APS1028 Operations and Production Management

Course Outline

Operations Management is the systematic approach and control of the processes that transform inputs (e.g. human resources, facilities, materials, Information systems etc.) into finished goods and services. The operations function consists of the core wealth creation processes of a business and helps an organization to efficiently achieve its mission while constantly increasing productivity and quality. This course focuses on the role of operations management as a strategic element of the total organization. We will cover classic and up-to-date tools and concepts used to support operational managerial decisions. **The course is tailored for engineers that aspire to senior management positions starting as departmental / functional managers of operations or engineering, and then progressing to directors, VP Operations, VP Manufacturing and eventually becoming a Chief Operations Officer (COO) of a small to large scale enterprise.**

Course Objectives

Upon course completion, the participants will be able to:

1) To gain an understanding and appreciation of the principles and applications relevant to the planning, design, and operations of manufacturing/service firms.

2) To develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems.

3) To reinforce analytical skills already learned, and build on these skills to further increase your "portfolio" of useful analytical tools for operations tasks.

4) To gain some ability to recognize situations in a production system environment that suggests the use of certain quantitative methods to assist in decision making on operations management and strategy.

5) To understand how Enterprise Resource Planning and MRPII CAD / CAM/CIM and automated factory systems are used in managing operations

6) To increase the knowledge, and broaden the perspective of the world in which you will contribute your talents and leadership in business operations.

7) To understand the managerial responsibility for Operations, even when production is outsourced, or performed in regions far from corporate headquarters.

Learning outcomes

Knowledge and Comprehension:

- Understand the core features of the operations and production management function at the operational and strategic levels, specifically the relationships between people,

process, technology, productivity and quality and how it contributes to the competitiveness of firms.
- Explain the various parts of the operations and production management processes and their interaction with other business functions (strategy, engineering, finance, marketing, HRM, project management and innovation)

Intellectual Skills (Analysis and Synthesis)
- Students will develop an integrated framework for strategic thinking and decision making to analyze the enterprise as a whole with a specific focus on the wealth creation processes
- **Be prepared to engage in a career path into senior operational management that can eventually lead to a C-Level role in a small to very large enterprise**

Practical Skills (Application and Evaluation) Students will be able:
- Develop the ability to identify operational methodologies to assess and improve an organizations performance
- Assess the OPM function performance and capabilities in various organizations
- To communicate effectively through discussion in seminars, teamwork and writing in discussion board, critiques and a project report
- To gather, organize and deploy evidence, data and information to make decisions.
- To plan and carry out work independently and to be self-disciplined and self-directed.
- To develop the skills of insight and critical evaluation.

Course Grading: The components of the final course grade will be weighted as follows:

Discussion Board Contribution (10 out off 12) – provides breadth in knowledge	30%
Mid Term Critical Review (CR1) Paper (based on discussions Mods 1-6)	15%
One 4-6 minute video that critiques your mid term CR using the Rubric	10%
Final Critical Review (CR2) Paper (based on discussions in Mods 7-12)	15%
Project Team Report– (Charter - 5%) (PPT Summary – 5%)	30%

Class Participation – Online Discussions. This course will be offered **online and inclass.** The course will be taught through a combination of video lectures (45-70 minutes), scholarly readings, and online discussion. **Use the online discussions input to form your critical review papers. Discussion board contribution can earn 30% -** you will be given an overall grade for the discussions against the performance rubric. There are three prime books; "***Operations Management"*** *Heizer & Render. 7th, 8th, 9th or10th Edition," Pearson (2011), "****Strategic Operations Management"*** *Brown, Bessant, Lamming. Routledge, 3rd Edition, (2013),* ***"Operations Management, Integrating Manufacturing and Services"*** *Davies & Heinke****,*** *McGraw Hill (2005).* It is not mandatory to buy these books but they can be a good reference in the future. There are other texts available in the library that we will refer to throughout the course. They are listed in the reading assignment document. It is important that you think critically – what are the benefits and pitfalls of the author's views?

Critical Review Papers. There are a total of 2 critical review papers (mid term and final) required from each student. These papers allow you to focus on depth of knowledge. The marks

are 20% each. Students will post critical review papers on the discussion board. Both critical reviews will be written papers (1200-1500 words) and the mid term paper will include a 4-6 minute verbal self-critique delivered via video – use drop box. The CR's should be formed around the input in the discussion board. The idea is that you produce a **CR that summates your learning and reflections from the online discussions**. So for the mid term you will synthesize modules 1-6 and for the final CR you will synthesize Modules 7-13.

Final Paper - Project Report. Depending on the class size students may form teams and produce a team report. Whether in a virtual team environment or as an individual the level of effort is the same. For the final paper you are free to select a topic in innovation that interests you. The goal of the final project report is not to do original field research, but to demonstrate to me your ability to apply innovation concepts *in a situation of your choosing*. The final report should be double-spaced, 12 point font, **(**approximately 1200-1500 words per student**).** Timing is very important to Managing Innovation! **A hard copy and a soft copy of the paper** (using Microsoft Word, NOT an Adobe Acrobat PDF!) must be delivered by email no later than **(see announcement)** to my email address, stephenc.armstrong@utoronto.ca - the hard copy to be given to the mechanical & industrial engineering graduate office.
Please note: for guidance purposes summaries of the team project reports from the 2010 to 2019 classes are available on blackboard in Module 0 – under content.

Office Hours. Not applicable

Important Dates (Approx – Use Announcements in Quercus):

- Mods 0 &1 Live Inclass: Orientation on Course Content - Overview & Planning – **This live class will also be used for Q and A**
- Project Teams formed and **team charter delivered**
- **Mid Term CR1 Essay due- midnight (post on BB)**
- **CR1 Self Critique Video Due**
- Project team (video optional) PPT presentations - **optional live class**
- **Final CR2 Essay due midnight (post on BB)**
- **Submission of team report (word, PDF and physical hardcopy)**

Course Structure and Content: Operations and Production Management is divided into 3 themes and 13 modules:

Part I – Operations and Production Management in Context

Mod 0: Orientation, instructor background, syllabus overview

- Overview of the entire course
- Grading structure (Critical Reviews, Book Review, Discussions, Projects)
- Web site layout and operation
- Project team formation and operation – Review past projects
- Critical Thinking and Performance Rubric
- Course Value in Career Planning – Levels of Management Thinking

Mod 1: Operations and Production (OPM) Introduction

- What is Operations and Production Management?
- Organizing To Produce Goods and Services
- Why Study OPM?
- What Operations and Production Managers do – Careers
- The Professional Engineer and OPM
- Where are the OPM Jobs?
- Operations in the Service Sector
- New Trends and Operation and Production Management
- The Productivity Issue

Important Link to My Company Web Site (Advanced Manufacturing Systems Projects) - This is a link to real practical work that I performed on employer / client projects over 30 years. You can choose an area that you are interested in as a team project or to do a special interest topic or even to do a critical review. They are quiet narrow specialized in depth topics (real expert practitioner oriented - not abstract theoretical). I will send you the paper (if I have it)**.** These are very much focused on the advanced manufacturing systems–varies industry sectors. Please ignore the Business Transformation section - this is included in the APS1018 – Management of Innovation.

http://www.amgimanagement.com/online.html

Mod 2: OM Strategy Development and Implementation

- **Developing Mission and Strategies: (**Mission and Strategy)
- **Achieving Competitive Advantage Through Operations (**Competing on Differentiation, Competing on Cost, Competing on Response)
- **Ten Strategic OM Decisions**
- **Issues in Operations Strategy (**Research, Preconditions, Dynamics)
- **Strategy Development and Implementation (**Identify Critical Success Factors, A Global view of Operations Cultural and Ethical Issues, Build and Staff the Organization, Integrate OM with Other Activities)
- **Global Operations Strategy Options (**International Strategy, Multi-domestic Strategy, Global Strategy, Transnational Strategy)

Mod 3 Role of Technology in Operations and Manufacturing

- Types of information systems that exist in an organization.
- How technology can add value to the operations function within an organization.
- Identify the ways technology can be used in a manufacturing company.
- Enterprise resource planning (ERP) systems and how they can affect an organization.
- CAD/CAM/CAE/CIM
- Demonstrate the ways technology can be integrated into service operations.
- Present a framework for defining the types of e-services currently being offered

Part 2 – Designing and Building the Operations Function

Mod 4: Product Design

- Goods and services selection
- Generating new products
- Product development
- Issues for product design
- Time-based competition
- Defining the product
- Documents for production
- Service design

Mod 5: Process Design and Plant Layout

- Four Process Strategies
- Process Analysis and Design
- Service Process Design
- Selection of Equipment and Technology
- Production Technology
- Technology is Service Industry
- Environmentally Friendly Processes
- Business Process Reengineering

Mod 6: Plant Location

- **Global company profile:** Federal Express
- **The strategic importance of location**
- **Factors affecting location decisions (**Labor Productivity, Exchange Rates and Currency Risks, Costs, Attitudes, Proximity to Markets, Proximity to Suppliers, Proximity to Competitors (Clustering))
- **Methods of evaluating location alternatives (**The Factor-Rating Method, Location Break-Even Analysis, Center-of-Gravity Method, The Transportation Method)
- **Service Location Strategy (**How Hotel Chains Select Sites, The Telemarketing Industry, Geographic Information Systems)

Mod 7: Work System and Job Design

- **Human resource strategy for competitive advantage**
- **Labor Planning (**Employment-Stability Policies, Work Schedules, Job Classifications and Work Rules)
- **Job Design (**Labor Specialization, Job Expansion, Psychological Components of Job Design, Self-Directed Teams, Motivation and Incentive Systems, Ergonomics and Work Methods)
- **The visual workplace**
- **Labor standards**

Part 3 – Operations Planning, Execution, & Control

Mod 8: Inventory Management

- **Functions Of Inventory (**Types and classifications of Inventory)
- **Inventory Management (**ABC Analysis, Record Accuracy, Cycle Counting, Control of Service Inventories)
- **Inventory Models (**Independent Versus Dependent Demand, Holding, Ordering, And Setup Costs)
- **Inventory Models For Independent Demand (**Basic Economic Order Quantity (EOQ) Model, Minimizing Costs, Reorder Points, Production Order Quantity Model, Quantity Discount Models)

Mod 9: Advanced Manufacturing Systems–Tailored to Class Interest

- **MRP, MRPII, ERP Structure**
- **MRPII, ERP Management (**MRP Dynamics, MRP and JIT)
- **Lot-Sizing Techniques**
- **Extensions of MRP (**Material Requirements Planning, MRP II, Closed-Loop MRP, Capacity Planning)
- **MRP In Services (**Distribution Resource Planning - DRP)
- **Enterprise Resource Planning - ERP) (**Advantages and Disadvantages of ERP Systems, ERP in the Service Sector)
- **Computer Integrated Manufacturing** - CAD/CAM/CAE/Factory Automation

Mod 10: Lean and JIT

- **Global Company Profile: Toyota Motor Corporation**
- **Just-in-Time, the Toyota Production System, and Lean Operations (**Eliminate Waste, Remove Variability, Improve Throughput)
- **Just-in-Time (**JIT Partnerships, Concerns of Suppliers)
- **JIT Layout (**Distance Reduction, Increased Flexibility, Impact on Employees, Reduced Space and Inventory)
- **Just-in-Time (**JIT Partnerships, Concerns of Suppliers)
- **JIT Layout (**Distance Reduction, Increased Flexibility, Impact on Employees, Reduced Space and Inventory)
- **JIT Inventory**
- **Reduce Variability (**Reduce Inventory, Reduce Lot Sizes, Reduce Setup Costs)
- **JIT Scheduling (**Level Scheduling, Kanban system)
- **JIT Quality**
- **Toyota Production System (**Continuous Improvement, Respect for People, Standard Work Practices)
- **Lean Operations (**Building a Lean Organization)
- **Lean Operations in Services**

Mod 11: Project Management in Engineering Driven Operations

- **Engineer to Order Manufacturing Companies**
- **The importance of project management**

- **Project Planning (**The Project Manager**,** Work Breakdown Structure)
- **Project Scheduling**
- **Project Control**
- **Project Management Techniques: PERT AND CPM** (Network Diagrams and Approaches, Activity on Node Example)
- **Determining the Project Schedule** (Forward Pass, Backward Pass, Calculating Slack Time and Identifying the Critical Path)

Mod 12- Maintenance Management

- **The strategic importance of maintenance and reliability)**
- **Reliability** (Improving Individual Components, Providing Redundancy)
- **Maintenance** (Implementing Preventive Maintenance, Increasing Repair Capability)
- **Total Productive Maintenance**
- **Techniques for establishing maintenance policies**

Mod 13: Total Quality Management

- **Quality and Strategy**
- **Defining quality (**Implications of Quality, Malcolm Baldrige National Quality Award, Cost of Quality (COQ)
- **International Quality Standards**
- **Total Quality Management** (Continuous Improvement, Employee Empowerment, Benchmarking, Just-in-Time (JIT), Taguchi Concepts, Knowledge of TQM Tools)
- **Tools of TQM** (Check sheets, Scatter Diagrams, Cause-and-Effect Diagram, Pareto Charts, Flow Charts, Histograms, Statistical Process Control (SPC)
- **TQM in services**

Other Optional Modules

Mod 14. Applied Computer Integrated Manufacturing (CAD/CAE/CAPP/FMS)

Mod 15. Aggregate Production Planning

Mod 16. Sales and Operational Planning

Mod 17. Forecasting for OPM

Mod 18: Masters Production Scheduling (MPS)

Mod 19. Bills of Material Structuring and Management

Mod 20. Work Centre and Routing Management

Mod 21. Distribution Resource Planning (DRP)

Mod 22. Rough Cut Capacity Planning (RCCP)

Mod 23. Material Requirement Planning

Mod 24. Short Term Scheduling

Mod 25. Capacity Requirements Planning

Mod 26. Purchasing Management

Mod 27. Production Activity and Shop Floor Control

Mod 28. Manufacturing Strategy

Mod 29: Planning, developing, implementing an ERP Manufacturing system

Mod 30. MRPII / ERP Performance Measurement

Mod 31. ERP History (MRP – MRP II – ERP – ERPII)

Mod 32. Supply Chain Management and ERP

Mod 33. 16 Steps to ERP Success

Mod 34. ERP ABCD Best Practice Checklist

Mod 35. ERP Cost Benefit Analysis

Mod 36. Achieving Data Accuracy

Mod 37. Business Process Management / Process Reengineering

Mod 38. Product Data / Life Cycle Management

Mod 39. OPM and the Management of Innovation

Mod 40. Systems Engineering Approach in OM

Mod 41. Applying Concurrent Engineering / DFM in OM

Mod 42. New Product Development Management

Mod 43. Management of Technology

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