and late. Forced to roll out before it is ready because of political considerations, the website crashes, causing anger and frustration for users unable to sign on or get information about the program. Because the act never really had the support of Republican Party representatives, the failure of the website stokes a political storm that appears to have more to do with reopening a debate in the media about Obamacare than it does with the website launch issues. Also in the spotlight is CGI, a technology company headquartered in Canada that is responsible for the overall design, development and execution of the project.

Learning Objective: ·To introduce the concept of process modeling.

·To explain and discuss the “information technology onion,” that is, the critical interplay between hardware, the operating system, application(s), data, people, business processes and business requirements.

·To consider a “Go/No-Go” decision framework.

·To present McFarlan’s risk cube and the variables that must be assessed when making a decision, along with related mitigation options.

Discipline: Management Science;

Issues: Website design; politics; outsourcing; success and failure; United States

Industry: Public Administration;

Setting: United States, Large organization, 2013

Difficulty: Undergraduate/MBA

Date Published: March 12, 2008

Product Number: 9B08E003

Security Breach at TJX

Product Authors:

Nicole R.D. Haggerty; R. Chandrasekhar

The chief security officer of TJX Companies Inc. (TJX) faces a dilemma on his first day on the job. The company has discovered in December 2006, a computer intrusion dating back to 2005. There is an ongoing investigation, involving the Federal Bureau of Investigation (FBI) into the attacks. The company is also in the middle of several class action law suits over losses suffered by financial institutions due to breaches of customer privacy. The chief security officer has to focus on plugging the loopholes in the company's information technology (IT) security, in the short term, and taking steps to ensure in the long term that the attack does not recur. He also had to get the management of TJX to start looking at IT security not as a technology issue but as a business issue.

Learning Objective: The objectives of this case are to:

·teach students the role that business leaders play in making decisions regarding the protection of IT assets

·teach students basic business concepts regarding security and privacy

·teach students about the scope and depth of adequate security plans

This case is suitable for all levels of students - from undergraduate to MBA to Executive MBA classes. Assignment questions are designed from the perspective of teaching this case to a business student audience. The case could certainly be adjusted to fit the needs of students in more technical disciplines.

Discipline: Management Science; Information Systems;

Issues: Computer Management; Security Systems; Retailing; Information Systems

Industry: Retail Trade;

Setting: United States, Large organization, 2007

Difficulty: Undergraduate/MBA

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