SCM.294. Digital Supply Chain Transformation
2020 - 2021

Details

Classroom: Hybrid (remote & in-person)
Meets:
  a. Mo, 2-3:30 pm, Remote
  b. We, 2-3:30 pm, In-person, E51-145
  c. Fri, 8-9:30 am, Remote (alternative to b.)
Units: 2-0-4
Canvas: https://canvas.mit.edu/courses/5576
Office Hours: Mo, 3:30-4:30 pm (remote, by appointment)

Instructor:
Dr. Maria Jesus Saenz (mjsaenz@mit.edu), Director, MIT Digital Supply Chain Transformation
Co-instructor: Dr. Ozden Tozanli (otozanli@mit.edu)
TA: Landon Hollingsworth (lsh3@mit.edu)

Prerequisites: Graduate-level courses in operations management, logistics design and/or supply chain management preferred.

Justification for the creation of this course

Digitalization is revolutionizing many industries; one field of exceptional transformation is the supply chain. Across the globe, industries have changed rapidly due to multiple factors: customer-centric strategies, supply chain expectations on delivery and customization, and many others. Final consumers learn and engage with brands and their partners. Managing suppliers upstream is also changing quickly. Supply chain actors’ expectations are increasing, their experience is becoming more prevalent, and they continue to open doors for new digital offerings. This course will allow students to learn about creating digital supply chain strategies and experimenting with key digital supply chain capabilities to further implement and transform their dynamic value chains at work. This course will contribute to the portfolio of electives at MIT, add to the perspective of the supply chain and their actors, and integrate the different areas of operations together with the technological transformative approach.

Course Description

Analyzes the factors involved in the digital transformation of supply chain relationships. Develops an in-depth understanding of the perspectives, roles, and decisions of relevant stakeholders in transforming supply chains in the digital era. Covers digital supply chain capabilities (Visibility, Agility, Collaboration, Omnichannel), the role of technology (Blockchain, IoT, AI, Digital Twins), processes and organizations, as well as digital platforms and performance. Discusses relevant and novel case studies.
of digitally transformed supply chains, covering topics of long-term competitive advantage, through operations and digitally enhanced value generation. Includes presentations, guest executive speakers, simulations, team projects, and case discussions under experiential learning complementary approaches.

Objectives

The five primary objectives of this course are:

1. Develop experience in creating a digital supply chain strategy
2. Identify and learn how to implement the key digital supply chain capabilities
3. Practice with End-to-End data governance and supply chain performance
4. Understand the balance between technology, processes, and organizations
5. Learn from simulations and case studies of organizations that successfully implemented digital transformations, as well as from the challenges they faced.

Course Environment

Class sessions will be divided into three sections each week: one lecture online, and two smaller subgroup discussion sessions that will meet on-line or alternatively in-person, depending on the topics to be discussed and the profile of the students attending the classes each week. All the sessions will be synchronous.

For this course, interaction and experiential learning are key, so class sessions will cover real-time presentations, case studies, simulation, group discussions, and quizzes. Students will participate just as if they were in an in-person course, based on:

- **One week in advance** of each class, the expectations for that class will be posted on Canvas. This will include: learning objectives, instructor/speaker announcements, reading documents (required and recommended), and homework.
- **Before each session** students are required to deliver a preliminary homework/report regarding the case/topic that will be discussed that day. For that purpose, some questions and instructions will be posted in advance of each class.
- **During each session**, discussions and breakout rooms may be held to discuss the relevant case study so that students can interactively deliberate in the class. Please make sure that you appoint one representative of the group who will inform the instructor about the names of the participants of that discussion. Quizzes will be conducted to assess the students’ knowledge of the key concepts. Attendance will be monitored.
- **Attendance to the final project presentations** is required, and discussions in the last session of the course will be monitored as well. This is required to facilitate interactive learning and a discussion environment with presentations and Q&A of all participants.

Some **practical instructions** for the online learning mode to enrich your interactive learning throughout this course:

- Please be especially well-prepared for the class discussions.
- You have to follow the class and participate with your video ON. This is important both for class dynamics and your engagement.
- During class sessions please do not check emails, surf the web, connect to social media, etc.
• Your microphone must be muted by default. If you want to participate during the class, raise your hand within the Zoom system and we will call on you. Only then will you unmute your microphone.
• If you have technical problems, please contact Landon Hollingsworth and copy Dr. Maria Jesus Saenz and Dr. Ozden Tozanli.
• We really welcome any feedback or suggestions to improve your learning experience within this course.

Grading

This course is graded through four primary components:

• **Graded Assignments** (20%): Primarily individual exercises, with one assigned for each class, performed during or/and outside of class time. Instructions for each assignment will be provided at least one week in advance of the class in which the assignment is due.

• **Simulation** (10%): Team-based simulation exercise and corresponding discussion about assessing the implementation of a digital platform for last-mile delivery.

• **Quizzes** (20%): For some lecture topics, students will answer quick quizzes with the main goal of assessing the student’s knowledge of key concepts of the class.

• **Class Participation** (15%): Students are expected to actively contribute to class discussions. Most class sessions will be based on cases, and all of them will require discussion that will be graded according to the value-added by the student to the learning progress of the class. Substantive contributions will be thoughtful, well-articulated, and will advance the collective discussion of the class.

• **Final Project** (35%): The final project will require teams of students to apply and integrate the different concepts and practices learned throughout the course. See the Final Project description below for additional details.

Each assignment and deliverable will be submitted via Canvas by the indicated deadlines.

Academic Honesty

As an MIT student, you are expected to adhere to MIT academic integrity policies. Specifically, all work for a grade that you submit must be your own work and your own work only, both individual- and group-based.
### (Tentative) Course Schedule

**a. Mon, 2-3:30 pm, Remote**  
**b. Wed, 2-3:30 pm, In-person**  
**c. Fri, 8-9:30 am, Remote (alternative to b.)**

<table>
<thead>
<tr>
<th>Session Date*</th>
<th>Topic - Instructor</th>
<th>Readings (before the session)</th>
<th>Assignments</th>
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<td><strong>Week 1-2</strong></td>
<td>What do we mean by Digital Supply Chain Transformation?</td>
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| Session 1a 9/2 | Overview of the Course. Introduction to concepts  
Dr. Maria Jesus Saenz | Syllabus | |
| Session 1bc b&c. 9/4 | Digitizing vs Digitalizing in Supply Chains  
Dr. Maria Jesus Saenz | See details | |
| **Weeks 2-3**  | Digital SC Transformation Capabilities | | |
| Session 2bc 9/9 c.9/11 | eCommerce Transformation and Omnichannel Revolution  
Dr. Eva Ponce | - Adidas Case Study  
- See details | - Case Study report |
| Session 3a 9/14 | Visibility, Visualization and Data Governance  
Javier Ramirez, SC Solutions Director Flex | See details | |
| Session 3bc 9/16 c.9/18 | E2E Visibility and Digital Thread. Discussion: Project scopes  
Dr. Maria Jesus Saenz | See details | - Deliverable 1. Project Scope and team partners |
| **Week 4**     | The Role of Technology | | |
| Session 4a 9/21 | Achieving End-to-End connectivity: Blockchain applications to Supply Chains  
Dr. Inma Borrella | - IBM Case study  
- See details | Case Study report |
| Session 4bc 9/23 c.9/25 | Industry 4.0 and Digital Transformation  
Dr. Maria Jesus Saenz | - TetraPak Case study  
- See details | Case Study report |
| **Week 5**     | Digital Platforms | | |
Dr. Maria Jesus Saenz and Dr. Ozden Tozanli | See details | - Deliverable 2 |
| Session 5bc 9/30 c.10/2 | Digital Twins in Supply Chains  
Dr. Ozden Tozanli | | |
| **Week 6**     | Digital SC Transformation Roadmap | | |
| Session 6a 10/5 | Multidimensional Collaboration and Performance. Discussion: Digital Platform for Last-Mile Delivery (5a)  
Dr. Maria Jesus Saenz and Dr. Ozden Tozanli | | -Report with the simulation results |
| Session 6bc 10/7 c.10/9 | Dell Case Study – Digital SC Transformation Roadmap  
Invited Executive from Dell | - Dell Case Study  
- See details | -Case Study report -Deliverable 3 |
| **Week 7**     | Advanced Applications | | |
| Session 7a 10/13 | Artificial Intelligence Driven SCs: Challenges and Opportunities  
Dr. Maria Jesus Saenz | See details | |
| Session 7bc 10/14 c.10/16 | Final Project presentations by the teams of students  
Wrap Up and Final Discussions | | Deliverable 4: Final Project report and presentation by teams |

* This is subject to change due to contingencies.
Topics

**Weeks 1-2. What do we mean by Digital Supply Chain Transformation?**

**Session 1a. Overview of the Course. Introduction to concepts.**
Instructor: Dr. Maria Jesus Saenz

**Session 1bc. Digitizing vs Digitalizing in Supply Chains.**
Instructor: Dr. Maria Jesus Saenz

Readings for this session:

**Weeks 2-3. Digital SC Transformation Capabilities**

**Session 2bc. eCommerce Transformation and Omnichannel Revolution.**
Adidas Russia Case Study.
Guest Speaker: Dr. Eva Ponce. Executive Director MITx MicroMasters in SCM. Director, Omnichannel Distribution Strategies. MIT CTL

Readings for this session (*only recommended)*:
- Adidas Russia / CIS and the Russian crisis: retrench or double down – Case Study.

Assignment:
- Case study report individually before the session: answer Bell et al.’s pre-reading questions before the session

**Session 3a. Visibility, Visualization and Data Governance.**
Guest Speaker: Javier Ramirez, SC Solutions Director Flex

Harmonization, Visualization and Data Governance:
- Company’s experiences with the development, implementation, processes mapping and scalability: framework, pillars (Real/Right Time, Collaboration, Mobility), etc.
- Data and technology: How Company’s tools, like platforms, ERP, sensors in manufacturing and logistics, Machine Learning and other technology, complement each other for the SC.

Required readings for this session (*only recommended)*:
• Flex. How we use real-time data analytics to manage complex supply chains, 2018.

Session 3bc. E3E Visibility and Digital Thread. Discussion: Project scopes
Instructor: Dr. Maria Jesus Saenz

Readings for this session:
• Watch this Video: Following the Digital Thread: Revolutionizing Supply Chains

Assignment:
- Deliverable 1: Project Scope (1 page) Select the final project topic, scope, business case and team partners. See the Final Project description below.

Week 4. The Role of Technology

Session 4a. Achieving End-to-End Connectivity: Blockchain applications to Supply Chains.
Guest Speaker: Dr. Inma Borrella. Research Scientist, MIT CTL.

Required readings for this session:
• Hunsaker B.T., IBM: Building with Blockchain Case Study, 2017 (TB0535-PDF-ENG)

Assignment:
- Short report with arguments to be used in the role-play game about the applications of Blockchain in Supply Chains. Instructions will be delivered in advance.

Session 4bc. Industry 4.0 and Digital Transformation
TetraPak Case study. A digitally enabled supply chain as a competitive advantage. The role of technology (IDM960)
Instructor: Dr. Maria Jesus Saenz

Required readings for this session:

Assignment: Case study report individually before the session.

Week 5. Digital Platforms

Instructors: Dr. Maria Jesus Saenz and Dr. Ozden Tozanli

In these two sessions (5a and 6a) we will work around the principles of vertical and horizontal collaboration and the opportunities that working with different competitive and non-competitive partners could bring into digital supply chains. Students, working in teams, will apply these
insights into a simulation of a digital platform for last-mile delivery. Discussions about incentives, gain sharing, and performance will take place.

Readings for this week (*only recommended):

Assignment:
- Deliverable 2: Project Deliverable about Digital SC Transformation Capabilities. See the Final Project description below.

**Session 5bc. Digital Twins in Supply Chains**
Instructor: Dr. Ozden Tozanli

Readings for this week (*only recommended):
- TBD

**Week 6. Digital SC Transformation Roadmap**

Instructors: Dr. Maria Jesus Saenz and Dr. Ozden Tozanli

Assignment: Presentation with the simulation results, according to instructions provided for the simulation.

**Session 6bc. Digital SC Transformation Roadmap. Operational and Organizational Challenges**
Dell: Roadmap of the Digital Supply Chain Transformation
Guest Speaker: TBD

Required readings for this session (*only recommended):

Assignments:
- Case study reports individually before the session.
- Deliverable 3: Project Deliverable about the role of technology and digital platforms. See the Final Project description below.
**Week 7. Advanced Applications**

**Session 7a. Artificial Intelligence-Driven SCs: Challenges and Opportunities**
Instructor: Dr. Maria Jesus Saenz

Required readings for this session (*only recommended):
- Forger G. AI Starts to make some supply chain decisions, Supply Chain Management Review, March 2020.

**Session 7bc. Final Project presentations by the teams of students.**
Wrap Up and Final Discussions.
Instructor: Dr. Maria Jesus Saenz

Assignment:
- Deliverable 4: Final Project report and presentation by teams. See the Final Project description below.

**Final Projects**

The main goal of these projects is to apply the main concepts and practices learned throughout this course, together with previous experience of the students, as well as additional insights extracted from current research.

The final projects will be done in teams of 4 (exceptionally 3) students. You will make the teams but please consider the compatibility of your schedules and time zones.

Each team will work on the analysis of the digital supply chain concepts learned in the course, applied to a particular industry/sector/area. The analysis might include the following (but is not limited to): the description of the company/s and its supply chains, current and future (digital) business model, challenges, opportunities, potential digital transformation developments, and the future (5-10 years) you envision for this industry, as well as the topics covered throughout the course. You can base your analysis on one particular company within a particular industry, known or unknown by you; you can develop a benchmark of the industry/sector, or you can select one portion of a supply chain in the industry that is relevant for proposing new insights and recommendations around digital transformation. You can also propose a pilot study.

Each team must submit the names of team members, expected scope, and business case for their project by the first session of Week 2 (Deliverable 1). By the following week/s after each topic is addressed in class, each group will deliver a short essay on how that topic applies to their project, according to the deadlines announced in the schedule above. Therefore, these are the expected project deliverables (2 pages each):
   - Deliverable 1. Project scope, team members and business case
Deliverable 2. Digital SC Transformation capabilities Essay
Deliverable 3. The role of technology and digital platforms Essay
Deliverable 4. Final report and presentation* (including Digital SC Transformation roadmap)

*For the Final Report, each group will deliver a 10-15-page critical analysis paper (based on the previous deliverables) as well as a short PowerPoint presentation to the class in the last session, including a time for discussion with the rest of the class. This session is mandatory for everyone in the class. All projects will be made public for the class to share.