Encyclopedia of Operations Management

For many years, a free electronic copy of an early version of this encyclopedia was made available on the Production and Operations Management Society (POMS) webpage (www.poms.org). That version was written largely by students, had many imprecise definitions, and was missing many important terms. Starting with several helpful contributions from my POMS colleagues and other leading academics around the world, I completely rewrote the Encyclopedia over the last year. This new version is much more precise and is three times longer, with definitions and extended articles for over 1000 terms related to the field of operations management. It is also completely reformatted with extensive cross references to help readers build an integrated mental map of the field.

The ***Encyclopedia of Operations Management*** can be ordered from Clamshell Beach Press www.ClamshellBeachPress.com.

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Cordially,

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University of Minnesota
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Operations Management Whitepapers and Workbooks CD

The ***Operations Management Whitepapers and Workbooks CD*** is also published by Published by Clamshell Beach Press. The Table of Contents for this CD follows.

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Section 1. Operations strategy

Section 2. Forecasting and planning

Section 3. Process design and improvement

- **Location models**
  - location theory.pdf – A whitepaper that presents a number of different location models, including both finite and discrete location models, with emphasis on the competitive model for location theory and the allocation-location infinite set model.
  - gravity.xls – An Excel workbook for the gravity model for competitive retail store location.
  - AL.xls – An Excel workbook that implements an advanced version of the numeric-analytic location model for finding the optimal solution for a single facility and near-optimal solutions for multiple warehouses using an infinite set location approach. The workbook extends the traditional approach by implementing a great circle distance option with latitudes and longitudes.
- **Learning**
  - learning models.pdf – A whitepaper that presents both volume-based leaning (learning curve) and time-based learning (half-life models). Also discusses Moore's Law for time-based growth.
  - learning models.xls – An Excel workbook for both the half-life and the learning curve. Finds the optimal learning parameters to minimize the sum of the squared errors.
- **Process improvement**
  - process improvement checklist.pdf – A whitepaper that presents an organized list of fundamental process improvement ideas that have been collected from Six Sigma blackbelts and many other sources over many years.
- **Brainstorming**
  - brainstorming with the nominal group technique.pdf – A short whitepaper that explains how to conduct a brainstorming session with the nominal group technique.

Section 4. Supply chain and inventory management

- **Aggregative inventory management and metrics**
  - aggregate inventory analysis.xls – An Excel workbook that finds the optimal lotsizes for a set of inventory items and compares current to optimal cycle inventory for each item and for the aggregate inventory.
  - dupont.xls – An Excel workbook that implements the DuPont model to show the sensitivity of Return on Net Assets (RONA) to changes in inventory investment.
  - inventory turnover.pdf – A whitepaper that discusses how to estimate inventory turnover and some common errors in using inventory turnover as a performance measure.
  - service level metrics.pdf – A whitepaper that presents a number of ways that manufacturing and distribution firms can use to measure the service level that they are achieving.
- **ABC classification analysis**
  - ABC classification analysis.pdf – A whitepaper that presents a mathematical model for ABC classification analysis.
  - ABC classification analysis.xls – An Excel workbook that implements numerical methods in VBA to find the optimal alpha parameter to fit a distribution-by-value curve to empirical data.
- **The newsvendor problem**

newsvendor.pdf – A whitepaper that explains the newsvendor problem in great depth, including proofs for both the discrete and continuous versions of the problem.

seasonal buying.pdf – A whitepaper that discusses how the newsvendor problem can be applied to handle seasonal buying for a retailer.

newsvendor.xls – An Excel workbook that finds the optimal solution to the newsvendor problem assuming that demand is defined by the triangular distribution. The program allows the user to experiment with various order quantities and displays several different graphs to help evaluate the results.

- **Managing slow-moving inventory**

  slowmove.pdf – A whitepaper that presents a model of managing slow-moving inventory.

  slowmove.xls – An Excel workbook designed to help firms find the optimal target inventory level for slow moving items assuming Poisson distributed demand.

- **Lotsizing and scheduling**

  lotsizing.pdf – A whitepaper that presents a large number of models for lotsizing for both constant and time-varying demand.

  EOQ.xls – An Excel workbook that implements EOQ logic for teaching purposes. This work also can be used to estimate the setup cost over carrying charge ratio from historical data.

  lotsizing.xls – An Excel workbook that implements several methods for lotsizing for time varying demand, including an efficient implementation of the Wagner-Whitin algorithm.

  economic lot scheduling problem.pdf – A whitepaper that presents a model for the economic lot scheduling problem.

  ELSP.xls – An Excel workbook that solves the economic lot scheduling problem. This workbook uses VBA to implement a Newton search to find the shadow price needed to satisfy the capacity constraint.

  netsolver.xls – An Excel workbook that implements a minimum cost flow network optimization algorithm using VBA code. This can be used to solve assignment, transportation, transshipment, and many other network optimization problems.

- **Inventory management and safety stocks**

  inventory management.pdf – A long whitepaper that presents a number of basic concepts and models for inventory management.

  to stock or not to stock.pdf – A whitepaper that addresses the important question, “should this item be stocked or not?”

  vendor managed inventory.pdf – A whitepaper that presents both the pros and cons of using vendor managed inventory.

  safety stock.xls – An Excel workbook with VBA that finds the optimal safety stock and order size in a wide variety of independent demand situations using a variety of methodologies.

  safety stock with serially correlated demand.pdf – A whitepaper that discusses the problem of estimating the proper safety stock when the demand is serially correlated (autocorrelated).

  order cycle service level tutorial.xls – An Excel workbook that exposes the folly of using an order cycle service level and argues for using the unit fill rate service level.

- **Carrying and setup cost**

estimating carrying cost.pdf – A whitepaper that explains how to estimate carrying charge and carrying cost.

estimating ordering and setup costs.pdf – A whitepaper that explains how to estimate ordering and setup costs.

how to reduce setup time and cost.pdf – A whitepaper that presents a number of practice ideas for how to reduce setup time and cost

- **Pull systems**

  smart pull system.pdf – A whitepaper that presents a periodic review/maximum inventory model called the smart pull system.

  smart pull system.xls – An Excel workbook that can help firms to set target inventories (and associated safety stocks) based on demand forecasts. This can be used as a tool to help implement a lean pull system.

Section 5. Theory of constraints

- **Theory of constraints**

  theory of constraints.pdf – A whitepaper that overviews the theory of constraints.

  drum-buffer-rope.pdf – A whitepaper that presents Goldratt's drum-buffer-rope concepts.

- **Throughput accounting**

  throughput accounting.pdf – A whitepaper that presents Goldratt's throughput accounting.

Section 6. Quality and statistics

- **Sampling**

  audit sampling.pdf – A whitepaper that presents a hypergeometric probability distribution approach for audit sampling.

  audit sampling.xls – An Excel workbook that implements a stop and go sampling plan for an audit based on the hypergeometric distribution. This distribution is the most precise approach for auditing and results in the lowest recommended sample size.

  dollar unit sampling.pdf – A whitepaper that presents a complete methodology for dollar unit sampling.

  DUS.xls – An Excel workbook that computes the required sample size for a dollar unit sampling plan. The workbook implements Newton's method to find the upper misstatement limit for a specified tail probability.

- **Confidence intervals**

  confidence intervals.pdf – A whitepaper that explains how to estimate confidence intervals and required sample sizes.

  confidence intervals.xls – An Excel workbook that helps the user to determine required sample sizes to achieve user-specified confidence intervals for a variety of problem types and assumptions.

- **Sigma level**

  sigma level.xls – An Excel workbook that determines the sigma level for a process given the number of defects per million opportunities and given the shift in the mean.

- **Probability distributions**

  distributions.xls – An Excel workbook that includes many important probability distributions including the uniform, normal, lognormal, exponential, Erlang, gamma,

beta, Weibull, triangular, Poisson, binomial, and hypergeometric distributions, with statistics, Excel formulas, VBA code, tables, and graphs. An additional worksheet includes the partial expectation function and its inverse for the normal distribution. All of the graphs for probability distributions in this Encyclopedia are from this Excel workbook.

Section 7. Project management

- **Project charters**
  project charters.pdf – A whitepaper that proposes an approach for creating a project charter. It also compares three other approaches (Lean, Lean Sigma, and PMI) for creating a project charter.

Section 8. New product development

- **Commonality**
  commonality.pdf – A whitepaper that presents a model for evaluating the benefits of increasing commonality.
  commonality.xls – An Excel workbook that estimates the savings from replacing two similar components with a single robust (universal) component.
- **Check digits**
  check digit.xls – An Excel workbook that implements a check digit algorithm to verify if a number such as a credit card number is clearly invalid.

Section 9. Service operations

- **Queuing models**
  staffit.xls – An Excel workbook that implements an interactive approximate M/G/s queuing model with costing features to help firms determine appropriate staffing levels (staffing fit) for each period of the day.
  queue.xls – An Excel workbook with VBA code that implements exact M/M/s and approximate M/G/s queuing models.
- **Service guarantee model**
  service guarantee.xls – An Excel workbook that helps firms evaluate the benefits of a service guarantee on their total customer base.
- **Student Project Assignment Technique**
  SPAT.xls – An Excel workbook that implements an interactive network optimization for assigning students to project teams. This workbook implements a minimum cost network optimization model and is implemented in Excel using VBA. SPAT is an acronym for the Student Project Assignment Technique.
- **Traveling salesperson problem**
  traveling salesperson problem.pdf – A short whitepaper that presents the mathematical model for the traveling salesperson problem.