FACULTEIT ECONOMIE EN BEDRIJFSKUNDE

UNIVERSITEIT GENT

Invitation

You are cordially invited to the public defence to obtain the academic degree of

DOCTOR OF BUSINESS ECONOMICS

by Claus Patrick Nottbrock

A Novel Maturity Model for Managing Digital Industry 4.0 Innovations through Interorganizational Value Chains

Supervisors:
Prof. dr. Amy Van Looy and Prof. dr. Steven De Haes

Thursday, 12. March 2026 at 17h
at the Antwerp Management School (Room 005), De Boogkeers 5, 2000 Antwerp
Please confirm your attendance no later than 05. March 2026 by email to
Claus.Nottbrock@student.ams.ac.be

EXAMINATION BOARD

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Abstract

This dissertation investigates how manufacturing organizations can improve their business process performance by extending the digital Industry 4.0 (I4.0) innovation perspective from single organizations to entire interorganizational value chains (IVCs). Although significant investment has been made, many organizations still struggle to scale their digital I4.0 initiatives. Maturity models (MMs) are commonly used to assess capabilities, identify areas for development, and set roadmaps for progress, guiding organizations to improve their business process performance.

The central researdch problem addressed is that manufacturers cannot fully optimize business processes across the IVC to achieve the full benefits of digital I4.0 innovations. The dissertation's three studies respond to: (1) insufficient understanding of BPM, SCM, and DI domains from an interorganizational perspective, (2) limited empirical knowledge of required digital I4.0 capabilities in IVCs, and (3) underuse of theoretical foundations in maturity model development.

To fill these gaps, the research develops and evaluates the Digital Interorganizational Value Chain Maturity Model (DIOVC MM). The DIOVC MM aims to enable organizations in jointly developing capabilities that improve their business process performance to the full potential out of digital innovation.

The three studies are integrated within the overall design science research approach to develop a novel artefact: (1) defining interorganizational capabilities and developing a conceptual DIOVC framework through a comprehensive literature review, (2) refining and validating the DIOVC capability framework via a Delphi study with international experts, and (3) introducing and validating four maturity levels that complement the DIOVC maturity model, which we evaluated in a single case study.

Together, these studies make significant theoretical and practical contributions by advancing understanding of interorganizational digital transformation and offering a structured approach for organizations to coordinate digital I4.0 innovation efforts in IVCs. The descriptive DIOVC MM provides a robust framework to evaluate maturity levels, guide capability development, and enhance collaborative performance among interorganizational entities.

Curriculum vitae

Claus Nottbrock is a Joint PhD researcher at the University of Antwerp and Ghent University, under the supervision of Prof. Dr. Steven De Haes and Prof. Dr. Amy Van Looy.

His doctoral research examines the impact of digital Industry 4.0 innovations on business processes and organizational value creation. Claus holds the degree of Master of Business Administration (2006, Mainz University). In addition to his academic interests, he holds the position of Executive Director of Business Operations and Strategic Transformation at Sumitomo Electric Bordnetze SE, contributing over two decades of executive leadership within the automotive industry.