

**Dissertation title:**

## **Versatile production networks**

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Production networks hold the potential for flexible (re-)configuration, which enables additional changeability for manufacturing systems. In this context, the network integration is highly relevant, as it fosters shaping and modifying the network's resource base in terms of the cognitive aspect of the dynamic capabilities perspective.

This thesis contributes to the identification of integration designs, which specifically enable manufacturing agility on network level. Therefore, the so called agility enabling concepts are established, which consider strategic changeability as the dynamic combination of redundant and complementary manufacturing systems distributed across different network locations. Based on this, two different types of collaborative resource usage can be distinguished, which benefit from network-based production shifts. One is granting access to a broad assortment of geographically diverse locational advantages (capacity pooling); the other allows the consolidation of distinct manufacturing competencies, which the single network locations hold (capacity allying).

The importance of this differentiation is underlined by the results of 37 peer reviewed articles on production network agility, combining a total of 90 references on integration designs for network-based production shifts. This data base reveals the existence of opposed recommendations for the five observed dimensions of network integration: horizontal and vertical orientation, hierarchical structure, process consolidation and global spread. Considering the different aspect of the two agility enabling concepts, the discrepant statements on network integration dissolve, as production networks are distinguished by their modes of operations. While capacity pooling requires a horizontal, heterarchical and globalised network design, the allying concept is favored by a vertical, hierarchical and process consolidated integration of the network. The major contribution of this thesis is the theoretically and empirically founded requirement to differentiate between location oriented and competence based production shifts to acquire network agility and underpinning the opposed necessities for integration designs to exploit and explore manufacturing resources in networks. The gained implications are discussed in relation to relevant network theories as well as consolidated into a management concept, to be applied in theoretical and practical settings.