LINKING IT ASSETS AND COMPETITIVE ADVANTAGE - IT CAPABILITIES OF SERVITIZED BUSINESS MODELS

CHRISTOPH BROSIG,[1] MARKUS WESTNER[1] &
SUSANNE STRAHRINGER[2]

[1] OTH Regensburg, Faculty of Computer Science and Mathematics, Regensburg, Germany; email: christoph.brosig@oth-regensburg.de, markus.westner@oth-regensburg.de
[2] TU Dresden, Chair of Business Informatics esp. Information Systems in Trade and Industry, Dresden, Germany; email: susanne.strahringer@tu-dresden.de

Abstract This paper connects research from business model innovation and information systems by exploring critical IT capabilities for servitized business models. The adoption of servitized business models is a major business model innovation strategy. At the same time, digitalization drives the evolution of IT capabilities at these business models. Scholars argue that it remains unclear how IT capabilities enable servitized business models to build a competitive advantage by achieving cost advantages or differentiation. This paper explores IT capabilities that enable building a competitive advantage for servitized business models based on a qualitative analysis of multiple published case studies. The authors identify configurations of IT capabilities among servitized business models. The findings contribute to servitization research by exploring IT capabilities and how they are combined among servitized business models. The insights help practitioners deploy digital technologies and IT assets effectively as building blocks of IT capabilities to advance their servitized business model.

Keywords: resource-based view, IT capability, digital servitization, competitive advantage

University of Maribor Press

DOI https://doi.org/10.18690/978-961-286-485-9.9
ISBN 978-961-286-485-9

1 Introduction

Since the 1980s, firms move from selling products to offering products as a service (Ulaga and Reinartz, 2011; Vandermerwe and Rada, 1988). Firms pursue this servitization of their business models to improve their competitive advantage (Kindström, 2010; Paschou et al., 2020).

Nowadays, digital technologies and information technology (IT) assets offer new levers to build a competitive advantage for servitized business models (Kohtamäki et al., 2019; Rapaccini and Gaiardelli, 2015). Multiple scholars have explored specific digital technologies and IT assets for digital servitization (Paschou et al., 2020). The resource-based view suggests that firms need to create IT capabilities to build a competitive advantage based on IT assets (Ross et al., 1996).

Despite the increasing number of publications on digital servitization, scholars claim that there is a limited understanding of which IT capabilities enable servitized business models to build a competitive advantage (Coreynen et al., 2017; Grubic and Jennions, 2018). Scholars ask for contributions on how IT capabilities enable different types of competitive advantage (Kohtamäki et al., 2019; Paschou et al., 2020).

We contribute to this discussion by a qualitative analysis of 17 published cases of servitized business models answering two research questions (RQ):

RQ1: Which IT capabilities enable servitized business models to build a competitive advantage?
RQ2: How do IT capabilities enable servitized business models to build a competitive advantage?

Our paper is structured along three main parts to address these two questions. First, we introduce digital servitization and the concept of IT capabilities (section 2). Section 3 describes our case selection and case analysis. Section 4 presents our findings on IT capabilities (RQ1) and configurations of how IT capabilities enable competitive advantages at servitized business models (RQ2). Finally, we discuss our findings and conclude our research.

This paper contributes to business model innovation and information systems (IS) research based on a qualitative analysis of multiple cases. Our paper contributes to the sparse research on IT capabilities of servitized business models and shows their role in building a competitive advantage.

2 Research Background

Servitization describes the transition of a business model from being product-centric to being service-centric (Vandermerwe and Rada, 1988). While product-centric business models focus on the sales of products, service-centric business models employ products to deliver outcomes as a service (Reim et al., 2015). Scholars suggest mapping business models along a continuum of product- to service-centric (Reim et al., 2015).

Digital technologies offer new levers to build a competitive advantage for a business model undergoing servitization (Kohtamäki et al., 2019). Scholars have introduced digital servitization to label the service transition of a business model enabled by digital technologies (Rapaccini and Gaiardelli, 2015).

For such a transition, it is critical to understand how digital technologies and IT assets enable a competitive advantage. The resource-based view offers an explanation based on the notion of assets and capabilities. Firms invest in assets and create capabilities to employ these assets to build a competitive advantage. The concept of capabilities links assets and competitive advantage (Grant, 1991).

An IT capability describes the ability to employ IT assets to support and enhance a firm's strategy or work processes to build a competitive advantage (Lu and Ramamurthy, 2011; Ross et al., 1996). This competitive advantage can be a cost advantage or differentiation (Porter, 1985). Scholars distinguish IT capabilities employing various IT assets. There are three types of IT assets: Tangible IT assets include, e.g., hardware, software, or data assets. Intangible IT assets refer to, e.g., IT management practices. Human IT assets are, e.g., specific IT skills (Ross et al., 1996).

Over the last years, scholars have introduced digital capabilities as types of IT capabilities (Côrte-Real et al., 2020; Krishnamoorthi and Mathew, 2018). Digital capabilities employ stacks of IT assets as digital technologies to support and enhance

a firm's strategy or work processes to build a competitive advantage (Brosig et al., 2020). In this study, we refer to the overarching concept of IT capabilities to cover the range of IT assets.

3 Research Methodology

In this section, we describe the data selection and data analysis of our case-based approach. We decided to analyze published case studies about servitized business models due to the early stage of this research stream (Yin, 2014).

First, we set up a case base. We searched seven literature databases and selected case studies in a two-step approach. Figure 1 summarizes the search parameters and the screening stages of contributions for our case base.

Search parameters	• **Search terms:** *(Servitization OR "Integrated Solution" OR "Service transition") AND "Case Study"* • **Search area:** Title, Abstract, Keywords • **Publication date:** (01st January) 2015- (20th March) 2020 • **Databases:** AISel, EBSCO Academic Search Complete, EBSCO Business Source Complete, ProQuest, ScienceDirect, Web of Science, Xplore		
Screening stages	Initial search results	Potential results	Results
Amount of results	460	135	15
	not discounted for duplicates	discounted for duplicates	

Figure 1: Overview of case study search and screening

We adopted our search terms from three extensive servitization literature reviews and chose the consistently used terms (Baines et al., 2017; Kowalkowski et al., 2017; Rabetino et al., 2018) searching in title, abstract, and keywords. We restricted our search to contributions from 2015 until 2020 (time of data collection), as most servitization literature associated with digitally-enabled service transition was published since then (Paschou et al., 2020). Before we screened the data, we chose three screening criteria, whether the contribution (1) is based on a case study (single- or multiple-case studies), (2) indicates competitive advantage of the case firm, and (3) provides information about the employment of IT assets in the case context linked to the competitive advantage. We obtained 17 cases from 15 contributions. Table 1 shows our case base, including reference, name of the case firm as stated in the original reference, industry, and the respective customer group.

Table 1: Overview of the case base

Case ID	Reference	Case name	Industry	Customer Group
[1]	Lim et al. (2015)	*undisclosed*	Car manufacturer	B2B/B2C
[2]	Beltagui (2018)	Eng. Co.	Power systems provider	B2B
[3]	Chen and Møller (2019)	*undisclosed*	Farming equipment provider	B2B
[4]	Niño et al. (2015)	*undisclosed*	Chemical equipment provider	B2B
[5]	Saarikko (2015)	DigitalCo	Telecommunication	B2B
[6]	Bressanelli et al. (2018)	Alpha	Household appliances provider	B2C
[7]	Robinson et al. (2016)	Laing O'Rourke	Construction provider	B2B
[8]	Sklyar et al. (2019)	Navicula	Maritime equipment provider	B2B
[9]	Reim et al. (2016)	Alpha	Construction machinery provider	B2B
[10]	Rapaccini et al. (2019)	Alfa	Building Equipment Provider	B2B
[11]	Dalenogare et al. (2019)	*undisclosed*	Building Equipment Provider	B2B
[12]	Weeks and Benade (2015)	*undisclosed*	Building Equipment Provider	B2B
[13]	Clegg et al. (2017)	Coen	Construction	B2B
[14]	Coreynen et al. (2017)	Beta	Electronic Switchboards Provider	B2B
[15]	Rymaszewska et al. (2017)	Company A	Manufacturing Machinery Provider	B2B
[16]	Rymaszewska et al. (2017)	Company B	Power Generators Provider	B2B
[17]	Rymaszewska et al. (2017)	Company C	Power Transformers Provider	B2B

We followed the resource-based view for our analysis: first, we coded IT assets among the cases with an open coding approach (Corbin and Strauss, 2015). Second, we analyzed how case firms employ these IT assets to build a competitive advantage, individually or as stacks. As a result, we linked IT assets and competitive advantage by IT capabilities (RQ1). Next, we analyzed configurations of IT capabilities to understand how IT capabilities enable servitized business models to build a competitive advantage (RQ2).

4 Results

In this section, we present three IT capabilities of servitized business models and configurations of how these IT capabilities enable a competitive advantage. For each IT capability, we introduce three examples from our cases. An overview of all examples across our cases can be obtained from the authors.

4.1 IT Capability to Connect the Value Chain

The first IT capability employs IT assets to connect the value chain to achieve cost advantages. Table 2 shows three examples based on our cases.

Table 2: Selected cases with IT capability to connect the value chain

Case ID	Observed IT Assets	Employment of IT Assets to Generate Competitive Advantage	Competitive Advantage
2	• Engine usage data *(tangible IT asset)* • Virtual engine testing models *(tangible IT asset)*	• Connect value chain (from maintenance delivery to product development) to reduce the efforts to resolve technical malfunctions by virtual engine simulation with engine usage data	Cost advantage
10	• Cloud-based management accounting system accessible to service network partners *(tangible IT asset)*	• Connect value chain (accounting) among service partners to uncover costs across the service network and eliminate them	
13	• Inventory management system externally accessible to suppliers *(tangible IT asset)*	• Connect value chain (inventory management) with suppliers to ensure availability of materials to avoid project delays at additional costs	
Cases showing same IT capability [Case IDs]: [2, 6, 7, 9, 10, 11, 12, 13]			

Case firms use primarily tangible IT assets, e.g., software systems, to distribute information internally along their value chain, e.g., from maintenance operations to product development or from maintenance operations to spare parts handling. Some case firms offer integration points to external stakeholders, like suppliers or service partners, to connect to their value chains. This connection enables efficient orchestration of processes, e.g., product development or maintenance delivery, and (human) resources, e.g., available maintenance technicians or spare parts. Case firms achieve cost advantages as a competitive advantage from this IT capability.

4.2 IT Capability to Connect Products

The second IT capability employs IT assets to connect products to differentiate by value-adding services. Case firms introduce tangible IT assets, e.g., product-integrated sensors, data transmission devices, or software systems to access connected products remotely. Table 3 shows three examples from our cases.

Table 3: Selected cases with IT capability to connect products

Case ID	Observed IT Assets	Employment of IT Assets to Generate Competitive Advantage	Competitive Advantage
3	• Software farm management system to connect to farm components *(tangible IT asset)* • Software developers, user interface experts, and user experience experts to build software system *(human IT asset)*	• Connect products (farm components to farm management software) to enable digital farm monitoring as an additional service	Differentiation by value-adding services
8	• Customer portal to manage condition data of maritime vessels and to access 3rd party maritime software *(tangible IT asset)* • Vessel condition data *(tangible IT asset)* • 3rd party maritime software *(tangible IT asset)*	• Connect products to enable monitoring of condition data for onshore operations of maritime vessels and to offer 3rd party software access as services	
17	• Logging device for power transformer data with internet connection *(tangible IT asset)* • Usage and operational fault data of power transformers *(tangible IT asset)*	• Connect products to enable access to power transformer operations metrics to offer use-based advisory to prolong life-cycle	
Cases showing same IT capability [Case IDs]: [1, 2, 3, 4, 5, 6, 7, 8, 9, 14, 15, 16, 17]			

Some cases explicitly mention the employment of human IT assets for this IT capability, e.g., IT skills to integrate sensors into products or skills to develop and deploy code for respective software systems. These IT assets make products connected to offer value-adding services, e.g., remote monitoring, remote maintenance, or use-based advisory. Case firms offer these value-adding services to differentiate as a competitive advantage.

4.3 IT Capability to Interconnect Value Chain and Products

The third IT capability employs IT assets to interconnect a value chain and products. This interconnection enables differentiation by performance-based contracts. This IT capability is the ability to employ integration points - between value chain and products - as IT assets to build a competitive advantage. Table 4 offers an outline of three examples from our cases.

Table 4: Selected cases with IT capability to interconnect value chain and products

Case ID	Observed IT Assets	Employment of IT Assets to Generate Competitive Advantage	Competitive Advantage
6	• IoT device in washing machines to extract and send data to the provider *(tangible IT asset)* • Washing machine usage data *(tangible IT asset)* • Data analytics tools to detect careless usage of product *(tangible IT asset)*	• Interconnect connected products (usage data) with the value chain (contract monitoring) to operate performance-based contracts	Differentiation by performance-based contracts
9	• IoT device in building equipment to extract and send data to the provider *(tangible IT asset)* • Building equipment condition data *(tangible IT asset)* • Software systems on availability of maintenance services and spare parts *(tangible IT asset)*	• Integration of connected products (condition data indicating maintenance needs) with the value chain (service systems and inventory data) to schedule maintenance delivery for performance-based contracts	
15	• IoT device in machine to extract sensor data and send to the provider *(tangible IT asset)* • Machine usage and performance data *(tangible IT asset)* • Cloud-based platform to access machine data for service organization *(tangible IT asset)*	• Interconnect connected products (usage/performance data) with the value chain (service organization) for remote support in performance-based contracts	
Cases showing same IT capability *[Case IDs]*: *[2, 6, 7, 9, 10, 11, 12, 13]*			

Case firms link product data to value chain information. Several firms connect their products to monitor product condition and usage data, as covered in section 4.2. In distinction, this IT capability focuses on the link of such product data to the providers' value chains, e.g., to anticipate product failure. Firms displaying this IT capability distribute the product data as information along the value chain, e.g., to activate maintenance provision. Interconnecting product data with value chain

information is critical to achieving agreed performance levels of products as a service.

4.4 Configurations of IT Capabilities Among Servitized Business Models

We analyzed how the three IT capabilities are distributed in our case firms and found case evidence for four out of eight possible combinations. We refer to each combination as a configuration where each of the IT capabilities is present or absent. Figure 2 shows an overview of these configurations and associated cases.

Configurations of IT Capabilities	Presence of IT Capabilities… (marked as ✓)			Observation of Configurations	
	to Connect the Value Chain	to Connect Products	to Interconnect Value Chain and Products	Number of Cases	Observed in Cases *[ID]*
A				0	
B	✓			4	*[10, 11, 12, 13]*
C		✓		7	*[1, 3, 4, 5, 8, 14, 17]*
D	✓	✓		0	
E			✓	0	
F	✓		✓	0	
G		✓	✓	2	*[15, 16]*
H	✓	✓	✓	4	*[2, 6, 7, 9]*

Figure 2: Overview of configurations of IT capabilities among servitized business models

We found case evidence for configurations B, C, G, and H, but not for A, D, E, and F. The case evidence supports how configurations of IT capabilities enable servitized business models to build competitive advantage.

The IT capability to connect products could be a sufficient IT capability for firms to build a competitive advantage, as shown in the configurations C, G, and H. Still, due to the lack of evidence for configuration D, this cannot be confirmed.

The IT capability to connect the value chain is present both individually (configuration B) or in combination with other IT capabilities (configuration H). In contrast, the IT capability to interconnect value chain and products is only present in combination with other IT capabilities (configurations G, H), in particular with the IT capability to connect products.

5 Discussion

In this section, we discuss our findings in comparison to existing literature. Our study makes two contributions: we identify IT capabilities for servitized business models (RQ1), and we find configurations of IT capabilities that enable servitized business models to build a competitive advantage (RQ2).

We find three IT capabilities among servitized business models that employ IT assets, (1) the IT capability to connect the value chain to achieve cost advantages, (2) the IT capability to connect products to achieve differentiation, (3) the IT capability to interconnect the value chain and products to achieve differentiation. Our study confirms the importance of IT capabilities in linking IT assets with competitive advantage: case firms employ different IT assets to build a similar competitive advantage. Some case firms employ similar stacks of IT assets to build different competitive advantages. IT capabilities help to understand these equifinal ways how IT assets contribute to building a competitive advantage.

We show configurations of IT capabilities among our case firms. Configuration B includes case firms focusing on the IT capability to connect the value chain to streamline processes and resources. This configuration is similar to the nature of capabilities of product-oriented business models striving for efficient processes (Kohtamäki et al., 2019; Reim et al., 2015; Ulaga and Reinartz, 2011). Configuration C is based on the presence of the IT capability to connect products. Case firms with configuration C offer their services to support the use of the product: services integrate with the product in use. Case firms with configuration C are similar to use-based solution providers with services as an integral part of their offering to maximize product efficiency for the customer (Kohtamäki et al., 2019; Ulaga and Reinartz, 2011). Configurations G and H include configurations of IT capabilities with the IT capability to interconnect value chain and products. Case firms with these configurations differentiate at least by offering product performance as a service. Literature labels similar business models as result-oriented or outcome providers (Kohtamäki et al., 2019; Reim et al., 2015).

We do not observe configurations A, D, E, and F in our cases. Configuration A is not to be found due to our initial case selection. It would not have contributed to clarifying the IT capabilities of servitized business models. The lack of case evidence for configurations E and F could indicate that the IT capability to interconnect value chain and products is dependent on the IT capability to connect products. Thus, it could be that configurations E and F are theoretically not possible. In contrast to configurations A, E, and F, configuration D could be available among cases beyond our case base.

Based on our insights on configurations of IT capabilities, we derive the assumption that specific configurations of IT capabilities support specific types of servitized business models along the continuum from product- to service-centric.

6 Conclusion

Our paper helps answer the call for interdisciplinary research at the frontier of business model innovation and IS research (Kohtamäki et al., 2019; Paschou et al., 2020). Section 4 provides an overview of three IT capabilities at servitized business models, (1) the IT capability to connect the value chain, (2) the IT capability to connect products, and (3) the IT capability to interconnect value chain and products (RQ1). We find five configurations of how IT capabilities enable building competitive advantage from rather product- to service-centric servitized business models (RQ2).

Practitioners profit from our synthesis of business model innovation and IS research by obtaining transparency about IT capabilities for servitized business models (Baines et al., 2017). Our configurations of IT capabilities offer starting points to invest in assets that may be used to build a competitive advantage. From our case evidence, practitioners also learn that individual IT assets per se do not build a competitive advantage for servitized business models (cf. (Wiener et al., 2020)).

Our study is not free from limitations: first, to ensure external validity, we collected cases from multiple research fields. Most cases cover the B2B area, consistent with previous servitization research (Paschou et al., 2020). Therefore, our findings may not be generalizable to the B2C area. Second, we sampled cases from fields where IT capabilities are not the primary research contribution. In some cases, the selected

cases may not exhaustively cover all IT capabilities of a servitized business model. We decided to mitigate this risk by sampling a broad set of cases to cover contributions from multiple perspectives.

For future research, we propose further analyses of IT capabilities for servitized business models. Researchers should continue to analyze how IT capabilities differ among different types of servitized business models along the continuum from product- to service-centric. Researchers could use our hypothesis as a starting assumption. For their analyses, they could apply a configurational approach as IT capabilities of servitized business models appear to create equifinal links between IT assets and competitive advantage.

References

Baines, T., Bigdeli, A. Z., Bustinza, O. F., Shi, V. G., Baldwin, J. S., & Ridgway, K. (2017). Servitization: Revisiting the State-of-the-Art and Research Priorities. International Journal of Operations & Production Management, 37 (2), 256-278.

Beltagui, A. (2018). A Design-Thinking Perspective on Capability Development. International Journal of Operations & Production Management, 38 (4), 1041-1060.

Bressanelli, G., Adrodegari, F., Perona, M., & Saccani, N. (2018). Exploring How Usage-Focused Business Models Enable Circular Economy Through Digital Technologies. Sustainability, 10 (3), 639.

Brosig, C., Westner, M., & Strahringer, S. (2020). Revisiting the Concept of IT Capabilities in the Era of Digitalization. Proceedings of the 22nd International Conference on Business Informatics, Antwerp.

Chen, K.-L., & Møller, C. (2019). A Thousand-Mile Journey Begins With the Very First Step: The Case of a Product-Centric Manufacturing Firm's Transformation Towards Servitization. CIRP Journal of Manufacturing Science and Technology, 27, 102-113.

Clegg, B., Little, P., Govette, S., & Logue, J. (2017). Transformation of a Small-to-Medium-Sized Enterprise to a Multi-Organisation Product-Service Solution Provider. International Journal of Production Economics, 192, 81-91.

Corbin, J., & Strauss, A. (2015). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory (Vol. 4). Thousand Oaks: Sage Publications.

Coreynen, W., Matthyssens, P., & Van Bockhaven, W. (2017). Boosting Servitization Through Digitization: Pathways and Dynamic Resource Configurations for Manufacturers. Industrial Marketing Management, 60, 42-53.

Côrte-Real, N., Ruivo, P., & Oliveira, T. (2020). Leveraging Internet of Things and Big Data Analytics Initiatives in European and American Firms: Is Data Quality a Way to Extract Business Value? Information & Management, 57 (1), 103141.

Dalenogare, L. S., Baseggio, M. M., Ayala, N. F., Le Dain, M.-A., & Frank, A. G. (2019). The Contribution of Smart Glasses for PSS. Procedia CIRP, 83, 318-323.

Grant, R. M. (1991). The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation. California Management Review, 33 (3), 114-135.

Grubic, T., & Jennions, I. (2018). Remote Monitoring Technology and Servitised Strategies – Factors Characterising the Organisational Application. International Journal of Production Research, 56 (6), 2133-2149.

Kindström, D. (2010). Towards a Service-Based Business Model – Key Aspects for Future Competitive Advantage. European Management Journal, 28 (6), 479-490.

Kohtamäki, M., Parida, V., Oghazi, P., Gebauer, H., & Baines, T. (2019). Digital Servitization Business Models in Ecosystems: A Theory of the Firm. Journal of Business Research, 104, 380-392.

Kowalkowski, C., Gebauer, H., & Oliva, R. (2017). Service Growth in Product Firms: Past, Present, and Future. Industrial Marketing Management, 60, 82-88.

Krishnamoorthi, S., & Mathew, S. K. (2018). Business Analytics and Business Value: A Comparative Case Study. Information & Management, 55 (5), 643-666.

Lim, C.-H., Kim, M.-J., Heo, J.-Y., & Kim, K.-J. (2015). A Conceptual Framework for Designing Informatics-based Services in Manufacturing Industries. Procedia CIRP, 30, 72-77.

Lu, Y., & Ramamurthy, K. (2011). Understanding the Link Between Information Technology Capability and Organizational Agility: An Empirical Examination. MIS Quarterly, 35 (4), 931-954.

Niño, M., Blanco, J. M., & Illarramendi, A. (2015). Business Understanding, Challenges and Issues of Big Data Analytics for the Servitization of a Capital Equipment Manufacturer. Proceedings of the International Conference on Big Data, Santa Clara.

Paschou, T., Rapaccini, M., Adrodegari, F., & Saccani, N. (2020). Digital Servitization in Manufacturing: A Systematic Literature Review and Research Agenda. Industrial Marketing Management, 89, 278-292.

Porter, M. E. (1985). The Competitive Advantage: Creating and Sustaining Superior Performance. New York: The Free Press.

Rabetino, R., Harmsen, W., Kohtamäki, M., & Sihvonen, J. (2018). Structuring Servitization-Related Research. International Journal of Operations & Production Management, 38 (2), 350-371.

Rapaccini, M., & Gaiardelli, P. (2015). Smart Services Initiatives in Product-Centric Companies. Proceedings of the 4th Spring Servitization Conference, Aston.

Rapaccini, M., Mauro, S. G., Cinquini, L., & Tenucci, A. (2019). Servitization of SMEs through Strategic Alliances: a Case Study. Procedia CIRP, 83, 176-181.

Reim, W., Parida, V., & Örtqvist, D. (2015). Product–Service Systems (PSS) Business Models and Tactics – A Systematic Literature Review. Journal of Cleaner Production, 97, 61-75.

Reim, W., Parida, V., & Sjödin, D. R. (2016). Risk Management for Product-Service System Operation. International Journal of Operations & Production Management, 36 (6), 665-686.

Robinson, W., Chan, P., & Lau, T. (2016). Finding New Ways of Creating Value A Case Study of Servitization in Construction. Research-Technology Management, 59 (3), 37-49.

Ross, J. W., Beath, C. M., & Goodhue, D. L. (1996). Develop Long-Term Competitiveness through IT Assets. Sloan Management Review, 38 (1), 31-42.

Rymaszewska, A., Helo, P., & Gunasekaran, A. (2017). IoT Powered Servitization of Manufacturing – An Exploratory Case Study. International Journal of Production Economics, 192, 92-105.

Saarikko, T. (2015). Digital Platform Development: A Service-Oriented Perspective. Proceedings of the 23rd European Conference on Information Systems, Münster.

Sklyar, A., Kowalkowski, C., Sörhammar, D., & Tronvoll, B. (2019). Resource Integration Through Digitalisation: A Service Ecosystem Perspective. Journal of Marketing Management, 35 (11-12), 974-991.

Ulaga, W., & Reinartz, W. J. (2011). Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully. Journal of Marketing, 75 (6), 5-23.

Vandermerwe, S., & Rada, J. (1988). Servitization of Business: Adding Value by Adding Services. European Management Journal, 6 (4), 314-324.

Weeks, R., & Benade, S. (2015). The Development of a Generic Servitization Systems Framework. Technology in Society, 43, 97-104.

Wiener, M., Saunders, C., & Marabelli, M. (2020). Big-Data Business Models: A Critical Literature Review and Multiperspective Research Framework. Journal of Information Technology, 35 (1), 66-91.

Yin, R. K. (2014). Case Study Research: Design and Methods (5th ed. Vol. 5). Thousand Oaks: Sage Publications.