

Source: Wehberg, G., Logistics 4.0 – Managing complexity in theory and reality, Springer Wiesbaden 2015.

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Foreword

Some 20 years ago, I wrote my first publications about logistics. This was for scientific interest. In the past 20 years, I have been supporting many executives and businessmen to develop and optimize logistics systems. During this time, a lot of new possibilities to organizing supply chains have raised. Under the headline “Industry 4.0” Germany wants to leverage on these possibilities in order to maintain its competitiveness and secure national wealth. The first industrial revolutions have introduced the mechanization, mass production and automation. The focus has been to making work easier for workers. The fourth industrial revolution now aims at connecting things along the value chain, i.e. at mobilizing people and machines. It provides significant opportunities for the management of the supply chain in terms of logistics 4.0.

Some figures: Today`s installed basis of connected devices is estimated to be around 20 billion globally, of which some 25 percent refer to the industry (HIS Technology 2015). Within the next 10 years, this number is expected to climb to 100 billion connected objects with some 50 percent industry share. The role of logistics within the industrial value chain tends to be underestimated, accordingly.

Considering these new possibilities as well as my personal experience, I would like to consolidate the scientific and practical perspectives with means of this publication. Thereby, the question how to handle complexity within the supply chain, effectively, should always be focused. I appreciate if I somehow manage both providing a new perspective to those who have a scientific interest as well as a guiding framework for the day-to-day business to people in charge.

Finding out that the complexity within the supply chain is high and increasing is not really new, neither to scientists nor to managers. With respect to scientific research, however, I believe it is fair to say that overall contributions are currently not very much based on substantial theories. Therefore, complexity management of supply chains is still seeking for a theory-based fundament for conceptual design.

The misfit between practical relevance and conceptual basis is the starting point of this publication. It aims at offering a clear guidance on key functionalities between complexity, effectiveness and efficiency of logistics in order to provide support for substantial decision-making. Such guiding framework refers to a so-called evolutionary logistics understanding. Just because evolutionary theory is a key content of what can explain complex phenomena in the sense of von Hayek. Logistics 4.0 then can be understood as a special occurrence of such evolutionary understanding and is well capable to respond to a highly complex environment.

Complexity management as well as logistics 4.0 do not aim at creating new solutions by inventing new logistics functions. Instead of that it is about the modified perception of existing logistics functions from a new, evolutionary perspective. Given that the physical

supply chain and information logistics typically have to be optimized together, the state of information technology has to be considered. Modern IT concepts such as the internet of things, cyber physics and cloud computing will be put into context, accordingly, as much as relevant IT standards such as RAMI 4.0.

Complexity management as well as the evolutionary logistics understanding have to build on existing logistics understandings. This is why in Part 2 of the publication existing understandings will be classified and evaluated. On this basis the evolutionary understanding and complexity management will be introduced from a theoretical as well as conception standpoint. A guiding framework for logistics 4.0 is being introduced, accordingly.

The following explanations of Part 3 and 4 are detailing before mentioned framework with means of more details and relevant theories. Part 3 introduces a profile technique that classifies the structural dimensions of the logistics 4.0. It focuses on the value, information as well as planning systems of logistics. The profile technique reflects on structural patterns that are key to understand for managing complexity in terms of logistics 4.0. Selected use cases demonstrate how to apply these concepts, practically (whereby any similarities to selected companies are not intended and by accident), and develop towards logistics 4.0.

For the time being, the profile technique of Part 3 will be introduced from a static standpoint. In an evolutionary logistics understanding, however, it is primarily the development of logistics over time that matters. This is why in Part 4 we will discuss relevant life cycle concepts of logistics. Business cases of logistics 4.0 do strongly depend on the specific life cycle and thus are contingent to a high extend. Additionally, general design principles for developing logistics 4.0 are being explained. For doing so, selected approaches of the holistic-evolutionary organization theory will be leveraged.

The outlook of Part 5 outlines necessary efforts of both logistics science as well as management for detailing the concept and further learning. There is still a lot to do, even over and beyond the current engagement of the platform industry 4.0 and its newly established office.

This publication is team work. A big thank you to my clients who I have supported in the past years and with whom I have learned a lot with respect to complexity and logistics. Also, I would like to thank you my family, friends, colleagues and Springer as publisher. Specifically, I would like to express my gratitude to Alexandra, Finn, Marie-Theres and Heinrich Wehberg, Angelika and Ernst Seibert as well as Tim Berger, Christian Kaufhold und Andreas Mertens. Last not least I have to thank Prof. Göpfert and Prof. Thonemann for the academic discussion we had as well as my lecturer Susanne Kramer for her excellent support. Without all of them this publication did not happen.

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