

Supply Chain Management
Course Number: 22:799:627
Course Title: Strategic Directions of Future Supply Chains

COURSE DESCRIPTION

Supply chains have been continually changing for many years, but lately the pace of change appears poised to accelerate greatly as new drivers begin to influence business decisions. Some of these drivers are: For the first time in recorded history, people in the middle class and above outnumber those that are poor or vulnerable to poverty. The middle class is expected to continue growing, and according to a Brookings Institute study, it will be "predominantly Asian-almost nine in 10 of the next billion middle-class consumers will be Asian-but they will be spread out in China, India, and South East Asia". Consequently, markets will be shifting too.

We are now entering the 4th industrial revolution. This revolution is not driven by new technologies; rather it is driven by the maturation of existing technologies that have been integrated into deployed systems. To wit, manufacturing plants of the 4th industrial revolution are called smart factories, and those tend to be designed to be able to shift quickly and inexpensively from producing one product to another (so-called product flexibility or agility). This means that supply chains delivering input materials and those moving finished products to market must be able to shift as well (so-called supply chain flexibility). Labor costs are of lesser significance, and this facilitates placement of production sites closer to markets. Smart factories can quickly react to changing demands in product types and production volumes, reduce the time needed to bring new products to market (design time, tooling and production scheduling), reduce energy consumption by optimizing production processes, and reducing waste, which in turn reduces the need for raw materials and their transportation.

More advanced automation, artificial intelligence (AI), and autonomous vehicles (air/land/sea) are being deployed.

Cybersecurity will be greatly enhanced by Blockchain technology.

World population is projected to increase by more than 1.5 billion people within the next 15 years, reaching 8.5 billion in 2030, and to increase further to 9.7 billion in 2050 and 11.2 billion by 2100 with more than half of global population growth between now and 2050 expected to occur in Africa. Companies need to be able to tap into new markets in order to maintain market share.

Regardless of the U.S. Government's position on the Paris Agreement, the rest of the world and industry accept that Green House Gas emissions need to be reduced and this will entail profound implications on supply chain management.

The rate of change will likely accelerate, and the consequences are not entirely clear at this time. Changes will probably vary by industry, and managers need to understand what is causing the changes and to be able to identify the issues/challenges involved in order to adapt, plan and survive.

This course addresses strategic aspects of future supply chains. As such, it discusses the evolution of

future drivers that will impact supply chains, drawing upon information posted by various organizations/sources, such as Capgemini Digital Transformation Institute, Intergovernmental Panel on Climate Change, OECD, United Nations Industrial Development Organization, IMF, Deloitte's 2016 Global Manufacturing Competitiveness Index, World Economic Forum's 2018 Global Competitiveness Index and other authoritative sources. The teaching approach and objectives include strong emphasis on providing students with useful content, engaging them in discussions, soliciting and asking questions, and practical and real-world examples applicable to developing student analytical skills necessary to detect changes in the business environment and to develop plans/strategies as needed.

COURSE MATERIALS

The basic course content will be created from open source publications posted by Capgemini Digital Transformation Institute, Intergovernmental Panel on Climate Change, OECD, United Nations Industrial Development Organization, IMF, Deloitte's 2016 Global Manufacturing Competitiveness Index, World Economic Forum's 2018 Global Competitiveness Index and other authoritative sources. A complete listing will be provided to the students prior to each course.

LEARNING GOALS AND OBJECTIVES

This course is designed to help students develop the analytical skills necessary to detect changes in the supply chain environment and develop plans/strategies that will be needed, as described above in the Course Description and in greater detail below.

Business Analytics. Students will acquire a command of the impact and interaction of current drivers of supply chain operations, allowing them to identify probable changes, and will demonstrate:

Ability to identify how changes made to specific drivers will impact overall supply chain management.

Ability to detect where changes to drivers will occur due to changes in markets, technology, or governance, and to assess what those changes will be.

• **Supply Chain Management.** Students will enhance their leadership and planning skills to enable them to better cope with the supply chain challenges ahead, and will demonstrate:

Ability to plan, including setting goals and objectives necessary to adapt supply chain operations during a period of rapid transformation.

Ability to identify risks associated with strategies developed to deal with future changes, and to develop mitigation measures where feasible.

Ability to estimate the costs associated with planning for future supply chain operations.

Effective communication. Students will have the opportunity to acquire effective and persuasive communication skills in demonstrating their knowledge of future directions of supply chains by:

Developing analytical skills to identify where and when changes to supply chain drivers will occur and their impact by attending class, participating in discussions, and preparing a smart plant/supply chain transition plan as well as presenting that plan to the class.

Participating in class and in making a presentation to the rest of the class in the final session, highlighting their smart plant/supply chain transition plan, applying the principles and practices covered in class.

Preparation and presentation of a smart plant/supply chain transition plan as the primary exercise in communication.

ACADEMIC INTEGRITY

I do NOT tolerate cheating. Students are responsible for understanding the RU Academic Integrity Policy (<http://academicintegrity.rutgers.edu/>)

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, “On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.” I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work. Don’t let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

COURSE SCHEDULE

Each session will consist of several components, including learning objectives, assigned reading, assignments, class discussions, links for further study and the like. Except for the last week, each week will start with a prerecorded lecture designed to provide a general overview of that week's topic and will also outline the questions that the students will need to discuss during the weekly session. The students will then read the assigned materials and conduct further research on the assigned topics. A live video conference will be held each week to discuss that week's topic. Just prior to the conference each student will post their speaking points and the references they used. Each student will be evaluated as to their contribution (both spoken and what they posted) to the discussion (50% of grade). The following is a preliminary list of sessions and contents:

Week 1: Current status of supply chains

Global trade scope

First time in recorded history more than 50% of world population is above the poverty level

Growth of specialized companies and value they have added

Internet promotes global sourcing

Global financing

Increase in product quality driven by competition

Efficiency gains in manufacturing and logistics and why

Efficiency in mass production
Walmart effect
Liberalization of trade globally
Meeting customer expectations

Week 2: Changes in progress and their implications

Last mile (Uberization)
Horizontal collaboration
Shrinking of the big box stores
More but smaller shipments
Specialization to a higher degree (global increase in the use of 3PLs)
E-commerce and omni-channels
Evolution of warehousing (functions, location, and operations)
Reduction in the use of long-term service contracts and more online bidding on logistics contracts

Week 3: Emerging factors that will impact supply chain operations

Demands for emission reductions
Congestion; localities are moving to reduce over-congestion
Population growth will occur to the greatest extent outside developed nations (markets too big to ignore)
Markets in developed nations are saturated and profit margins are shrinking; less developed and more risky markets are the new business battleground
Factors that distort trade
Changes in fuels linked to reducing emissions
Tribalism and how to identify and deal with it

Week 4: Additive manufacturing (3D Printing) and Autonomous vehicles (air, land and sea)

As these technologies are already making an impact, what is their full potential?
How will they impact supply chain operations?
What is the infrastructure required?
What are the challenges?
Where will they be deployed first?

Week 5: The 4th Industrial Revolution

What is it and what does it entail?
What are smart factories?
Networking of designs and production
How is manufacturing changing as a result?
How are logistics impacted?
Impact on the workforce
How can a company compete?

Week 6: AI, IT, Cybersecurity, Blockchain and Quantum Computing

Future of these technologies, security and planning
Identifying the skills needed and obtaining the workforce needed for the future

Week 7: Risks and benefits

Student-led discussion moderated by instructor.

Week 8: Financial implications of the 4th Industrial Revolution

Draw of low labor rates is no longer paramount
Technological savings require short-term pain

Impact on developing nations and world trade

Week 9 Development of a smart plant plan

Plan elements

Setting goals - objectives

Identifying issues of concern and mitigation measures

Milestones/schedules and managing personnel while transitioning to the 4th Industrial Revolution

Maintaining morale

Retraining and transition

Risk of disenfranchising the workforce

Week 10: Meeting customer expectations during the expected transitions and into the future

New business models and the sharing economy

How will changes in world demographics foster changes in customer expectations

How will expectations evolve

Challenges in identifying customer expectations

Who will be better suited to meet diverse and evolving customer expectations over extended periods of time; very large companies or niche market companies?

Week 11: Metrics

What is being measured in supply chains and why

Adjusting metrics to work to support new business models and the sharing economy

Measuring performance in objectives set by stakeholders (e.g. shareholders, public, policy makers)

Week 12: Student groups of up to 5 members, that were formed in week 7, present their recommendations regarding how an industry sector or company, that they selected should plan for the future

Week 13: Examine/discuss the key challenges identified by instructor-selected student groups

What is the scope of each of these challenges (the interrelationship between them and other functions/operations)?

How significant are they in terms of impact?

Probability they can be successfully addressed

Impact of failure to address the challenges

Week14: Course summary

What have we covered?

Where is there agreement and or disagreement

What are the key issues that we need to watch and gather more information as they evolve?

Where are we heading and what do we need to survive

Week 15: Final exam (50% of grade)

Other Considerations

We often speak positively about disruptive technologies in business, but business actually fears change, and this sentiment is captured by the maxim Capital is a Coward. Many changes, however, can be anticipated well in advance if we know where to look and we understand the causations. This course is designed to develop such skills for people involved in managing supply chains, and classes are designed

as interactive. Students are expected to come from a wide array of companies, and they will need to understand that any specific change in drivers or supply chain operations may impact companies differently, leading to insightful class discussions. Students will ultimately be evaluated based on their ability to explain the linkages between drivers and operations and the logic used in developing plans that are feasible to deal with changes and not whether the solutions they develop will apply to all companies.

SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at ods.rutgers.edu.

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email dsoffice@echo.rutgers.edu]

[Rutgers University-Newark ODS phone (973)353-5375 or email ods@newark.rutgers.edu]

If you are *pregnant*, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email jackie.moran@rutgers.edu]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email TitleIX@newark.rutgers.edu]

If you seek *religious accommodations*, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email deanofstudents@echo.rutgers.edu]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email DeanofStudents@newark.rutgers.edu]

If you have experienced any form of *gender or sex-based discrimination or harassment*, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at <http://vpva.rutgers.edu/>.

[Rutgers University-New Brunswick incident report link: <http://studentconduct.rutgers.edu/concern/>. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7 . You may also contact the Office of Title IX and ADA Compliance at (973)353-1906 or email at TitleIX@newark.rutgers.edu. If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email run.vpva@rutgers.edu]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via <https://temporaryconditions.rutgers.edu> .

If you are a military *veteran* or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of *mental health* services, please use our readily available services.

[Rutgers University-Newark Counseling Center: <http://counseling.newark.rutgers.edu/>]

[Rutgers Counseling and Psychological Services–New Brunswick: <http://rhscaps.rutgers.edu/>]

If you are in need of *physical health* services, please use our readily available services.

[Rutgers Health Services – Newark: <http://health.newark.rutgers.edu/>]

[Rutgers Health Services – New Brunswick: <http://health.rutgers.edu/>]

If you are in need of *legal* services, please use our readily available services: <http://rusls.rutgers.edu/>

Students experiencing difficulty in courses due to *English as a second language (ESL)* should contact the Program in American Language Studies for supports.

[Rutgers–Newark: PALS@newark.rutgers.edu]

[Rutgers–New Brunswick: eslpals@english.rutgers.edu]

If you are in need of additional *academic assistance*, please use our readily available services.

[Rutgers University-Newark Learning Center: <http://www.ncas.rutgers.edu/rlc>

[Rutgers University-Newark Writing Center: <http://www.ncas.rutgers.edu/writingcenter>]

[Rutgers University-New Brunswick Learning Center: <https://rlc.rutgers.edu/>]

[Optional items that many faculty include:

- Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.

- Students must sign, date, and return a statement declaring that they understand this syllabus.]