

COURSE OUTLINES: BC2409 Supply Chain Analytics

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|--|--|-----------------|---|
| Academic Year | 2022-2023 | Semester | 2 |
| Course Coordinator | Chua Geoffrey Bryan Ang | | |
| Course Code | BC2409 | | |
| Course Title | Supply Chain Analytics | | |
| Pre-requisites | BE1401 or BE1402 Business Operations and Processes | | |
| No of AUs | 3 | | |
| Contact Hours | 3hr x 13 weeks = 39 | | |
| A) Course Aims | | | |
| <p>Supply chain analytics is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses and stores and to efficiently manage material, information and financial flows so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to maximize system-wide surplus or value. It plays an important role in today's global economy, because efficient supply chains not only make companies more profitable but also allow customers to receive better products at lower prices. For business and technology management students, it becomes critical to have a good understanding of supply chains and its vital role as a source of both performance improvement and business innovation.</p> <p>The goals of the course are i) to provide an understanding and appreciation of key challenges in supply chain analytics and key drivers of supply chain performance, and ii) to expose students to techniques and strategies used to optimize supply chain decisions and to anticipate or explain supply chain phenomena. The teaching method used is seminar style with a mix of lectures, case discussions, problem-solving exercises, spreadsheet-modeling demonstrations and class discussions. Students will be graded on class participation, individual assignments, quizzes, and a final group project. The course is suitable for students of business analytics or technology management, as well as aspiring consultants or entrepreneurs.</p> | | | |
| B) Intended Learning Outcomes (ILO)/Objectives | | | |
| <p>By the end of this course, you (as a student) would be able to:</p> <ol style="list-style-type: none"> 1. Make a case for the role and importance of supply chain analytics 2. Discuss the key challenges and drivers in managing supply chains 3. Apply the analytical tools to optimize the supply chain drivers 4. Evaluate the performance of different supply chain designs 5. Formulate a strategy to apply analytical tools to real-world supply chain problems <p>See <u>Annex F</u> for learning objective taxonomy.</p> | | | |
| C) Course Content | | | |
| <p>In this course, students will learn four key challenges facing supply chain managers, six drivers of supply chain performance, techniques to optimize these key drivers, supply chain best practices, as well as strategies for supply chain coordination and integration. They will learn how to optimally leverage on facilities, inventory, transportation, information, sourcing and pricing in order to address the complexity, uncertainty, dynamic environment and fragmented ownership inherent in supply chains. In the process, the course will cover the success stories of Amazon's centralization, Walmart's cross-docking, Hewlett-Packard's postponement, Dell's modular design, Timbuk2's mass customization, Sport Obermeyer's quick response, Barilla's vendor-managed inventory, Ford's flexible manufacturing, and Blockbuster's revenue-sharing contract.</p> | | | |

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. Class Participation | ILO1, ILO2, ILO3 | Oral Comm, Critical Thinking, Acquisition of knowledge | 20% | Individual | Rubric 1 |
| 2. Individual Assignments | ILO3 | Acquisition of knowledge | 15% | Individual | NA* |
| 3. Group Assignments | ILO3 | Acquisition of knowledge | 10% | Team | NA* |
| 4. Quizzes | ILO3, ILO4 | Critical Thinking, Acquisition of knowledge | 30% (Quiz 1 – 15%, Quiz 2 – 15%) | Individual | NA* |
| 5. Group Project | ILO4, ILO5 | Problem Solving and Decision Making | 25% | Team | Rubrics 2 and 3 Use the rubric and give the same score to everyone in the team. Then give them a confidential optional peer evaluation form. No submission by a team member means the default rating is 7. |
| Total | | | 100% | | |

* Short answers

E) Formative feedback

The seminar will be interactive and student inputs will be highly encouraged and assessed. Feedback will be provided during the class discussions. For assignments and quizzes, the instructor will grade the submissions, review the grades with the students, and discuss common mistakes and weaknesses. For the group project, there will be a Q&A segment where the instructor will ask questions and provide feedback.

F) Learning and Teaching approach

| Approach | How does this approach support you in achieving the learning outcomes? |
|------------------------------------|---|
| Seminars and Class Discussions | The seminars and class discussions allow ample opportunities for me to expound on the concepts and demonstrate the analytical tools to the students as well as to hear about their intuition, experience and difficulties pertaining to the content. It also offers me the chance to assess their ability to think critically and articulate clearly. |
| Spreadsheet Modeling Demonstration | This allows me to guide the students through the steps of complex analytical tools for optimizing supply chains. The students may stop me at any point or ask me to repeat certain steps. |
| Problem Solving Exercises | This would allow the students to get their hands dirty and solve some challenging problems and apply the analytical tools covered in the course. |
| Case Discussions | This teaching format allows the students to have a highly interactive learning environment where they experience both instructor-to-student learning as well as peer learning. |

G) Reading and References

Recommended Textbook:

- (CM) CHOPRA and MEINDL, Supply Chain Management: Strategy, Planning and Operation, 6th Edition (Global Edition), 2016, Pearson, ISBN 978-1-292-09356-7.

Supplementary Textbook

- SKS) SIMCHI-LEVI, KAMINSKY and SIMCHI-LEVI, Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, 3rd Edition, 2009, McGraw-Hill, ISBN 978-007-127097-7.
- (SS) SNYDER and SHEN, Fundamentals of Supply Chain Theory, 2011, Wiley, ISBN 978-0-470-52130-4.

Case Studies

- Sport Obermeyer, Ltd. (HBS case)
- Barilla SpA (A) (HBS case)
- Blockbuster Inc. & Technological Substitution (A): Achieving Dominance in the Video Rental Industry (HBS case)
- Tetra Pak: A Digitally Enabled Supply Chain as a Competitive Advantage (IMD case via HBP)

H) Course Policies and Student Responsibilities

1. Attendance: Students are required to attend at least 75% of the seminars.
2. Punctuality: They are expected to be punctual and arrive before the start of class, as late arrivals will be disruptive to class activities and considered disrespectful to the instructor and fellow students. For submission of course requirements, students are required and expected to follow the submission deadlines.
3. Preparation: Students are expected to prepare for each class meeting by reading and working on all assigned material prior to class. The quality of you and your peers' learning will largely depend on how well prepared you are for class.

4. Participation: Once in class, you are expected to contribute to class discussions and exercises as well as ask questions whenever in doubt. You are also expected to observe respectful behavior such as raising your hand before speaking, not interrupting other students, not using electronic devices unless required for problem solving exercises, and not causing any distractions to fellow students. Suggested fields for this portion include general policies with regards to students' assignment, punctuality absenteeism, etc.
5. 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.

I) Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour 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 |
|----------------------------|-----------------|--------------|--------------------|--------------------------------|
| Chua Geoffrey Bryan Ang | S3-B2A-04 | 6790 6140 | gbachua@ntu.edu.sg | By prior appointment via email |

K) Planned Weekly Schedule

| Week | Topic | ILO | Readings/ Activities |
|------|---|------|---|
| 1 | Introduction to Supply Chain Management | 1, 2 | CM Chapters 1, 2, 3 |
| 2 | Forecasting: Mature vs New Products | 3 | CM Chapter 7 SS Chapter 2 All Sports case study |
| 3 | Facilities: Basic Network Design | 3, 4 | CM Chapter 5 |
| 4 | Inventory: Cycle Stocks and Safety Stocks | 3 | CM Chapters 11, 12 |

| | | | |
|----|---|---------|--|
| 5 | Inventory: Seasonal Stocks and Perishable Stocks | 3 | CM Chapters 8, 13 Sport Obermeyer case study |
| 6 | Transportation: Modes, Network Types and Routing Techniques | 3, 4 | CM Chapter 14 Additional notes |
| 7 | Facilities, Inventory and Transportation: Advanced Network Design | 3, 4 | SS Chapter 8 SKS Chapter 4 |
| 8 | Information: Demand Distortion and Role of IT | 2, 3 | CM Chapters 10, 17 SKS Chapter 5 Barilla case study |
| 9 | Sourcing: Supplier Management and Contracting for Coordination | 2, 3 | CM Chapter 15 SKS Chapters 4, 9 Blockbuster case study |
| 10 | Pricing: Differential Pricing and Revenue Management | 2, 3 | CM Chapter 16 |
| 11 | Supply Chain Integration | 1, 2, 5 | SKS Chapters 6, 11 Tetra Pak case study |
| 12 | Industry Guest Speaker | 1, 5 | |
| 13 | Group Projects | 4, 5 | |
| | | | |

ANNEX B: ASSESSMENT CRITERIA**Rubric 1: Class Participation**

Learning Objective: (1) the ability to communicate well with others verbally so that it clearly expresses the intended message and is understandable and useful to the receiving party, (2) the ability to define, examine, evaluate, analyze and synthesize various arguments and knowledge to form independent judgment

| Traits | Performance | |
|--|---|--|
| Communicate Thoughts and Analysis in a Succinct Manner | Not Yet Unable to present key issues and points in a clear manner. | Substantially Developed Able to explain exceedingly well an argument that addresses all the key points and recommendations. |
| | Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> Substantially Developed | |
| Integrate Data, Knowledge and Insights to Provide Information for Decision Making | Not Yet Analysis of alternatives, and thinking and methodology used are incomplete or flawed. | Substantially Developed Able to perform detailed analysis and evaluation of processes; and provide sound recommendations based on detailed analysis of alternatives. |
| | Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> Substantially Developed | |

Rubric 2: Group Project

Learning Objective: The ability to identify problem, generate a plan, examine implementation feasibility and evaluate outcome in the process of solving a problem and making sound business decision.

| Traits | Performance | |
|---|---|--|
| Define the Problem | Not Yet Does not identify the problem clearly; demonstrates limited understanding of the problem or related contextual factors. | Substantially Developed Identifies the problem clearly and thoroughly; demonstrates the ability to construct a clear and insightful problem statement with evidence of all relevant contextual factors. |
| | Evaluation: Not Yet <u>1</u> 2 3 4 5 6 7 8 9 <u>10</u> Substantially Developed | |
| Devise Strategies to Solve the Problem | Not Yet Selects a strategy without regard to fit; does not demonstrate the ability to consider new strategies even if his/her approach is clearly not appropriate; identifies alternatives that reflect limited understanding of the situation. | Substantially Developed Identifies multiple strategies for solving the problem that apply within a specific context; demonstrates the ability to invert a process to form a plan and clearly articulates his/her decision-making process; identifies alternatives that reflect an in depth understanding of the situation. |
| | Evaluation: Not Yet <u>1</u> 2 3 4 5 6 7 8 9 <u>10</u> Substantially Developed | |
| Assess implementation feasibility | Not Yet Does not examine how well the stakeholders/ beneficiaries are involved and not able to identify areas of risk and possible side-effects. Does not specify how the implementation will be monitored and controlled. No indicators or instruments to review or analyze the success of the action. | Substantially Developed Clearly assess how well the stakeholders/ beneficiaries are involved; considers areas of risk and provides insights in addressing possible side-effects. Able to state how the implementation will be monitored effectively; identifies the stages at which progress should be measured and specify what results are expected to have been achieved at these stages. |
| | Evaluation: Not Yet <u>1</u> 2 3 4 5 6 7 8 9 <u>10</u> Substantially Developed | |
| Evaluate Outcomes | Not Yet Reviews results superficially in terms of the problem defined with no consideration of need for further work. | Substantially Developed Reviews results relative to the problem defined with thorough, specific considerations of need for further work. |
| | Evaluation: Not Yet <u>1</u> 2 3 4 5 6 7 8 9 <u>10</u> Substantially Developed | |

For NBS Sample rubrics, please write to nbsacro@ntu.edu.sg

Rubric 3: Peer Evaluation (Optional)***Sample Peer Evaluation Used in an Undergraduate Course*****Peer Evaluation Instructions**

All members are required to complete a peer evaluation for each member of the team (i.e., including a self-assessment). The completed peer evaluation form must be submitted individually to the instructor immediately after the team project has been submitted for grading. Identity of appraisers will be kept **confidential** and will not be revealed to other team members.

We will use a member's ratings (on a scale ranging from 1 to 7) to award marks for the team project to other members by computing the average rating that a member receives from other members (i.e., excluding each member's self-rating). Each member will be informed of his/her average rating. A member's mark for the team project will be computed as follows:

1. If a member's average rating is ≥ 4 , the member will receive **100%** of the overall mark awarded to the team project.
2. If a member's average rating is < 4 but ≥ 3 , the member will receive **80%** of the overall mark awarded to the team project.
3. If a member's average rating is < 3 but ≥ 2 , the member will receive **50%** of the overall mark awarded to the team project.
4. If a member's average rating is < 2 , the member will receive **30%** of the overall mark awarded to the team project.

A member who has concerns with the ratings given by other team members and/or his/her average rating should immediately consult his/her instructor upon receiving his/her peer evaluation feedback.

CONFIDENTIAL PEER EVALUATION FORM FOR TEAM PROJECT

Member's name: _____

Seminar group and team number: _____

Please use the attached Peer Evaluation Rubric to evaluate yourself and your team members on each of the 5 stated attributes (on a scale of 1 to 7). State your ratings for yourself and each of your team members in the table below. For your self-assessment, insert "(Self)" after your name in the table below.

| Index # | Name of team members | 1 - RR | 2 - CM | 3 - CR | 4 - CT | 5 - RS | Average Rating |
|---------|----------------------|--------|--------|--------|--------|--------|----------------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |

If any of your ratings above is < 4, please provide a brief explanation to justify the ratings.

| Index # | Brief explanation to justify a rating of < 4 |
|---------|--|
| | |
| | |
| | |

You may attach supporting documents (like emails and screen shots), if any, to support your explanations above.

Teamwork & Interpersonal Skills (Peer Evaluation) Rubric

Learning Objective: The ability to work effectively with others in a group setting.

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

References: *Teamwork Value Rubric - Association of American Colleges and Universities*. Retrieved from <http://www.aacu.org/value/rubrics/pdf/teamwork.pdf>