

COURSE OUTLINE: BT2404 Service Operations Management

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|---------------------------|-------------------------------|-----------------|---|
| Academic Year | 2022-2023 | Semester | 1 |
| Course Coordinator | Prof Chen Shaoxiang | | |
| Course Code | BT2404 | | |
| Course Title | Service Operations Management | | |
| Pre-requisites | None | | |
| No of AUs | 3 | | |
| Contact Hours | 3hr x 13 weeks = 39 | | |
| Proposal Date | 20 Jan 2022 | | |

A) Course Aims

Services make up over 75% of the Singapore economy both in GDP and in employment, with similar trends across the industrialized and developing/emerging nations within the global economy. However, Distinctive characteristics of services such as their intangibility, perishability, simultaneity, and heterogeneity, present unique challenges for managers in service organizations. The main aim of this course is twofold: to introduce you to the most important aspects and general principles of service management across different industries and economies, following a service-dominant logic on business; to provide you with an understanding and essential knowledge of the analysis, modelling, decision making and implementation for managing the operational issues of a service. Emphasis will be on developing your modelling skills with the use of mathematical tools and techniques to manage service operations. Topics include the service concept and operations strategy, the design of effective service delivery networks, service quality management, managing service inventory, waiting line analysis, capacity planning, and yield management.

B) Intended Learning Outcomes (ILO)/Objectives

This course has four modules: (i) Service Economy: ILO 1, 2, & 3; (ii) Optimization & Applications: ILO 4, 6, & 11 ; (iii) Queueing Models & Simulation: ILO 7, 8, & 9; (iv) Service Inventory & Yield Management: 5, 6, & 10.

1. The Service Economy

- a. Describe the central role of services in an economy.
- b. Identify and differentiate the five stages of economic activity.
- c. Describe the features of preindustrial, industrial, and postindustrial societies.
- d. Describe the features of the experience economy contrasting the consumer (B2C) with the business (B2B).
- e. Explain the essential features of the service-dominant logic.
- f. Identify and critique the six distinctive characteristics of a service operation and explain the implications for managers.
- g. Describe a service using the service package dimensions.
- h. Use the service process matrix to classify a service.

2. Service Strategy

- a. Formulate a strategic service vision.
- b. Describe how a service competes using the three generic service strategies.
- c. Perform a SWOT and Five Forces Analysis
- d. Explain service qualifiers, service winners, and service losers.
- e. Discuss the competitive role of information in services.
- f. Explain the concept of the virtual value chain and its role in service innovation.
- g. Discuss service firm sustainability & triple bottom-line impact

- h. Identify service features leading to economics of scalability.
- i. Categorize a service firm according to its stage of competitiveness.

3. Service Quality

- a. Describe and illustrate the five dimensions of service quality.
- b. Use the service quality gap model to diagnose quality problems.
- c. Apply poka-yoke methods to a service.
- d. Construct a “house of quality” as part of a quality function deployment project.
- e. Construct a statistical process control chart for a service operation.
- f. Describe the features of an unconditional service guarantee and its managerial benefits.
- g. Perform a walk-through audit (WtA).
- h. Explain what service recovery is and why it’s important.

4. Service Facility Location

- a. Explain differences between competitive clustering and saturation marketing.
- b. Explain impact of the Internet on location decisions.
- c. Describe how a geographic information system is used in service location decisions.
- d. Differentiate between a Euclidian and metropolitan metric approach to measuring travel distance.
- e. Locate a single facility using the cross-median approach.
- f. Use the Huff retail location model to estimate revenue and market share for a potential site.
- g. Locate multiple facilities using the set covering model.

5. Service Supply Relationships

- a. Contrast supply chain for physical goods with service supplier relationships.
- b. Identify sources of value in a service supply relationship.
- c. Discuss managerial implications of bidirectional relationships.
- d. Identify factors that drive profitability for a professional service firm.
- e. Classify business services based on the focus of the service and its importance to the outsourcing organization.
- f. Discuss managerial considerations to be addressed in outsourcing services.

6. Managing Capacity and Demand

- a. Describe strategies for matching capacity and demand for services.
- b. Recommend an overbooking strategy.
- c. Use Linear Programming to prepare a weekly work shift schedule.
- d. Prepare a work schedule for part-time employees.
- e. Explain yield management and how it is applied.

7. Managing Waiting Lines

- a. Describe the economies of waiting lines.
- b. Describe how queues form.
- c. Apply Maister’s “laws of service.”
- d. Address attributes of waiting.
- e. Describe essential features of a queuing system.
- f. Describe relationship between a negative. exponential distribution of time between arrivals and a Poisson distribution of arrival rates.

8. Capacity Planning and Queueing Models

- a. Discuss the strategic role of capacity planning.

- b. Describe a queuing model using A/B/C notation.
- c. Use queuing models to calculate system performance measures.
- d. Describe the relationships between queuing system characteristics.
- e. Use queuing models and various decision criteria for capacity planning.

9. Computer Simulation

- a. Describe the nature of computer simulation.
- b. Describe the process of system simulation.
- c. Apply Monte Carlo simulation.
- d. Generate discrete random variable.
- e. Generate continuous random variable.

10. Managing Service Inventory

- a. Discuss role of information technology in managing inventories.
- b. Describe functions and costs of an inventory system.
- c. Determine order quantity for various inventory models.
- d. Determine reorder point and safety stock for inventory systems with uncertain demand.
- e. Design a continuous or periodic review inventory-control system.
- f. Conduct an ABC analysis of inventory items.
- g. Determine order quantity for single-period inventory.
- h. Describe rationale behind retail discounting model.

11. Optimization

- a. Describe five key elements of optimization.
- b. Differentiate between different optimization models.
- c. Formulate real-world problems into linear programming problems.
- d. Solve linear programming problems using graphic solution.
- e. Solve linear programming problems using Excel solver.
- f. Carry out sensitivity analysis of linear programming problems.

C) Course Content

In the first 4 weeks of the course, students will learn the fundamental concepts and techniques necessary for designing, managing, analyzing, and improving service operations. Students will also learn to use analytical models and decision support tools for improving the operational effectiveness and efficiency in service organizations. Topics covered include Introduction to Service Operations, Service Strategy, Service Quality Management, Workforce Management, and Service Facility Location. In the next 4 weeks, the course will focus on Managing Waiting Lines, Capacity Planning and Queueing Models, and Service Simulation. Lastly, the final 5 weeks will discuss Service Supply Relationships, Service Inventory Management, News Vendor Problem, and Yield Management.

D) Assessment (includes both continuous and summative assessment)

| Component | ILO Tested | NBS Learning Goal (Refer to Annex E for list) | Weighting | Team/ Individual | Assessment Rubrics (Please insert rubrics as Appendix) |
|----------------------|------------|---|-----------|---------------------|---|
| 1. Group Assignments | ILO9, 11 | Problem Solving and Decision Making | 20% | Team | - Problem Solving & Decision Making Rubric - Teamwork and Interpersonal Rubric |

| | | | | | |
|--|--------------------------|--|------|------------|--|
| | | Teamwork and Interpersonal Skills | | | |
| 2. Project - (written report and in-class presentation*) | ILO1-11 | Acquisition of knowledge, Problem Solving & Decision Making Teamwork and Interpersonal Skills Oral Communication | 20% | Team | - Acquisition of Knowledge Rubric - Problem Solving & Decision Making Rubric - Teamwork and Interpersonal Rubric Oral Communication |
| 3. Quiz 1 | ILO 1, 2, 3, 4, 6, 7, 11 | Acquisition of knowledge | 20% | Individual | N.A |
| 4. Quiz 2 | ILO 5, 6, 8, 9, 10, | Acquisition of knowledge | 20% | Individual | N.A |
| 5. Pre-class self- study & Assignments | ILO1-11 | Acquisition of knowledge | 10% | Individual | - Acquisition of Knowledge Rubric |
| 6. Class Participation | ILO1-11 | Oral Communication | 10% | Individual | - Class Participation Rubric |
| Total | | | 100% | | |

* Every team member is required to present (i.e. effectively individual presentation).

For team assessments, individual score may vary due to feedback on his contribution.

E) Formative feedback

You will receive feedback on your group assignments through written responses in emails. Quiz grades will be distributed no more than three days after the quiz. You will receive summative group feedback on the project following the conclusion of the in-class presentation.

F) Learning and Teaching approach

| Approach | How does this approach support you in achieving the learning outcomes? |
|----------------------|---|
| Pre-Class Self-study | You would have to learn new things by yourself after university study. Thus, you need to build up the self-learning ability during your university time in the first place. Self-studying also allows you to control your own pace of learning and think about topics more deeply and make connections between what you are learning. In addition, pre-class preparation will make the in-class learning and teaching more effective. |
| Seminars | The interactive lecture sessions where ample opportunities for open discussion on the conceptual questions raised in the class allow you to think critically and share their ideas and concept with the class. This also allows me to get the concepts clearly through the entire class by involving you and ensure that the targeted learning outcomes are being achieved |
| Group assignments | The assignments require you to generate, analyze and deliver humorous materials in a guided manner. |

| | |
|---------------------|--|
| In-Class activities | Some learning outcomes for this course are skills which are practical in nature and cannot be achieved by reading and writing. The achievement of such learning outcomes requires hands-on experience, in-class activities provide such opportunities. |
|---------------------|--|

G) Reading and References

Recommended Textbook:

BFF – BORDOLOI, FITZSIMMONS and FITZSIMMONS, Service Management: Operations, Strategy & Information Technology, 9th Edition, 2019, McGraw - Hill, ISBN 1259784630.

The e-text book is available by purchase at McGraw-Hill Connect with LearnSmart tool

Other course materials will be made available on the course website (NTULearn).

H) Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned pre-class readings and assignments, attend all seminar classes punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments, and course related announcements for seminar sessions they have missed. You are expected to participate in all seminar discussions and activities.

(2) Absenteeism

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

If you miss a lecture, you must inform the course instructor via email prior to the start of the class.

If you miss both the quiz and the makeup quiz, which will usually be arranged in the following week, you will receive zero as the quiz score.

I) Academic Integrity

Good academic work depends on honesty and ethical behavior. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honor Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

J) Course Instructors

| Instructor | Office Location | Phone | Email | Consultation Hours |
|---------------------|-----------------|----------|--|--------------------------------|
| Prof Chen Shaoxiang | S3-B2A-30 | 67906143 | aschen@ntu.edu.sg | By prior appointment via email |

K) Planned Weekly Schedule

| Week | Topic | ILO | Readings/ Activities |
|------|--|--------------|--|
| 1 | Introduction to Service Operations Optimization 1 – Introduction | ILO 1, 11 | Lecture Note BFF – <i>Chapter 1</i> |
| 2 | Service Strategy Optimization 2 – Graphic Solution | ILO 2, 11 | Lecture Note BFF – <i>Chapter 2</i> |
| 3 | Service Quality Optimization 3 – Excel Solver | ILO 3, 11 | Lecture Note BFF – <i>Chapter 6</i> |
| 4 | Service Facility Location Optimization 4 – Location Theory | ILO 4, 11 | Lecture Note BFF – <i>Chapter 8</i> |
| 5 | Optimization 5 – Workforce Management Managing Waiting Lines Little’s Law | ILO 6, 7, 11 | Lecture Note BFF – <i>Chapter 11, 12</i> |
| 6 | Capacity Planning and Queueing Models | ILO 8 | Lecture Note BFF – <i>Chapter 13</i> |
| 7 | Case Study – Renaissance Clinic Simulation | ILO 8, 9 | Lecture Note BFF – <i>Chapter 13 Supp</i> |
| 8 | Quiz 1 (Weeks 1-5) in Class | | |
| 9 | Service Supply Relationships Managing Service Inventory | ILO 5, 10 | Lecture Note BFF – <i>Chapter 9, 15</i> |
| 10 | Managing Capacity and Demand News Vendor | ILO 6 | Lecture Note BFF – <i>Chapter 11</i> |
| 11 | Yield Management (Yield Mgt. Game) | ILO 6 | Lecture Note BFF – <i>Chapter 11</i> |
| 12 | Group Presentations | | |
| 13 | Quiz 2 (Weeks 6-11) in Class | | |

ANNEX A: ASSESSMENT CRITERIA**Acquisition of Knowledge Rubric**

| Learning objectives | Performance Levels | | |
|--|--|--|---|
| | Above Expectations (A+,A,A-) | Met Expectations (B+, B, B-) | Below Expectation (C-F) |
| knowledge of fundamental concepts, challenging issues, strategies, techniques and skills necessary designing, managing and optimizing service operations | <p>Able to very clearly articulate and write about concepts, frameworks, strategies and methods to solve service operational problems theoretically and practically.</p> <p>Able to model and analyze operational problems systematically, logically and correctly</p> | <p>Able to address and articulate most of the relevant points of the operational problems using the knowledge and skills learnt.</p> <p>Demonstrate certain ability to model and analyze operational problems.</p> | <p>Unable to address and articulate the key relevant points of the operational problems with the knowledge and skills learnt.</p> <p>Lack of the ability to model and analyze operational problems.</p> |

Assessment Rubric for Group Project (To assess PSDM)**Group Written Report – 60%**

| Traits | Performance | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|
| | Not Yet | | | | | Substantially Developed | | | | |
| Define the Problem (20%) | Does not identify the problem clearly; demonstrates limited understanding of the problem or related contextual factors. | | | | | Identifies the problem clearly and structurally with enough description of operational details based on evidence of all relevant contextual factors. Demonstrates the ability to construct an abstract and insightful problem statement. | | | | |
| | Evaluation: 1 2 3 4 5 6 7 8 9 10 | | | | | | | | | |
| | Not Yet | | | | | Substantially Developed | | | | |
| Analyze the Problem (30%) | Do not identify the key issues and their interrelations of the problem. The analysis has no clear framework, no logic, and is lack systematic approach. | | | | | Analyzes the key issues and their interrelations of the problem with supporting facts and figures. Present arguments that have an element of originality. The analysis has a clear framework, and is logical and systematic. | | | | |
| | Evaluation: 1 2 3 4 5 6 7 8 9 10 | | | | | | | | | |
| | Not Yet | | | | | Substantially Developed | | | | |
| Devise Strategies and models to Solve the Problem (30%) | Does not have ideas about how to solve the problem. Select a strategy and/or model without regard to fit. Identifies alternatives that reflect limited understanding of the situation. | | | | | Ideas and strategies on solving the problem are clearly proposed and discussed; Demonstrates strong ability to formulate the business problem with the right model(s) that reflect an in-depth understanding of the situation and the model(s). Modelling assumptions are discussed. | | | | |
| | Evaluation: 1 2 3 4 5 6 7 8 9 10 | | | | | | | | | |
| | Not Yet | | | | | Substantially Developed | | | | |
| Discuss the solution and its practical implications (20%) | Does not translate model outputs to business solution. No solution validation is performed. No discussion is given to the possible implementation issues. | | | | | Business solution is clearly presented, validated and its practical implications discussed. Key implementation issues are explored. Main learning points are summarized. Report is written fluidly. | | | | |
| | Evaluation: 1 2 3 4 5 6 7 8 9 10 | | | | | | | | | |
| | Not Yet | | | | | Substantially Developed | | | | |
| Individual Oral Presentation – 40% | | | | | | | | | | |
| Oral Presentation | Presentation is not engaging, and explanation lacks coherence and clarity. | | | | | Articulates problems, analysis and results clearly and neatly in a structural manner with a good explanation of how it fits into the whole project. Presentation is easy to follow and offers learning points to class. | | | | |
| | Evaluation: 1 2 3 4 5 6 7 8 9 10 | | | | | | | | | |
| | Not Yet | | | | | Substantially Developed | | | | |

Class Participation Rubric

| Traits | Performance | | |
|-------------------------------|---|--|--|
| | 1 | 2 | 3 |
| Punctuality | Was late for class on more than 2 occasions | Was late for class on 1 occasion | Always on time for class |
| Engagement | Hardly focuses in class (e.g. using mobile phone, unnecessary chatting) | Occasionally engages in distracting activities (e.g. using mobile phone, unnecessary chatting) in class. | Engages fully in class <i>Being an active listener in class</i> |
| Contribution frequency | Does not speak up/contribute in class | Occasionally speaks up/contributes in class | Speaks up/contributes in all classes |
| Contribution quality | No contributions/Contributions lack substance | Contributions demonstrate knowledge of subject matter | Contributions are constructive and insightful |

Teamwork & Interpersonal Skills (Peer Evaluation) Rubric

| Traits | Performance | |
|--|--|--|
| 1. Roles and (RR) Behaves professionally by upholding responsibility and assuming accountability for self and others in progressing towards the team's goal. | Scant Unclear about his/her own role; refuses to take a role in the group; insists to work individually and has limited coordination or communication with others. | Substantially Developed Always fulfills responsibilities; performs his/her role within the group with enthusiasm and demonstrates willingness to work collaboratively. |
| | Evaluation: Scant 1 2 3 4 5 6 7 Substantially Developed | |
| 2. Communication Identifies appropriate mechanisms to coordinate and correspond with team members. | Scant Modes of communication are not appropriate, causing confusion and miscommunication among team members. | Substantially Developed Modes of communication are appropriate, and maintaining timely communication and correspondence with team members. |
| | Evaluation: Scant 1 2 3 4 5 6 7 Substantially Developed | |
| 3. Conflict Resolution Resolves conflicts using a variety of approaches. | Scant Does not recognize conflicts or is unwilling to resolve conflicts. | Substantially Developed Consistently resolves conflicts through facilitating open discussion and compromise. |
| | Evaluation: Scant 1 2 3 4 5 6 7 Substantially Developed | |
| 4. Contributions (CT) Contributes positive input for the team; effectively utilizes one's knowledge and expertise. | Scant Largely disinterested in working in a group and refuses to participate; observes passively or is unwilling to share information with other team members. | Substantially Developed Actively attends and participates in all activities and provides meaningful contribution in articulating ideas and opinions. |
| | Evaluation: Scant 1 2 3 4 5 6 7 Substantially Developed | |
| 5. Relationship (RS) Maintains cooperative interaction with other team members regardless of individual /cultural differences and respects diverse perspectives. | Scant Rarely listens to others and does not acknowledge the opinions that differ from his/her own. | Substantially Developed Engages in respectful relationships with all other members in the team. Embraces and accepts diverse points of view without prejudice. |
| | Evaluation: Scant 1 2 3 4 5 6 7 Substantially Developed | |