

School/Department:	<i>Rotterdam School of Management – Technology and Operations Management Department (Supply Chain Management Section)</i>
Project Title:	Modelling risk management strategies to address drug shortages
Abstract:	<p>High- and middle-income countries are facing an “epidemic of medicine and vaccine shortages”, which makes ensuring their availability a key societal challenge. Market consolidation, large-scale offshoring of production, and pressure on prices (leading to low inventories and manufacturing quality issues) have made medicine supply chains extremely vulnerable to even small disruptions. In response, countries are developing strategies to safeguard against smaller (e.g. manufacturing or distribution problem) and larger disruptions of supply (e.g. disruption of manufacturing) and/or demand (e.g. pandemics). A big challenge is that evidence on “what works” and “how much it costs” is presently scarce. Should one build “strategic stocks”? Stimulate “Multi-sourcing”? Increase fines for stockouts? Review tendering and pricing policies?</p> <p>The field of supply chain management can and should play an important role in answering such questions. In particular, modelling studies can provide much-needed evidence about costs and effects of strategies without having to implement them first. Extant literature, however, mostly considers optimizing supply chains from a pharma company’s perspective. It has failed to take the government/policy maker’s view, and to conceptualise and model supply chains as systems that must adapt from stable situations to crises and back to stability again. Existing models tend to exclude patients, treat demand as exogenous, and disregard market dynamics (e.g., manufacturers entering and leaving the market).</p> <p>This research project entails evaluating the impact of strategies to reduce shortages by means of supply chain and economical models, in close collaboration with policy makers and medicine supply chain actors. It is part of a large international research project¹ including researchers from INSEAD, BI Oslo, Lancaster University, and the Norwegian institute of public health.</p>

¹ <https://www.bi.edu/about-bi/news/2020/01/how-to-ensure-availability-of-vaccines-and-medicines/>

<p>Requirements of candidate:</p>	<p>Background: <i>Supply Chain Management, Operations Research, (Applied) Economics or Industrial Engineering.</i></p> <p>Required skills: <i>Mathematical programming and modeling, programming (any programming language)</i></p> <p>Master's degree: Yes</p> <p>EUR requirement: IELTS: 7.5 (min. 6.0 for all subs) or TOEFL: 100 (internet) or 600 (paper); GMAT-test or GRE-test: 85%</p>
<p>Supervisor information:</p>	<p><i>Prof. dr. Rob Zuidwijk</i> <i>Email address: rzuidwijk@rsm.nl</i> <i>Personal website: https://www.rsm.nl/people/rob-zuidwijk/</i> <i>Selected key publications:</i></p> <ul style="list-style-type: none"> - Arslan, A.M., Agatz, N.A.H., Kroon, L.G., Zuidwijk, R.A. (2019). Crowdsourced Delivery – A Dynamic Pickup and Delivery Problem with Ad-Hoc Drivers. <i>Transportation Science</i> 53(1), 222-235. - Fan, Y., Behdani, B., Bloemhof-Ruwaard, J.M. Zuidwijk, R.A. (2019). Flow consolidation in hinterland container transport: an analysis for perishable and dry cargo. <i>Transportation Research. Part E, The Logistics and Transportation Review</i>, 130, 128-160. - Ypsilantis, P., Zuidwijk, R.A. (2019). Collaborative Fleet Deployment and Routing for Sustainable Transport. <i>Sustainability</i> 11(20):5666. - Kishore Bhoopalam, A., Agatz, N.A.H., Zuidwijk, R.A. (2018). Planning of truck platoons: A literature review and directions for future research. <i>Transportation Research. Part B, Methodological</i>, 107, 212-228. - Zuidwijk, R.A., Caro, F., Tan, T. Corbett C.J. (2013). Double-counting in Supply Chain Carbon Footprinting. <i>Manufacturing and Service Operations Management</i> 15(4), 545-558. <p><i>dr. Harwin De Vries</i> <i>Email address: harwin.devries@rsm.nl</i> <i>Personal website: https://www.rsm.nl/people/harwin-de-vries/</i> <i>Selected recent publications:</i></p> <ul style="list-style-type: none"> - De Vries, H., Van de Klundert, J.J., Wagelmans, A.P.M. (2020). The Roadside Healthcare Facility Location Problem. <i>Production and Operations Management</i> 29(5), 1165-1187. - De Vries, H., & Van Wassenhove, L. N. (2020). Do Optimization Models for Humanitarian Operations Need a Paradigm Shift? <i>Production and Operations Management</i>, 29(1), 55-61.

	<ul style="list-style-type: none"> - Wang, X., Fan, Y., Liang, L., De Vries, H., & Van Wassenhove, L. N. (2019). Augmenting fixed framework agreements in humanitarian logistics with a bonus contract. <i>Production and Operations Management</i>, 28(8), 1921-1938. - De Vries, H., Wagelmans, A. P., Hasker, E., Lumbala, C., Lutumba, P., de Vlas, S. J., & van de Klundert, J. (2016). Forecasting human African trypanosomiasis prevalences from population screening data using continuous time models. <i>PLoS Computational Biology</i>, 12(9), e1005103. - De Vries, H., & Duijzer, E. (2017). Incorporating driving range variability in network design for refueling facilities. <i>Omega</i>, 69, 102-114. - Ares, J. N., De Vries, H., & Huisman, D. (2016). A column generation approach for locating roadside clinics in Africa based on effectiveness and equity. <i>European Journal of Operational Research</i>, 254(3), 1002-1016. <p>dr. Stef Lemmens Email address: s.lemmens@rsm.nl Personal website: https://www.rsm.nl/people/stef-lemmens/ Recent publication list, preferably last 3-5 years (1-2 pages)</p> <ul style="list-style-type: none"> - Calmon, A.P., Graves S.C., Lemmens, S. (2020). Warranty Matching in a Consumer Electronics Closed-loop Supply Chain. <i>Manufacturing and Service and Operations Management</i>. Available online. - Lemmens, S., Decouttere, C., Vandaele, N., De Boeck K., Banzimana, S., Hassane S. (2019). The Integration of Flow Modeling into a Stakeholder-based Framework for Vaccine Supply Chain Design. In Barbosa-Povoa, A.P. Jenzer, H. Miranda, J.L. (Eds.), <i>Pharmaceutical Supply Chains – Medicines Shortages</i> (193-201). Cham: Springer. - Decouttere, C., Vandaele, N., Lemmens, S. Bernuzzi, M. (2016). The Vaccine Supply Chain Multathlon: the Reconciliation of Technology, Economy and Access to medicines. In Zobel, C., Altay, N. Haselkorn, M. (Eds.). <i>Advances in Managing Humanitarian Operations</i> (205-227). Cham: Springer. - Vermuyten, H., Lemmens, S., Marques, I., Beliën, J. (2016). Developing Compact Course Timetables with Optimized Student Flows. <i>European Journal of Operational Research</i>, 251(2), 651-661. - Lemmens, S., Decouttere, C., Vandaele, N., Bernuzzi, M. (2016). A review of Integrated Supply Chain Network Design Models: Key Issues for Vaccines Supply Chains. <i>Chemical Engineering Research & Design</i>, 109, 366-384.
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