STEERING MANUFACTURING FIRMS TOWARDS IoT ENABLED SERVICE AND PRODUCT BUSINESS

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RESEARCH MOTIVATION

During the last decades industrial transformations have been fundamentally changing the way companies generate, capture and deliver value. Respectively, how manufacturing companies do business with their customers as well as how products are developed, produced and delivered (Gersch & Goeke, 2007). Today, digital servitization – consisting specifically out of the two macro trends Industry 4.0 and servitization – is disrupting product companies' business strategies and operations (Porter & Heppelmann, 2015).

Thereby, servitization embraces the boost of the service offering directly coupled to their products by shifting from purely selling goods to hybrid product-service offerings. Whereas, Industry 4.0 is considered a new industrial revolution in which the junction of a set of emerging technologies (internet of things (IoT), big data and analytics) results in cyber physical systems enabling to maximize the whole product lifecycle value. The convergence of these two trends results in digitalized services, providing disruptive ways to generate value both for the external customer and the firm's internal processes. For example, Liebherr's FridgeCam building the basis for services such as storage optimization, shopping guidance and food management support or Michelin's pay per kilometer tire offering where emerging technologies such as real-time monitoring and analytics enabled a profitable offering through better tire usage management and tire lifecycle costs. However, despite high investments of firms to extend their technical capabilities on embedding connectivity into products and on cloud-based platforms for utilizing data for digital services, many manufacturers still not fully realize the expected growth benefits.

In order realize the expected growth benefits, recent research argues for the necessity of adequate performance measurement and management (PMM) systems to effectively steer their investments (e.g. Bigdeli et al., 2018; Nudurupati, Tebboune, & Hardman, 2016). Despite its rationality, considerable challenges remain for large manufacturing companies regarding service taxonomy, hybrid accounting, relevant key performance indicators (KPIs) and their steering implications. Since there is a need to obtain a holistic understanding of operations and profitabilities to improve companies overall servitization and Industry 4.0 profitability.

CONTRIBUTION TO THEORY AND PRACTICE

This upcoming study responds to the identified KPI and steering gap through an in-depth case study at a large manufacturing firm. Where data is collected by conducting semi structured interviews (30-40) with managing directors and controllers, complemented through expert interviews (10-15) with executives from software companies, venture capitalists and consultants. The following contributions are proposed for academics as well as practitioners.

Emerging technologies induce an increasing shift from a product-dominant towards service-dominant organizations to offer innovative combinations of products and services. Resulting in a need to rethink how firms are measured and managed (Nudurupati, Tebboune, & Hardman, 2016). More specifically, following the famous quote "what you measure is what you get" (Kaplan & Norton, 1992, p. 71), the successful implementation of such IoT enabled product-service business relies on a comprehensive

measurement framework based on relevant KPIs. Hitherto considerable research on indicators exists for "pure" analog servitization. For example, Kastalli, Van Looy, and Neely (2013) emphasizing 'service adoption', 'service coverage' and 'complementarity index', and Rabetino, Kohtamäki, Lehtonen, and Kostama (2015) pointing out the need to quantify total cost of ownership. However, these traditional KPIs focus mainly on delivering value-in-exchange rather than value-in-use and therefore may not support the target setting and the business objectives of manufacturing companies in a digital era. Furthermore, unidimensional reporting, which still prevails in many organizations, limits the steering of the changes such as servitization and Industry 4.0. Pointing out the need to complement financial data with the data collected by the installed base, which remains largely unaddressed in academic literature. For example, the underlying case company illustrated cases where giving out free hardware and software would allow them to secure huge spare part service revenues in the future through gaining/retaining important market shares and occupying the whole customer value chain. Although the advantages over the traditional sale model were clear, the focus on KPIs such as CapEx (capital expenditure) prohibited them from adopting the new more valuable business model. Thereby also presenting a huge risk of losing towards start-ups entering the market with these business models. The example highlights the need for measures that adequately depict the nature of the manufacturing business in the digital era. Hence, we discuss relevant KPIs for managing IoT enabled business and their respective reporting and target management through the stages of the digitalization process. Thereby we are also discussing necessary service classifications for reporting and measuring service business, as well as the handling of hybrid offerings.

Furthermore, we are witnessing situations where revenues of the traditional purely physical service business will come under severe pressure from digitalization. Hence, we provide an understanding of the relationships and tradeoffs between KPIs and their steering to handle such situation. Thereby managers should recognize that emerging digital technologies lead to a portfolio of digital business models. Which only succeeds if any tendencies on cannibalizations are actively mitigated and synergies among these digital business models are ensured.

KEY DISCUSSION POINTS

- Traditional KPIs focusing mainly on delivering value-in-exchange rather than value-in-use and may not support the business objectives of manufacturing companies in a digital era.
- Relevant KPIs represent a combination of financial and installed based information collected through emerging technologies.
- What are relevant KPIs?
- Internal and external reporting should be reconsidered in the light of new innovative business models for manufactures.
- Manufacturing firms lack adequate measurement and control systems to steer their servitization and Industry 4.0 investments.

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