

Exploring the Willingness-to-Share Data of Digitized Products in B2B Manufacturing Industries

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Abstract In the digital age, physical products of all kind become infiltrated by technology. Especially for the sophisticated manufacturing industries manifold opportunities, yet in the same way defiances originate. While academia and practice on the one hand show that the value of digitized products for an ecosystem participant increases with the access to data from the surrounding ecosystem, on the other hand research to understand and manage this willingness-to-share data is limited. Accordingly, the Research-in-Progress Paper at hand explores the willingness-to-share data of digitized products in B2B manufacturing industries. In particular, an exploratory case study research design in the Swiss B2B manufacturing industries is carved out. Considering the inherent limitations of this qualitative research approach, preliminary findings show that highly different aspects influence the willingness-to-share data of digitized products in these environments.

Keywords: • Willingness-to-Share Data • Digitized Product • B2B • Manufacturing Industries • Case Study Research • Research-in-Progress •

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1 Introduction

In the digital age, physical products of all kind become infiltrated by technology (Yoo et al. 2010, Yoo et al. 2012). Recent forecasts by corporate consultancy McKinsey & Company (2018) value the annual economic potential of this digital product innovation (Yoo et al. 2010, Yoo et al. 2012) up to 11 trillion USD by 2025.

Especially for the sophisticated manufacturing industries manifold opportunities, yet in the same way defiances originate (Herterich et al. 2016a, Herterich et al. 2016b). While academia and practice on the one hand show that the value of digitized products for an ecosystem participant (e.g., manufacturer, supplier, or customer) increases with the access to data from the surrounding ecosystem (Porter & Heppelmann 2014, Porter & Heppelmann 2015), on the other hand research to understand and manage this willingness-to-share data is limited (Jernigan et al. 2016).

Accordingly, the Research-in-Progress Paper at hand explores the willingness-to-share data of digitized products in B2B manufacturing industries. Thereby, the following research question is addressed: *[RQ] What are the relevant factors that influence the willingness-to-share data?* To proceed with this leading question, this paper develops an empirical research approach (Yin 2003) based on literature review (Webster & Watson 2002, vom Brocke et al. 2009). In particular, an exploratory case study research design (Yin 2003) in the Swiss B2B manufacturing industries is carved out.

The overall structure of this paper takes the form of four sections: Section 2 continues by outlining the background in terms of digitized products and willingness-to-share data. Section 3 develops a research methodology with an overview, case description, acquisition and analysis of research data. Section 4 finally serves as conclusion pointing towards preliminary findings, contributions to research and practice, limitations as well as an outlook.

2 Literature Review

Digitized products. Throughout publications, various concepts related to digitized products can be found. These novel characteristics are described as intelligent (Terzi et al. 2010), smart, connected (Porter & Heppelmann 2014), or digitized (Herterich et al. 2016a). We aim to build on and contribute to the IS domain, hence we consistently use the herein dominant concept digitized product (Novales et al. 2016). In this sense, digitized products are artifacts “containing sensing, memory, data processing, reasoning, and communication capabilities” (Yoo et al. 2010, p.725). Congruent to traditional physical products, their digitized versions comprise a lifecycle where they are developed and produced, used and maintained, and – for example – recycled (Terzi et al. 2010).

In their seminal article, Porter and Heppelmann (2014) describe the evolution towards these digitized products in five steps: Step 1 represents the pure physical product, for example a tractor. In step 2 this product becomes smart – equipped with embedded systems – and in step 3 connectivity is added to create a smart connected product. By integrating adjacent products (such as planters or tillers) a farm equipment system with the possibility for overarching management emerges in step 4. In step 5, complementing this farm equipment system with further systems (e.g., seed optimization system), a farm management system – or more generally a system-of-systems – emerges (Porter & Heppelmann 2014). Particularly from an IS perspective, Herterich et al. (2016a, 2016b) describe the technology affordances and corresponding obstacles of digitized products in manufacturing industries.

Willingness-to-share data. As a matter of principle, the area of willingness-to-share data represents a highly interdisciplinary field involving domains such as management, law, and psychology (Hart & Saunders 1997). As socio-technical question, this field can be considered as emerging in the IS domain (Du et al. 2012). To work up the current knowledge, we reviewed literature following established guidelines (Webster & Watson 2002, vom Brocke et al. 2009).

In a wider sense, within the increasing diffusion of IT into organizations, data sharing has been studied in traditional functions of the value chain such as electronic data interchange (e.g., Hart & Saunders 1997) or supply chain management (e.g., Eurich et al. 2010). Recent research has also looked more

deeply into more modern IS fields such as social media (e.g., Lee et al. 2013, Morey et al. 2015). In a narrower sense, particularly for the context of digitized products, not many researchers are engaging these days (Jernigan et al. 2016). Whereas in the business-to-consumer (B2C) context such as smart watches or fitness wrists (Chen et al. 2016, Seifert et al. 2018) some initial scientific insights are available, the business-to-business (B2B) setting is scarcely studied (Jernigan et al. 2016). To condense the review, environmental uncertainty (e.g., customer, supplier), intra-organizational facilitators (e.g., top management support, IT enablers), and inter-organizational relationships (e.g., trust, shared vision) have been identified as relevant factors (Li & Lin 2006, Fawcett et al. 2007).

Based on this analysis, the following methodical research gap (Müller-Bloch & Kranz 2015) can be summarized: Less empirical data – in particular no valuable, context-rich qualitative research – from the mainly hidden corporate contexts is available (Jernigan et al. 2016).

3 Research Methodology

Overview. Our phenomenon targeted is the willingness-to-share data of digitized products in B2B manufacturing industries. Hence, case study research understood as “empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin 2003, p.13) can be regarded as sound research method. More precisely, to explore the factors influencing the willingness-to-share, an in-depth single-case study approach with multiple embedded units of analysis is applicable (Yin 2003). Thereby, the case is represented by a manufacturing company with its different customers operating different products as units of analysis.

Case description. B2BComp is a Swiss small to mid-sized enterprise developing, manufacturing, and maintaining heavy equipment for mining. Its product portfolio encompasses a range of heavy equipment from rather basic to high-end machinery which are mostly marketed abroad in B2B markets. With some customers also in Europe, main application fields are in Asia, Africa, and the United States. Driven by the competitive market environment as well as specific customer needs, the company is moving towards making their equipment digitized and offering additional product-related services such as predictive

maintenance. For these services different sensors need to be installed at the mining equipment and the customers have to consent to share this data basis. Thereby, the data can range from simple discrete data (e.g., periodic monitoring of operating hours) to complex real-time data (e.g., continuous logging from shock sensors).

Acquisition of research data. Upon the recommendation by Yin (2003), we aim for several sources of evidence to study the willingness-to-share factors. From a sampling perspective, a purposeful sampling strategy (Coyne 1997) is intended performing semi-structured interviews (Schultze & Avital 2011) and focus groups (Morgan 1988) at the interface between B2BComp and its different customers operating the different products. By the support of B2BComp unique access (Yin 2003) to internal experts as well as customer executives is given. For rich insights relevant departments such as management, marketing, R&D, IT, and legal are included. Interviews and workshops will be conducted until information saturation (Coyne 1997). More specifically, both data acquisition methods comprise the following steps: (1) Introduction of the project, (2) contextual questions referring to the participant and its organizational entity, (3) initial examination of current practices on willingness-to-share data, (4) detailed working out of relevant factors leveraging wh-questions, and (4) conclusion. For the sake of scientific rigor, we seek to records all events (Yin 2003).

Analysis of research data. For further processing, qualitative data will be brought to written form by transcription (interviews) and memos (focus groups) (Sinkovics et al. 2005). The research stream of grounded theory (Strauss & Corbin 1990, Strauss & Corbin 1997) has yielded a set of structured methods to aggregate data. Accordingly, the acquired data are analyzed in the steps open, axial, and selective coding (Strauss & Corbin 1990, Strauss & Corbin 1997). Operatively, the texts are loaded into the qualitative data analysis software “NVIVO” by QSR International annotating all passages addressing the willingness-to-share factors. Then, these codes are iteratively pooled and lastly re-organized around the emerging categories (Strauss & Corbin 1990, Strauss & Corbin 1997). Qualitative research is often confronted with reluctances (Yin 2013, Keutel et al. 2014). Thus, to ensure scientific quality, we apply case study guidelines like audio recording, multi-coder data analysis, and continuous sense making (Yin 2003, Yin 2013).

4 Preliminary Findings and Conclusion

Preliminary findings. This Research-in-Progress Paper aims to set the stage for exploring the willingness-to-share data of digitized products in B2B manufacturing industries. For this objective an exploratory case study research design in the Swiss B2B manufacturing industries was proposed. So far, initial interviews and focus groups (sales and product manager interview in February 2019, focus group with board of management in May 2018, interdisciplinary focus group in February 2019) were conducted and analyzed. Preliminary findings show that highly different aspects influence the willingness-to-share data of digitized products in B2B manufacturing industries. In detail, main drivers can be detected, complemented by a range of mediating factors. The drivers in turn can be distinguished into willingness-to-share factors that can be influenced (e.g., trust and established relationship, type and frequency of product data, and data security practices) and factors that cannot be affected (e.g., dominance in the market, degree of innovation, and data privacy regulations). Beyond, factors such as received benefits, the design of contracts, and implementation efforts act mediating.

Conclusion. For the scholarly community, the expected findings offer initial empirical evidence from a real-world case in the manufacturing industries as inquired by research (Jernigan et al. 2016). In the profound upheaval by digital product innovation (Shim et al. 2019), this research generates valuable insights referring to the foundations of data-driven innovations. For the industrial application, the results represent a base to understand and shape partnerships to realize efficiency increase as well as novel value-adding services. Upon the strategic character and long-term impact of decisions on digital product innovation in manufacturing industries, these insights are relevant to guide investments.

The authors are aware of the inherent limitations of this qualitative research approach. Case study research cannot generate representative insights (Yin 2003, Yin 2013), hence the expected findings are in some way bound to B2BComp, its products, and customers.

A future avenue of research could follow on the one hand a quantitative validation of the identified factors in further B2B manufacturing industries. On the other hand, more complex multi-tier relationships need to be addressed in the future as well.

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