Can SCM Students Become Process Experts? An Educational Approach

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Abstract

It has been shown that students' opportunities to learn are embedded in the instructional tasks with which they are invited to engage in the classroom. Integrating process modeling software in courses is a hands-on task that improves the students' understanding of business processes. Especially in supply chain management, the development of process models provides a unique learning experience for students, supporting their understanding of the cross-functional and inter-organizational nature of supply chain processes. Based on our teaching experiences, we present a higher education class that trains students on how to map processes, enabling them to derive theoretical and managerial implications.

Keywords: Supply chain management, business process management, teaching

Introduction

The discussion of business processes and their modeling have a long history in organizational research (cf. Bartezzaghi et al., 1994; Trkman et al., 2015). A business process can be defined as "a set of logically related tasks performed to achieve a defined business outcome" (Davenport & Short, 1990). Most of such processes are, in fact, cross-functional in nature, thereby spanning the "white space" between the different roles of the organization (Rummler & Brache, 1995, p. 8).

With the emergence of supply chain management (SCM) thinking in organizations, many of such processes have developed beyond the boundaries of a single organization, involving processes of suppliers and customers (Mentzer et al., 2001; Lu et al., 2013; see Figure 1 as an illustrative example). This makes modeling of business processes not only a vital element of intra-organizational management but also an important part of today's SCM.

Today's curricula of higher education teaching in SCM, however, commonly contain courses about process management or related topics such as business process re-engineering. These courses train students the Supply Chain Operations Reference (SCOR) model, which contains processes to plan, source, make, deliver, return and

enable supply chain operations (APICS, 2016), or the often cited set of supply chain business processes originally suggested by Cooper et al. (1997) providing them yet with a static and functional view on SCM.

As we will claim in the following, empowering students to use process modeling software may alleviate their discussions on and understanding of business processes and related SCM implications. Especially in SCM, the development of such models may provide unique learning experiences for students, supporting their understanding of the processes involved in the development and management of products and services in company networks (Virvou et al., 2005).

In the present manuscript, deriving from our own teaching experience, we will develop four needs for an improved SCM education. In what follows we will then depict a modeling software and construct a higher education class around it that is free to university educators, helps to respond to the developed educational needs and supports us in adhering to the Standards and Guidelines for the Quality Assurance in the European Higher Education Area (ENQA, 2015). As an educational case, we eventually show how the software can be used to teach students how to map supply chain processes in order to enable them to derive theoretical and managerial implications.

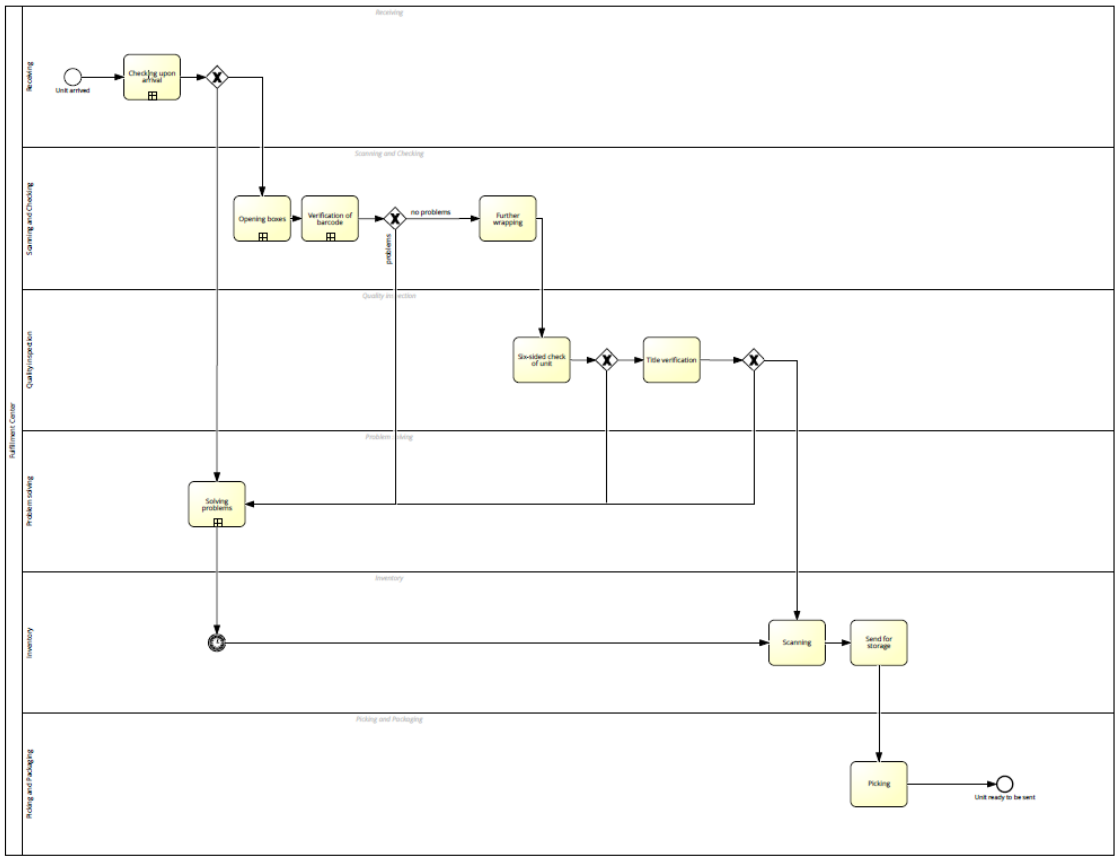

Figure 1 – BPMN Map of an Order Fulfillment Process

Educational Needs in SCM Higher Education

Deriving from our teaching experience in higher education, what is missing in many of today's higher education curricula is an effective way to teach students how to develop and reflect inter-organizational supply chain processes. This is surprising, considering both the theoretical importance of inter-organizational relationships in the academic

discipline (Carter et al., 2015; Carter et al., 2017) and the managerial value that can be generated through the modeling, simulation and understanding of inter-organizational processes (Lu et al., 2013). We, therefore, propose our first need for SCM higher education: *Students in SCM higher education need to be educated in inter-organizational supply chain theories to be empowered to understand business process models spanning organizational boundaries.*

Business Process Model and Notation (BPMN) provides a graphical representation with notational and diagramming elements as well as execution semantics to describe, specify and simulate such business processes. BPMN contains features that support modeling intra- and inter-organizational business processes. In other words, BPMN is particularly suitable to be included in SCM classes to *empower* students to develop and understand processes that span the boundaries of a single company. We, thus, propose our second need in SCM higher education: *Students need to understand business process models by developing and applying BPMN models.*

However, this raises the next issue. Similar to memorizing vocabulary when learning a new language, memorizing the notational and diagramming elements to describe business processes in a standard like BPMN is difficult to align with the teaching principles of *active learning* and *student-centered learning*. We have learned that students' opportunities to learn are embedded in the instructional tasks with which they engage in the classroom (Doyle, 1983). It is profoundly different whether students are required to memorize facts or artifacts or whether they are tasked to authentically engage in modeling, simulating and understating disciplinary processes and ideas (Kisa & Stein, 2015). A task in developing a higher education SCM class that teaches BPMN is to actively involve students in discussing and understanding BPMN. A good way to ignite such discussions is the teaching of BPMN by using process modeling software in which models cannot just be theoretically built but also simulated. Unfortunately, commonly used process modeling software such as Visio or Arena is not free of charge, which, in times of budget cuts, can create challenges to learning institutions. We, therefore, propose our third need in SCM higher education: *In order to adhere to the principles of active learning and student-centered learning, students need to be taught BPMN through the use of a, preferably free of charge, process modeling software.*

Especially student-centered learning (i.e. students actively participating in their learning; Griffiths et al., 2007), and the development of new forms of delivering knowledge have become key pillars in today's higher education according to the Standards and Guidelines for the Quality Assurance in the European Higher Education Area (ENQA, 2015). The new forms of today's teaching demand a transformation in the kinds of tasks to which students are exposed in the classroom, mostly taking account of the increase in digital learning. That being said, teaching BPMN on the software itself does not guarantee that students will better understand SCM processes. Although it may be relatively easy to get SCM teachers to use BPMN in their classrooms, it is much more difficult to assure that the teaching of BPMN is actually implemented in ways that support students' high-level thinking and meaningful engagement in disciplinary practices. We, therefore, propose our fourth and last need in SCM higher education: *A class that seeks to empower students on the use of BPMN needs to be well-constructed in order to support high-level thinking.*

Business Process Model and Notation as an Answer to the Educational Needs

In order to adequately address our four proposed needs in SCM higher education, we will, in the following (1) introduce and argue for BPMN as a useful standard to map SCM processes, (2) introduce a process modeling software that is free of charge for

higher education purposes, and (3) outline an SCM lecture that trains students on BPMN through the use of this software. The course is designed such ways to empower students to better analyze and understand SCM processes, with the goal to improve the learning experience when teaching inter-organizational SCM theory.

Various graphical standards and quasi-standards for business process design exist, including Business Process Model and Notation 2.0 [BPMN] (Object Management Group, 2011), event-driven process chains [EPC] (Scheer, 1992) and flow charts. We decided to focus on BPMN, as there is "growing consolidation of BPMN as the *de facto* standard for [business process] modelling" (Ko et al., 2009, p. 756) in the industry.

The main goal of BPMN is "to provide a notation that is readily understandable by all business users, from the business analysts that create the initial drafts of the processes, to the technical developers responsible for implementing the technology that will perform those processes, and finally, to the business people who will manage and monitor those processes" (Object Management Group, 2011, p. 1), making it very relevant for business reality. Moreover, by thinking in "swim lanes" and "pools", BPMN explicitly supports inter-functional and inter-organizational business processes, i.e., those types of business processes that are particularly crucial in SCM. Indeed, the inter-functional and inter-organizational nature of BPMN is well-aligned with the nature of SCM. As BPMN provides both diagrams ("process map") and an execution language, it bridges the technical gap between software engines and humans and supports an IT perspective of SCM will become increasingly important (Object Management Group, 2011).

We will now briefly introduce Signavio's BPM Academic Initiative that may help us to achieve our educational aspiration in terms of developing students' high-level thinking and engaging them into disciplinary practices without the need for an extra educational budget. Today, a large number of software applications exist to model business processes. This includes, for example, the widespread use of Microsoft Visio or the Rockwell Automations Arena Simulation Software tools. Mostly, such software is required to be installed on the university's or students' computers and typically also causes costs for purchasing the software. Signavio, a German software company, provide with their Process Editor a browser-based (not requiring a plug-in) tool that does not require any installation and can be freely accessed via academic institutions. Signavio supports multiple modeling languages, including EPC, ArchiMate, Petri nets and also BPMN 2.0. For our purpose, students can use Signavio as a tool to design a supply chain process based on the BPMN 2.0 specification. As instructors, we find Signavio very intuitive and easy to learn and it does not require much time to learn this software to be able as an educator to use it in class.

Outline of an SCM lecture on BPMN

We will now provide an outline of a 180 minutes class that we regularly offer to our students in which the students are trained on the modeling, simulation, and interpretation of BPMN. The described class was initially developed for two SCM courses held at our institutions. It is the outcome of an iterative improvement and learning process. The class follows the principles of reception and reflection. That is an iteration between content instructions (reception), case study provision and open discussions with and among the students on what they have learned (reflection). It includes the following activities:

1. The students are asked to prepare for the class by reading chapter 7 of the BPMN 2.0 specifications (Object Management Group, 2011). This chapter provides an

introduction to BPMN and its most relevant elements. The students are also asked to create an account in the Signavio system prior to the class.

2. At the beginning of the class, a theoretical introduction to business process management in the context of supply chain management is taught to the students. Moreover, a series of simple BPMN examples (Object Management Group, 2010) is presented to illustrate the characteristics of the most relevant modeling elements.
3. A video is presented to the students which illustrates a selected business process of a real supply chain. Any process that highlights an initial need, decisions and alternatives, a sequence of process steps, an outcome and that involves at least two actors of different companies (supply chain perspective) is suitable for this purpose.
4. The students are then asked to form groups of two or three students, which from our experience is the ideal group size for this exercise. They are then given the following task: "Use Signavio to create a BPMN 2.0 map of the presented business process. Make own assumptions of the process if needed."
5. Back in the classroom, the groups are asked to present their solutions, while the other students are instructed to play the role of consultants and challenge the group's solutions. The role of the teacher is to point to typical mistakes and relate the solutions to the theoretical supply chain management perspectives.

Several participants of our classes have later reported that they successfully implemented BPMN in their own companies and that the decision to do so was based on the course content. That being said, we believe that this exercise helps to narrow the gap between theoretical SCM knowledge and its application in business practice.

Conclusion

It should be noted that BPMN as a business process modeling standard and Signavio as a software tool that supports BPMN are by no means the only options lecturers have to teach supply chain process management in the classroom. Although BPMN has gained most importance in business reality, which was the reason for us to select it in the depicted approach, other modeling standards like EPC could easily replace BPMN in the teaching approach described in this article. Most of the available standards share many similarities, which makes it easy for students to switch from one standard to another.

When it comes to software tools that support such standards, we identified a large number of options. We decided to use the web-based process modeling platform Signavio, as it does not require any installation and, as part of Signavio's BPM Academic Initiative (Signavio, 2016), is free of charge in the classroom. We also identified alternative software that offers similar functionality, which allows easily replacing Signavio in our approach.

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