

# Development of an Operational Resilience Assessment Model

## Motivation

Geopolitical developments, climate change, supply chain bottlenecks, and advancing digitalization are reshaping the global economy, presenting numerous challenges for manufacturing companies. These challenges increase operational complexity and expose organizations to frequent crises and disturbances. To maintain long-term competitiveness and secure their place in the market, manufacturing companies must continuously improve or, at the very least, sustain their levels of efficiency and productivity. In this increasingly volatile environment, resilience—the ability to react flexibly and swiftly to disturbances and external influences and to adapt to changing circumstances—has become a critical factor for success. While many methods for enhancing resilience exist, there is still limited understanding of what resilience entails for manufacturing companies and how to assess their current levels of resilience. A key challenge in this context is the lack

of a standardized and actionable way to quantify resilience. Manufacturing systems often depend on Key Performance Indicators (KPIs) to monitor and optimize processes, but the role these KPIs play in measuring resilience remains underexplored. As companies strive to become more resilient, the need for a robust framework to assess resilience based on meaningful KPIs becomes essential.

## Objective

This thesis aims to develop an operational resilience assessment model for manufacturing systems based on Key Performance Indicators (KPIs). The model will help quantify resilience and provide manufacturing companies with actionable insights into their ability to withstand and adapt to disruptions. The development of the model will be grounded in a thorough review of existing literature on disruptions, mitigation decisions, and KPIs in manufacturing systems, structured in accordance with ISO 22400-1.

The assessment model will be verified and validated using empirical research methods, such as semi-structured expert interviews, to ensure its relevance and applicability in real-world manufacturing environments. By addressing the challenges of quantifying resilience, this thesis seeks to provide manufacturing companies with a valuable tool to evaluate and enhance their resilience, enabling them to navigate the complexities of the modern global economy more effectively.

## Qualifications

- Some exposure or a strong interest in supply chain management and resilience
- Engaging with external stakeholders for expert interviews
- Demonstrated interest in self-directed learning and an openness to explore unfamiliar topics.
- Ability to convey thoughts and findings effectively in written form and verbally.
- Independent, determined, and structured way of working.
- Solid English and German communication and writing skills.

## Why *iwb*?

- Personal and thematic supervision
- Professional perspective at an excellent institute of the TUM

## Contact

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