Supply Chain Dynamics (SCD)

Summer term 2022, version: 24/03/2022

Please note: This document reflects our planning before the term started; it will **not** be updated regularly. For short-term changes regarding rooms or times, see Campus. Changes regarding the content will be discussed in class and, if appropriate, communicated via Ilias.

Technicalities

One semester course, taught every second semester in the summer term

Six credit points; on average, four contact hours per week. Taught in English

Course coordinator and lecturer: Prof Dr Andreas Größler; tutorials: Ivan Đula, Julia Horn

Part of the MSc study programme in (technically oriented) business administration

Time and location

Classes: Mondays, 15:45–17:15 in M17.73 and Thursdays, 17:30–19:00 in M17.73 (for topics and preparation, see timetable below)

First class: Thursday, 21 April, 17:30

Recommended requirements

Introductory bachelor level course in operations management and/or supply chain management

Short description and learning goals

The course starts with discussing the nature of supply chains, in particular their dynamic aspects. Students acquire first-hand experience on effects of dynamic behaviour. A major part of the course is devoted to learning a methodology for better understanding and controlling supply chains, system dynamics. It is used to analyse some real-world cases of dynamic supply chain issues.

After successfully finishing the course, students can:

- name and discuss sources and effects of dynamics in supply chains;
- develop simple supply chain models with system dynamics;
- understand and evaluate complex dynamic supply chain models.

Course design

Although officially split into lectures and tutorial sessions, all classes consist of theoretical and practical parts. Thus, the content will run over the two sessions per week with teacher presentations, case study work, modelling exercises, and experiential learning elements. Students are expected to attend all sessions and actively engage in classroom discussions. They are supposed to study the required readings before class.

Course element	Quantity	Time required	Total [h]
Contact hours			
Interactive lectures	23	2 h	46
Self-study			
Required reading	404 pp.	98.5 h	98.5
Working on exercises	6	2 h	12
Exam preparation	1	22 h	22
			132.5
Examination			
Written exam	1	1.5 h	1.5
Total			**180**

A forum has been opened in Ilias for regular communication between students and teachers, and amongst students.

Examination

Examination will be carried out by means of a written homework assignment. In total, 50% of all points are necessary to pass the course with 6 credit points. The homework assignment asks you to integrate all parts of the course, including lectures, tutorials, and required readings (see timetable). **Deadline of the assignment is Friday, 29 July 2022, 12:00 noon**, submission by Ilias; by the beginning of July, all topics necessary to answer the assignment will have been covered. A detailed description of the assignment together with a framework document will be provided on Ilias. You need to register for the examination on Campus between 11 May 2022 and 02 June 2022. NB: in case you want to withdraw from the examination, this needs to be done by 02 June 2022.

Timetable

Week		Date	Topic	Teacher	Required reading
16	C1	Thu, 21/04	Introduction to and motivation for course	AG	McKinsey (2020)
17	C2	Mon, 25/04	An overview of supply chain management	AG	Kovács & Falagara Sigala (2021)

	C3	Thu, 28/04	Experience dynamics! The Beer Distribution Game	AG/ID	
18	C4	Mon, 02/05	Beer Distribution Game: debriefing Structural causes of supply chain dynamics	AG	Senge (1990), ch. 3
	C5	Thu, 05/05	Operational causes of supply chain dynamics	AG	Lee et al. (1997)
19	C6	Mon, 09/05	Behavioural causes of supply chain dynamics The case for modelling and simulation	AG	Sterman (2000), ch. 1
	C7	Thu, 12/05	An introduction to system dynamics	ID	Sterman (2000), ch. 4
20	C8	Mon, 16/05	Simple dynamic inventory models	AG	Sterman (2000), ch. 6
	C9	Thu, 19/05	Practice session: identifying stocks and flows, feedback loops	ID	Sterman (2000), ch. 7.1&8.3
21	C10	Mon, 23/05	Hands on session: getting to know Vensim	ID	Kirkwood (2005)
22	C11	Mon, 30/05	Growth dynamics of organizations	AG	Sterman (2000), chs. 8.1, 8.2, 8.4, 8.5
	C12	Thu, 02/06	Practice session: modelling exercises I	JH	
24	C13	Mon, 13/06	Aging chain models and their behaviour	AG	Sterman (2000), ch. 12.1
25	C14	Mon, 20/06	Business cycles and oscillations	AG	Sterman (2000), ch. 17
	C15	Thu, 23/06	Practice session: modelling exercises II	JH	
26	C16	Mon, 27/06	Dynamic production/supply chain models	AG	Sterman (2000), ch. 18
	C17	Thu, 30/06	Validity of system dynamics models and implementation issues	AG	Sterman (2000), ch. 21
27	C18	Mon, 04/07	Practice session: modelling exercises III	JH	
	C19	Thu, 07/07	Archetypal dynamic behaviour and modelling modules	AG	Senge (1990), app. 2

28	C20	Mon, 11/07	Practice session: modelling exercises IV	JH	
	C21	Thu, 14/07	Practice session: modelling exercises V	JH	
29	C22	Mon, 18/07	Summary: Modelling and simulation as research methods	AG	Sterman (2000), ch. 22
	C23	Thu, 21/07	Q&A / Guest lecture	JH	Saltelli et al. (2020)

References to readings

Kirkwood, C.W. (2005): Vensim PLE Quick Reference and Tutorial, available at
http://www.public.asu.edu/~kirkwood/sysdyn/SDRes.htm.

Kovács, G., & Falagara Sigala, I. (2021): Lessons learned from humanitarian logistics to manage supply chain disruptions. *Journal of Supply Chain Management*, 57(1), 41–49.

Lee, H. L., Padmanabhan, V., & Whang, S. (1997): Information distortion in a supply chain: the Bullwhip effect. *Management Science,* 43(4), 546–558.

McKinsey & Company (ed.) (2020): Demystifying modeling: How quantitative models can—and can't—explain the world.

Saltelli, A. et al. (2020): Five ways to ensure that models serve society: a manifesto. *Nature*, 582, 25 June, 482–484.

Senge, P.M. (1990): The Fifth Discipline – The Art and Practice of the Learning Organization, Currency Doubleday.

Sterman, J.D. (2000): Business Dynamics – System Thinking and Modeling for a Complex World, Irwin McGraw-Hill.

Software

Download and install Vensim PLE on your computer: http://vensim.com/free-download/.