

## THE ROLE OF SERVITIZATION IN BUILDING ORGANISATIONAL RESILIENCE: A META-SYNTHESIS OF CASE STUDIES

Mirosław MATUSEK

Silesian University of Technology, Department of Logistics; miroslaw.matusek@polsl.pl,  
ORCID: 0000-0002-6681-8265

**Purpose:** This paper aims to investigate the role of servitization in enhancing organisational resilience. By synthesising case studies from various industries, the paper aims to identify the key dimensions of resilience that servitization supports and understand how these dimensions influence an organisation's ability to adapt, remain flexible, and manage risks in dynamic market conditions.

**Design/methodology/approach:** The paper utilises a meta-synthesis of qualitative case studies as the primary research method. Five case studies were selected from different sectors where servitization strategies have been implemented. The synthesis process involved coding and analyzing the data to identify common patterns and relationships between servitization models and resilience dimensions. The paper integrates theoretical frameworks on organizational resilience and servitization, focusing on adaptability, flexibility, risk management, and collaboration.

**Findings:** The study found that servitization enhances vital dimensions of organisational resilience, including adaptability, flexibility, modularity, and complexity management. Digitalisation and inter-organisational collaboration were also highlighted as crucial factors that support resilience. The analysis shows that while servitization provides a pathway for increased resilience, it introduces complexity that requires careful management through modular approaches.

**Research limitations/implications:** The research focuses on case studies within specific sectors, which may limit the generalizability of the findings to other industries. Future research could explore the impact of servitization on resilience in a broader range of contexts and industries. Additionally, the study emphasizes the need for further exploration of how different servitization models affect various resilience dimensions.

**Practical implications:** The findings provide valuable insights for managers and organisations considering or implementing servitization strategies. By adopting servitized business models, companies can enhance their operational flexibility, manage complexity more effectively, and build long-term resilience. Modular designs allow organisations to manage this complexity, adapting quickly to changing conditions without increasing operational risks.

**Social implications:** Through its focus on long-term customer relationships and sustainable practices, servitization can positively influence corporate social responsibility by promoting more efficient resource use and innovation.

**Originality/value:** This paper comprehensively synthesises the relationship between servitization and organisational resilience, highlighting the complexity and adaptability servitization brings to organisations. The value lies in its holistic approach, addressing managers, academics, and policymakers interested in resilience-building strategies in the face of increasing market uncertainties.

**Keywords:** servitization, organisational resilience, complexity, modularity, flexibility, meta-synthesis.

**Category of the paper:** Research paper, Case study.

## 1. Introduction

Modern organisations operate in an environment full of disruptions and challenges resulting from global crises such as the COVID-19 pandemic, climate change, supply chain disruptions, and digital transformation. In the face of these challenges, building organisational resilience, which enables companies to survive and thrive in unpredictable conditions, becomes a critical management element. Organisational resilience, the ability to anticipate, adapt, and recover from disruptions, is becoming a priority in management strategies (Lengnick-Hall et al., 2011; Burnard, Bhamra, 2019). Companies must be prepared not only to respond to crises but also to adapt to long-term changes in market conditions.

In the context of increasing market complexity and dynamics, servitization—the shift from a product sales model to offering integrated product-service solutions—is gaining importance. (Kamal et al., 2020) This transformation increases companies' competitiveness and enhances their ability to cope with disruptions, which can contribute to the growth of organisational resilience. As Rabetino et al. (2017) point out, servitization can positively influence operational flexibility and intra-organizational collaboration. The primary research problem addressed in this article is understanding which dimensions of organisational resilience are supported by servitization and how they influence an organisation's ability to cope with disruptions in dynamically changing market conditions. Although previous studies suggest that servitization may enhance organisational resilience (Rabetino et al., 2017; Reim et al., 2019), further research is needed to identify specific dimensions of this resilience (Li et al., 2022).

The article aims to identify the key dimensions of organisational resilience in the context of different product-service offering models within servitization. The study analyses how these dimensions influence an organisation's ability to adapt, remain flexible, and manage risk and complexity in dynamic market conditions. This approach will help fill the research gap and better understand how servitization can support companies in building organisational resilience, which is particularly important in an unstable business environment.

A meta-synthesis of qualitative case studies was used to achieve the research objective. Five case studies were selected, involving companies from different sectors implementing servitization strategies.

The article is divided into several sections. The theoretical part provides a literature review on the concepts of organisational resilience and servitization. Then, the research methodology is described, including the criteria for selecting case studies and the data analysis procedures. The following section presents the research results, highlighting the relationships between servitization and resilience dimensions. The final section discusses the findings in the context of existing literature and proposes practical implications for companies seeking to enhance their organisational resilience through servitization. The conclusion summarises the study's contributions and outlines directions for future research.

## **2. Theoretical framework**

### **2.1. Dimensions of organisational resilience**

Organizational resilience has become a crucial concept in management, particularly in the face of escalating threats such as natural disasters, financial crises, cyberattacks, and pandemics. It is also closely tied to the ongoing process of digital transformation, which has further underscored the need for adaptability and preparedness in the modern business landscape. This concept refers to an organisation's ability to anticipate, respond to, recover, and learn from adversity (Hepfer, Lawrence, 2022). The literature emphasises that organisational resilience is a multifaceted phenomenon, encompassing various dimensions with distinct foundations and outcomes (Lengnick-Hall et al., 2011; Hosseini et al., 2015; Hepfer, Lawrence, 2022). Adaptability, operational flexibility, risk management, and collaboration determine an organisation's ability to survive and thrive in disruptions.

Adaptability refers to an organisation's ability to dynamically adjust its resources, structures, and strategies in response to changing internal and external conditions. As Karadzic et al. (2012) point out, organisations that can learn from crisis experiences develop their ability to respond more effectively to future threats. On the other hand, operational flexibility is defined as the ability to modify processes and reallocate resources, allowing companies to quickly adapt to operational disruptions (Lengnick-Hall et al., 2011). This flexibility enables organisations to minimise the impact of short-term shocks and maintain operational continuity. Risk management is another dimension of organisational resilience, which involves identifying, assessing, and responding to threats. Resilient organisations actively anticipate risks and implement contingency plans to minimise negative consequences (Chopra, Sodhi, 2014). Effective risk management allows companies to be better prepared for disruptions and recover quickly after a crisis. Internal and external collaboration plays a key role in building organisational resilience. Companies that effectively collaborate within their teams and with external partners are better prepared for disruptions and can efficiently leverage resources available within the collaboration network (Lengnick-Hall et al., 2011).

Understanding and developing these key dimensions of organisational resilience benefits organisations. Companies that are better at anticipating and responding to threats minimise losses and leverage disruptions as opportunities for innovation and growth (Hepfer, Lawrence, 2022). Organisational resilience enables firms to survive and learn from difficult experiences, making them stronger and better prepared for future crises (Essuman et al., 2020). Moreover, organisational resilience provides a competitive advantage, particularly in industries where the costs of disruptions are high, and the ability to maintain operational stability is crucial (DesJardine et al., 2019). Organisations that can strategically adapt to changing market conditions can sustain long-term growth and profitability, even in the face of external shocks (Dewald, Bowen, 2010).

However, achieving organisational resilience comes with challenges. Coordinating different organizational functions and shifting the organizational culture towards greater adaptability and proactive risk management requires commitment and investment (Settembre-Blundo et al., 2021). Additionally, the dynamic and complex business environment demands continuous monitoring of the surroundings and rapid adjustment of operational strategies. (Teece, 2007)

In light of these challenges, it becomes crucial to seek strategies that support the development of various dimensions of organisational resilience. Servitization, through the integration of products and services, can play a significant role in building resilience, particularly in areas such as operational flexibility, modularity, and risk management (Rabetino et al., 2017). The following sections will discuss the role of servitization as a tool supporting organisational resilience.

## **2.2. Servitization and organisational resilience**

Servitization is gaining importance as a strategy for enhancing organisational resilience, particularly in dynamic and uncertain market conditions and during crises such as the COVID-19 pandemic (Li et al., 2022; Bettiol et al., 2023). Servitization integrates product and service offerings to increase customer value by providing more comprehensive solutions (Dwyer, 2008). Companies increasingly recognise that services can generate greater profits than selling products alone, enabling differentiation of offerings and strengthening customer relationships (Vandermerwe, Sánchez-Rada, 1988; Ulaga, Reinartz, 2011). This process combines products, services, self-service, and knowledge, creating holistic solutions tailored to customers' evolving needs. As a result of this approach, businesses focus on providing services, while products become a platform for creating value.

Servitization offers a range of benefits, such as increased revenue, improved profitability, strengthened customer relationships, and enhanced operational efficiency (Rabetino et al., 2017; Reim et al., 2019). However, its implementation comes with numerous challenges, including the need to change organisational culture, develop new competencies, and integrate

products and services into a cohesive offering, which can lead to operational complications (Rabetino et al., 2017; Raddats et al., 2019).

Despite growing interest, research on the impact of servitization on organisational resilience is still in its early stages, and the results suggest that its effects can be both positive and negative, depending on the context. For example, companies with service-based business models demonstrated excellent operational stability in challenging conditions, suggesting that servitization can be a significant stabilizing factor (Zhang, Qi, 2021). On the other hand, other studies indicate the risk of reduced resilience when companies cannot adapt to changing conditions (Nicoletti, Appolloni 2023). The variety of servitization strategies makes their impact on organisational resilience more complex than initially assumed, which calls for further research.

Servitization in the literature is often associated with dimensions such as adaptability, flexibility, complexity management, and risk management, which are key to building organisational resilience. Companies that implement service-based models must quickly adapt to new market conditions and change their organisational culture and approach to resource management (Paiola, 2018; Rapaccini et al., 2023). Despite many benefits, servitisation can increase management complexity, which poses an operational risk if not properly managed (Grubic, 2018).

These diverse outcomes demonstrate the phenomenon's complexity and highlight the need to explore how specific servitization models impact key dimensions of organisational resilience. Rabetino et al. (2017) noted that quickly adapting to market changes and managing complexity and risk is key to company survival in today's unstable business environment. Servitization, as a tool to increase flexibility and innovation, requires further research to understand how different product-service offering models can support organizations in achieving these goals.

Therefore, this article aims to identify the key dimensions of organizational resilience in servitization. In this way, it will deepen the understanding of the role of servitization in building organizational resilience, addressing the urgent research needs highlighted by authors such as Huikkola and Kohtamäki (2018) and Rabetino et al. (2017).

It should be noted that these studies are primarily qualitative, with case studies of companies from various industries and with different product-service offering models dominating. They already provide valuable insights into servitization models and their impact on organisational resilience but in a fragmented way. A meta-synthesis of existing research results can offer valuable insights into how servitization influences organisational resilience.

### 3. Research Methodology

#### 3.1. Meta-synthesis of qualitative case studies method

Meta-synthesis of qualitative case studies is a research method aimed at integrating and analysing results from several independent case studies to create new theories or develop existing ones (Hoon, 2013). It is crucial in organisational and management research, where case studies are available that already provide knowledge in a given research area but often remain isolated and unconnected. This method combines different perspectives and identifies key relationships that may be overlooked in individual case studies.

The selected method focuses on interpretation rather than aggregation of statistical data, as with traditional quantitative meta-analysis. The key is to identify patterns, relationships, and the significance of results across various case studies while considering the context in which each study is situated.

Methodological rigour is essential in meta-synthesis, as in other research methods. Applying explicit inclusion and exclusion criteria and transparent data coding and analysis methods is crucial to ensure reliable and consistent results. This study follows Hoon's (2013) eight-step process for meta-synthesis. This process includes (1) formulating the research problem, which allows for the precise definition of research questions and inclusion or exclusion criteria for the cases analysed; (2) identifying and collecting relevant case studies related to the research problem; (3) establishing explicit inclusion and exclusion criteria to determine which studies will be included in the analysis; (4) extracting and coding data from the selected studies to create a foundation for analysis; (5) analysing individual cases to identify key variables, patterns, and relationships; (6) synthesising at the overall level, where data from all analysed studies are combined to create a general picture; (7) building theory based on the data synthesis, which may lead to the extension, modification, or creation of new approaches to the topic under study; and (8) discussing the meta-analysis results, including an evaluation of their significance and limitations.

#### 3.2. Research Process

##### 3.2.1. *Formulating the Research Problem – Step 1*

The first step involved precisely defining the research problem and research questions. The key aim of the study was to understand how servitization can support organisational resilience in the context of dynamic market conditions and external disruptions. Specifically, the research question was formulated: What dimensions of organisational resilience can be identified in different product-service offerings?

Formulating the research problem was crucial, as it allowed for establishing the selection criteria for appropriate case studies and determining what data would be needed for the analysis.

### 3.2.2. Identifying and collecting relevant case studies – Step 2

In the second step, a systematic search for relevant studies was conducted in the Web of Science (WoS) database. This database was chosen due to its broad coverage and reputation among academic databases (Chadegani et al., 2013). Keywords such as "servitization", "case study", "resilience", "adaptability", "flexibility", "innovation", "digitalisation", and "collaboration" were used in the search. Multiple iterative queries were conducted, alternating the main keywords. The search results are presented in Table 1. The table was limited to only those queries where the number of articles was greater than zero. Based on the database search, 192 articles initially matched the specified criteria. Considering each article's title, abstract, and keywords, they were critically analysed before downloading files to verify whether they truly fit the scope of the study. As a result, the number of articles was reduced to 37.

**Table 1**  
*Strings used and number of documents identified*

No.	Strings used	Number of selected studies
1	(servitiz*) AND ("case study") AND (resilien*)	5
2	(servitiz*) AND ("case study") AND (adapt*)	17
3	(servitiz*) AND ("case study") AND (flexibilit*)	4
4	(servitiz*) AND ("case study") AND (innov*)	157
5	(servitiz*) AND ("case study") AND (risk*)	23
6	(servitiz*) AND ("case study") AND (complexit*)	30
7	(servitiz*) AND ("case study") AND (knowledg* OR learn*)	77
8	(servitiz*) AND ("case study") AND (learn*)	12
9	(servitiz*) AND ("case study") AND (adapt* AND innov*)	10
10	(servitiz*) AND ("case study") AND (adapt* AND complexit*)	3
11	(servitiz*) AND ("case study") AND (flexibilit* AND innov*)	1
12	(servitiz*) AND ("case study") AND (flexibilit* AND complexit*)	1

Note. The table was restricted to only those queries for which the number of articles was greater than zero.

Source: Author's study.

### 3.2.3. Establishing inclusion and exclusion criteria – Step 3

The 37 selected articles were evaluated based on the established inclusion criteria in the third step. To do this, the articles were read in full and assessed according to the quality of their discussion concerning the following inclusion criteria: 1. Are the case studies described indicative of the service offerings of the entity under study? 2. Whether references to previously identified dimensions of organisational resilience can be found in sections such as the case description, discussion, and/or conclusions; 3. Whether the study used in-depth case studies, aiming to exclude studies that used large samples of case studies (n = 10 or more). In studies with larger samples, authors rely on a few data sources for each case, which does not characterise such research as in-depth case studies. This step narrowed the results to 5 empirical articles, while the remaining 32 were excluded (detailed information on the selected case studies can be found in Table 2).

**Table 2.**  
*Details of the studies selected for analysis*

Case reference name	Authors	Title of publication	Published by	Number of enterprises
Case 1	Turunen, T., Eloranta, V., Hakanen, E. (2018)	Contemporary perspectives on the strategic role of information in internet of things-driven industrial services	Journal of Business & Industrial Marketing	5
Case 2	Durugbo, C., Erkoyuncu, J.A. (2016)	Mitigating uncertainty for industrial service operations: a multi case study	International Journal of Operations & Production Management	3
Case 3	Fangxu Yan, Shiyuan Yin, Lujie Chen, Fu Jia (2022)	Complexity in a platform-based servitization: a complex adaptability theory perspective	International Journal of Logistics Research and Applications	3
Case 4	Momeni, B., Rapaccini, M., Martinsuo, M. (2024)	Manufacturers managing complexity during the digital servitization journey	Journal of Manufacturing Technology Management	2
Case 5	Rapaccini, M., Paiola, M., Cinquini, L., Giannetti, R. (2023)	Digital servitization journey in small-and medium-sized enterprises: the contribution of knowledge-intensive business firms	Journal of Business & Industrial Marketing	2

Source: Author's study.

#### 3.2.4. Data extraction and coding – Step 4

Data were extracted from the selected five case studies, focusing on the key dimensions of organisational resilience and product-service offering models. An exploratory and inductive approach was adopted. This means that throughout the study, key dimensions were gradually discovered by analysing details related to the listed capabilities of the companies, their strategies, and their outcomes in the respective cases. This approach is often used when the goal is to identify patterns and relationships in the data rather than testing predefined hypotheses. Each case was described, and its data were coded, allowing for the identification of recurring patterns of organisational resilience dimensions and the relationships between product-service offering models and resilience dimensions.

An open coding approach was used, which involved assigning labels (codes) to important text segments in the case descriptions that were significant for the study. For example, if the case description mentioned "flexibility in resource management," this segment was coded as "flexibility." After reviewing, coding, and discovering the initial dimensions, the cases were revisited to check if other dimensions that were not obvious could be added or expanded upon. This process was repeated three times. The results of this stage are presented in the Results section.



### *3.2.5. Case-level analysis – Step 5*

Each of the five cases was thoroughly analysed, allowing for the identification of specific characteristics and resilience dimensions for each case. At this stage, the analysis focused on how the servitization influenced specific dimensions of organisational resilience.

The case analysis provided insights into how product-service offerings support key resilience dimensions. The results of this stage are presented in the Results section.

### *3.2.6. Data synthesis – Step 6*

After analysing each case, data synthesis was conducted to identify general patterns and key conclusions regarding the impact of servitization on organisational resilience. The synthesis allowed for the integration of findings from different cases, providing a more complete picture of the relationship between servitization and the dimensions of organisational resilience. The results of this stage are presented in the Results section.

### *3.2.7. Theory building – Step 7*

Based on the conducted synthesis, theories were formulated regarding the impact of servitization on the dimensions of organisational resilience. The results of this stage are presented in the Results section.

### *3.2.8. Discussion – Step 8*

The final step was to discuss the results in the context of existing literature and identify key implications for companies implementing servitization. The identified dimensions of organisational resilience were compared with existing research.

## **4. Results**

This section presents the findings from steps 4 to 7. Based on the case-level analysis, the identified service offerings and the dimensions of organisational resilience are described (Steps 4 and 5). Next, the obtained results are synthesised by combining the findings from the individual cases (Step 6) with the formulation of theories regarding the impact of servitization on the dimensions of organisational resilience (Step 7).

### **4.1. Case-level analysis - Step 4 and Step 5**

#### *4.1.1. Case 1*

The first case analyses companies that provide advanced technology-based services supporting process optimisation and data management in various industrial sectors. They offer solutions such as production process monitoring, building management systems, security system integration, energy efficiency optimisation, and predictive machine maintenance. A common element of their activities is IoT technology, real-time data analytics, and system integration, enabling proactive and efficient resource management.

Their offering is based on a servitization model that combines products (e.g., monitoring equipment) with real-time data analysis services, allowing proactive resource management and problem prediction. Although organisational resilience is not the main focus of the study, the analysed cases reveal key aspects of information management that directly contribute to the company's ability to cope with shocks and disruptions in its operational environment.

The research noted that the analysed entities prioritise access to data rather than control over it. This approach reflects a shift towards greater adaptability, allowing companies to quickly respond to changing market conditions and customer needs. Flexibility in acquiring and utilising data is crucial for coping with disruptions and adapting to unforeseen circumstances. The article underscores the importance of collaboration and data sharing within industrial service networks. This approach fosters mutual connections and shared responsibility, potentially strengthening resilience by distributing risk and creating redundancy in the network. The authors emphasise the pivotal role of continuous learning and knowledge management in the success of the analysed companies. The process of continuous improvement, driven by the analysis of collected data, enables organisations to adapt to new challenges and improve their operations in response to changing market conditions. The authors challenge the traditional approach of viewing data protection as a key source of competitive advantage. Companies can mitigate risk through openness and collaboration in the context of servitization. Although the article does not directly address organisational resilience, its findings suggest that servitization can build resilience through adaptability, collaboration-based networks, continuous learning, and risk mitigation.

#### *4.1.2. Case 2*

The article's main aim was to explore how companies in the industrial sector, particularly in the aerospace industry, manage operational uncertainties related to industrial services. The analysis is based on a case study of three large international companies: BAE Systems, Lockheed Martin, and Rolls-Royce, leaders in delivering advanced technologies and service solutions. The study focuses on how these companies manage uncertainty through various product-service offerings, including after-sales agreements, long-term technical support, and product lifecycle management.

Although this article does not directly focus on organisational resilience, it discusses how service offerings help companies manage uncertainties, indirectly impacting their resilience. The cases analysed in the article show that by employing advanced service models based on long-term contracts, these companies ensure operational stability and predictability.

These models offer several key benefits that directly support organisational resilience through 1. financial and operational stability thanks to long-term service agreements like Rolls-Royce's TotalCare®; 2. technological risk management, where Lockheed Martin and BAE Systems provide regular maintenance, upgrades, and repairs of their products through long-term technical support; 3. proactive product lifecycle management, allowing for better planning of technological development, monitoring of equipment wear, and making appropriate

adjustments at the right time; 4. flexibility and adaptability, where remote monitoring and on-demand services enable companies to quickly respond to changing customer needs. Adjusting services to current market and technological challenges allows for greater flexibility and adaptability.

#### *4.1.3. Case 3*

The key theme of Case 3 is understanding how service modularity and digitalisation within a digital platform affect system complexity and the organisation's ability to adapt in the face of external disruptions. From the service provider's perspective, Case 3 provides insights into managing complexity and building resilience in the supply chain, directly impacting functional organisational resilience.

The authors analyse how companies like JD.com, Siemens, and Alibaba use digital platforms to manage complexity and build organisational resilience. These companies provide platform-based services supporting various industries. JD.com offers supply chain optimisation, data analysis, and consulting for e-commerce and FMCG. Siemens provides a 3D printing collaboration platform with design and engineering tools. Alibaba integrates sales, finance, and logistics, supporting industrial app developers and manufacturing companies with IoT technology.

The analysis shows these platforms contribute to increased flexibility and adaptability in supply chain disruptions. Service modularity, or the division of the servitization process into smaller, independent modules, allows companies to manage service system complexity better. This enables providers to respond more quickly to changing customer needs and adjust their offerings without adding complexity. Siemens, for example, uses the Additive Manufacturing platform to connect different participants, such as designers, engineers, and OEM suppliers, allowing for efficient and flexible management of the entire production process. The analysed cases prove that IoT, data analytics, and artificial intelligence improve flexibility and responsiveness to disruptions. The authors also noted that by connecting various stakeholders, the platform increases connectivity among participants, leading to a higher degree of internal complexity. This increased complexity, while potentially leading to higher supply chain resilience (SCR) through agile responses, also increases supply chain vulnerability (SCV), making the supply chain more susceptible to disruptions due to denser relationships and greater interdependence.

Ultimately, Case 3 shows that platform-based servitization, while offering numerous benefits, requires careful consideration of the impact of internal complexity on SCR and SCV to achieve optimal adaptive capacity. Case 3 provides evidence that the platform approach to servitization can significantly enhance the organisational resilience of service providers, enabling them to manage complexity better, adapt to market changes, and respond more quickly to supply chain disruptions. Digitalisation and service modularity are key elements of this process.

#### *4.1.4. Case 4*

Case 4 examines how manufacturers manage the complexity associated with their digital servitization (DS). Two companies were analysed, which, through the development of service offerings, aimed to monitor installed products in real-time and perform predictive maintenance, streamline production processes, and optimise production efficiency. Research shows that digital servitization, which involves integrating technologies such as IoT, cloud computing, and data analytics, introduces new forms of complexity. The key here is building resilience by absorbing complexity, which means adopting new technologies and adjusting organisational processes. A modular approach to servitization, where service systems are divided into smaller, independent components, allows manufacturing companies to respond more quickly to changes and disruptions. Digital services are created based on data from various sources, allowing companies to predict technical problems and better manage risk. This approach not only increases the flexibility of organisations but also strengthens their resilience to technological disruptions. The companies described in Case 4 benefit from extensive collaboration networks with technology providers, universities, and research partners. This collaboration enables the absorption of external resources and knowledge, helping manufacturing companies better cope with external threats and enhancing their resilience to external disruptions. Digital servitization, based on remote monitoring and data analysis, allows companies to quickly respond to changing customer needs, increasing their resilience to unforeseen changes in demand or technology.

Based on Case 4, it can be concluded that service offerings based on digital servitization significantly impact the organisational resilience of manufacturing companies. Modularity, complexity management, organisational flexibility, and collaboration with technology partners enable companies to respond effectively to changing market and technological conditions, contributing to increased resilience.

#### *4.1.5. Case 5*

Case 5 describes how knowledge-intensive business services (KIBS) support small and medium-sized enterprises (SMEs) in digital transformation, particularly servitization. KIBS is essential in managing operational complexity by offering technological (T-KIBS) and professional (P-KIBS) solutions that support SMEs in implementing new technologies and transforming business models. As a result, companies better adapt to changing market conditions, strengthening their resilience.

Organisational flexibility is another key aspect that allows SMEs to adapt to changes quickly. Standardised technologies, such as SaaS platforms, minimise risk and costs, enabling more efficient adaptation. KIBS also supports innovation by providing new knowledge and technologies, allowing SMEs to develop new products and services and enhancing their market competitiveness.

Partnerships with KIBS also allow SMEs to reduce the risk of introducing new technologies by gradually implementing IoT and cloud platforms, reducing operational risk. A modular system approach facilitates operational complexity, optimising production and service processes.

The knowledge and learning processes supported by KIBS enable SMEs to implement innovations faster and adapt to digital transformation. KIBS provides new knowledge resources and helps SMEs integrate and utilise the acquired experience effectively.

In conclusion, KIBS supports SME resilience by helping them manage complexity, increase flexibility, introduce innovations, and minimise risk. This allows for more effective responses to disruptions and crises in a dynamically changing technological and market environment.

#### **4.2. Synthesis of the obtained results - Step 6**

Based on the information in the company descriptions and service offerings, several key dimensions of organizational resilience can be distinguished. These dimensions include stability, adaptability, flexibility, modularity, digitalisation, and inter-organizational collaboration.

The first significant dimension is stability, which refers to an organisation's ability to maintain operational and financial balance over time despite changing environmental conditions. (Cheese, 2016) Stable organisations can anticipate future actions, plan resources, and avoid disruptions through long-term service agreements, product lifecycle management, and regular maintenance. Case 2, describing companies such as Rolls-Royce, Lockheed Martin, and BAE Systems, shows that long-term technical support, like Rolls-Royce's TotalCare, allows companies to achieve operational stability and financial predictability. Regular maintenance and lifecycle management enable better technological planning and minimise technological risks.

Another key dimension of resilience is adaptability, understood as an organisation's ability to quickly and effectively adjust its actions, strategies, and processes to changing external conditions, such as new technologies, market changes, or crises. (Karadzic et al., 2013) Adaptability is evident in the analysed cases, particularly in companies like Siemens (Case 1), Alibaba (Case 3), JD.com (Case 4), and KIBS (Case 5). Operating in the integrated solutions model, Siemens effectively implements new digital technologies, such as IoT, to respond to customer needs and market changes in the long term. Operating on a digital platform, Alibaba can transform its infrastructure and services in response to the dynamic demands of the e-commerce market, integrating new technologies and optimising processes. JD.com uses digital tools to monitor product usage in real time, allowing the company to adjust its operational processes and introduce technological improvements that support long-term changes. In turn, KIBS companies, operating in the result-oriented services model, continuously adjust their services to changing technological conditions and the specific needs of their clients, supporting their digital transformation and long-term innovation strategies. In each of these

cases, adaptability is a key factor that enables organisations not only to respond to immediate disruptions but also to make significant strategic changes in response to long-term market challenges, strengthening their organisational resilience.

A frequently observed dimension in the analysed cases was flexibility. It refers to an organisation's ability to immediately adjust its resources, processes, and activities to changing conditions quickly and effectively without disrupting ongoing operations (Roberts, Stockport, 2009). Flexibility involves operational adjustments, such as changing production volumes, reallocating resources, or reorganising processes to meet changing needs or market demands. It is a crucial element in many cases. In Case 3, thanks to an advanced digital infrastructure, the company can instantly scale its resources, change processes, and adjust its offerings in response to fluctuations in demand without disrupting ongoing operations. Similarly, in Case 4 (JD.com), the company can react immediately to changes in usage intensity by monitoring product usage in real time. Case 5 illustrates flexibility in the context of consulting and technological services. KIBS companies can immediately adjust the scope and form of their services due to their expertise and competencies, allowing them to respond flexibly to client needs. These companies rely on intensive expert knowledge, technology, and experience, enabling the rapid transformation of resources and processes in response to a changing environment. Close cooperation with clients allows them to quickly identify changing needs and challenges and immediately adapt to new conditions.

Modularity was the next dimension observed in the cases. Modularity refers to an organisation's ability to divide its processes, products, and services into smaller, manageable components (modules) that can be flexibly adapted and reorganised as needed (Brax et al., 2017). A modular approach reduces operational complexity and increases a company's ability to adapt. It is essential in Case 3, where servitization is based on digital technology, enabling the quick scaling and adaptation of services. Similarly, in Case 1 and Case 4, modularity allows companies to divide processes into smaller, easier-to-manage parts, reducing complexity and increasing adaptability. This allows these companies to easily adjust their services to changing customer needs while minimising the risk of introducing additional complexity.

Digitalisation is another dimension in the analysed cases, understood as integrating modern technologies such as IoT, data analysis, artificial intelligence, and automation (Stawiarska et al., 2021). In Case 1, the company uses digital technologies to monitor machines in real-time, allowing it to predict problems and optimise maintenance, minimising downtime. Similarly, in Case 3, advanced data analysis and artificial intelligence support the dynamic management of logistics and commercial processes, enabling the company to monitor demand changes and optimise supply chains. In Case 4, digitalisation allows for real-time monitoring of product usage by customers, enabling effective management of predictive maintenance and quick adjustment of operational processes. Digitalisation supports resource monitoring, problem prediction, and process optimisation in these cases, increasing operational efficiency and organisational resilience.

The last key dimension is inter-organizational collaboration, an organisation's ability to establish and maintain relationships with external partners, such as suppliers, customers, and technological and strategic partners (Ataee et al., 2011). Servitization relies on integrating products with services, often requiring cooperation with various external entities. The need to consider this dimension arises from several key aspects. Firstly, servitization requires access to advanced technologies and competencies that are not always available within the organisation. Collaboration with technological partners and service providers enables companies to gain easier access to these resources, helping them deliver comprehensive service solutions more quickly and effectively. An example is the company in Case 1, which, in the integrated solutions model, collaborates with partners to provide product servicing and monitoring using digital technologies. This allows the company to offer more advanced services while minimising risks and operational costs. Secondly, servitization carries risks associated with long-term service contracts, equipment maintenance costs, and changing customer needs. Collaboration with external partners allows companies to share these risks. For example, in Case 3, collaboration with external logistics and technology service providers enables the company to manage its infrastructure flexibly, transferring some operational risk to its partners and strengthening its ability to maintain service continuity. Thirdly, collaboration with partners enables companies to understand customer needs better and tailor their services to meet their requirements. In Case 5, consulting and technology firms collaborate with clients and technological partners to deliver services tailored to changing market needs. Through this collaboration, KIBS companies can flexibly adjust the scope and form of their services, sharing knowledge and resources with partners, allowing them to manage better the challenges associated with servitization.

#### **4.3. Theory building based on meta-synthesis – Step 7**

In the final step of the meta-synthesis process, we move beyond individual case insights to construct a broader theoretical framework that explains the relationship between servitization and organisational resilience. This involves synthesising the identified dimensions—stability, adaptability, flexibility, modularity, digitalisation, and inter-organizational collaboration—into a cohesive theory that can be generalised across different contexts.

The theory developed here posits that servitization enhances organisational resilience by enabling firms to navigate complex, dynamic environments better. Through servitization, organisations offer products and integrate services that support long-term customer relationships, technological improvements, and operational efficiencies. This integration inherently promotes stability by securing predictable revenue streams and reducing operational risks through long-term contracts and lifecycle management, as seen in companies like Rolls-Royce with its TotalCare program. Stability, a dimension often overlooked in the literature, proves essential in maintaining operational balance, as demonstrated in cases where long-term service agreements reduce disruptions and provide financial predictability.

In addition to stability, modularity emerges as a dimension of resilience that is not frequently highlighted in existing research. Modularity allows organisations to break down their processes and services into smaller, manageable units that can be flexibly reorganised or scaled. This reduces operational complexity and enhances adaptability. For example, companies like Siemens and Alibaba use modular service models to respond quickly to shifting customer needs and market conditions, improving their ability to maintain continuous operations while minimising risks. Modularity not only supports adaptability but also enables companies to maintain stability by reducing the complexity and risks associated with large-scale changes.

Adaptability and flexibility are further bolstered by servitization, where digital tools and modular service offerings allow firms to quickly adjust to changing market conditions and customer needs. As demonstrated by the real-time operational adjustments in cases like Siemens and JD.com, companies can rapidly scale resources and reconfigure processes without disrupting ongoing operations. Thus, flexibility and adaptability become key drivers of organizational resilience, allowing firms to make immediate and long-term strategic adjustments.

Digitisation is another driver of resilience. It provides the technological infrastructure for real-time monitoring, predictive maintenance, and data-driven decision-making, strengthening adaptability and operational stability. This is evident in several cases where advanced digital tools support internal efficiency and external collaboration, ensuring that firms remain resilient in highly volatile environments.

Finally, inter-organizational collaboration is crucial in enhancing resilience by sharing risks and resources with external partners. With its reliance on comprehensive service models, servitization often necessitates partnerships with technology providers, logistics firms, and customers. This leads to an extended network of resilience capabilities, as illustrated by the collaboration strategies employed by companies like Alibaba and KIBS firms.

Thus, the theory derived from this meta-synthesis suggests that servitization is a multifaceted driver of organisational resilience. Stability and modularity, often underexplored in the literature, emerge as key dimensions that complement more commonly discussed aspects such as adaptability and flexibility. These elements work together, promoting stability, adaptability, and collaborative strength by integrating services and digital technologies. This theoretical framework can serve as a basis for further empirical research and practical applications in industries undergoing digital transformation and servitization.



## 5. Discussion

This study aimed to explore how servitization influences key dimensions of organizational resilience. A meta-synthesis of case studies identified several dimensions of resilience, including adaptability, flexibility, digitalization, inter-organizational collaboration, stability, and modularity. The analysis revealed that servitization enhances these dimensions in various ways, contributing to an organization's capacity to withstand and adapt to disruptions.

Adaptability, a critical dimension of resilience, is significantly bolstered by servitization. According to Baines et al. (2020), servitization enables organizations to make long-term strategic adjustments in response to changing market and technological conditions. Companies adopting integrated solutions models can quickly integrate new technologies, such as IoT, to meet evolving customer demands, demonstrating high adaptability. As Teece (2007) highlights, pivoting and making strategic adjustments are essential for resilience in dynamic environments. Servitization facilitates these adjustments, ensuring companies can continuously evolve and remain competitive.

Flexibility is another dimension supporting servitisation. Lexutt (2020) emphasises the importance of flexibility in managing market volatility. Servitization enables organisations to offer dynamic, customer-centric service models, such as pay-per-use or subscription-based services, allowing them to adjust their offerings in real-time based on fluctuating demand. This operational flexibility ensures that organisations can respond quickly to external changes without disrupting their core functions, making them more resilient to sudden shifts in market conditions or customer needs.

Digitalization is central in servitization, particularly integrating IoT, artificial intelligence, and data analytics into service offerings (Coreynen et al., 2017). Digital tools allow companies to monitor operations in real-time, predict risks, and optimise processes, enhancing adaptability and operational stability. In servitized models, digitalisation supports resilience by enabling companies to anticipate and respond to potential disruptions before they escalate. The ability to continuously optimise service offerings based on real-time data allows organisations to maintain high levels of operational efficiency and resilience, even in highly dynamic environments.

Inter-organizational collaboration is also a key element in enhancing resilience through servitization. Mennens et al. (2018) emphasise that collaboration with external partners allows firms to share resources, reduce risks, and enhance their capacity to manage complex service solutions. This study confirmed that collaboration is crucial in servitization. Partnering with external technology providers and service experts helps companies access new capabilities and distribute risks more effectively, strengthening their overall resilience.

At the same time, stability—a less frequently highlighted aspect in the resilience literature (Hepfer, Lawrence, 2022)—emerged as an essential factor in the context of servitization. As Baines et al. (2009) discuss, long-term service agreements are central to creating stable operational environments. Companies ensure steady revenue streams and long-lasting customer relationships by offering maintenance and lifecycle management. Rolls-Royce's TotalCare program exemplifies stability and helps organisations maintain operational and financial balance, even in volatile environments. This dimension of servitization underscores how companies can depend on predictable operations and recurring contracts, providing a solid foundation for resilience.

Finally, the study highlights the role of modularity, another dimension not always emphasised in resilience discussions. Modularity reduces operational complexity and enhances flexibility and stability, as organisations can adapt their service offerings in real-time without overcomplicating operations. For example, modularity enables companies to scale services based on real-time customer demand, ensuring they can quickly adjust to changing conditions while maintaining efficient operations. Modularity thus plays a dual role in reinforcing flexibility and stability, making it an essential factor in supporting resilience.

In conclusion, this study confirms that servitization enhances multiple dimensions of organisational resilience. While adaptability, flexibility, digitalisation, and collaboration are well-established elements of resilience, the findings underscore the importance of stability and modularity—dimensions less frequently highlighted in the literature. Servitization enables organisations to adapt and respond to disruptions and provides the stability and operational structure necessary to maintain long-term resilience. This holistic approach ensures companies can navigate dynamic environments and thrive amid uncertainties, positioning themselves for sustained success.

## 6. Conclusion

Through the analysis of multiple case studies, it is evident that servitization, as a strategic approach, provides organisations with the tools and capabilities necessary to navigate and thrive in dynamic, unpredictable environments.

One of the primary findings is the importance of adaptability and flexibility. Servitization allows firms to remain responsive to market fluctuations, technological advancements, and evolving customer needs. By integrating digital technologies and offering flexible service models, organisations can swiftly adjust their offerings and operations, ensuring they remain competitive and resilient in the face of disruption.

The role of digitalisation is also pivotal. Digital tools like IoT, data analytics, and AI are integral to servitized business models, allowing companies to optimise operations, predict risks, and respond proactively. This supports resilience by enhancing adaptability and stability through real-time insights and optimised resource allocation.

Collaboration emerged as another key dimension of resilience. Partnerships with external stakeholders—such as technology providers, service partners, and customers—allow firms to share resources, distribute risks, and innovate more effectively. These partnerships are essential for managing the complexity of servitized offerings and maintaining resilience in volatile markets.

Notably, this study highlights the often underexplored dimensions of stability and modularity. Stability, achieved through long-term service agreements, provides predictable revenue streams and strengthens customer relationships, creating a solid foundation for resilience. Modularity, which allows organisations to break down services into manageable components, enhances flexibility and stability by enabling quick, targeted adjustments without overcomplicating operations.

These findings provide several key takeaways for managers. First, adopting servitization strategies incorporating digitalisation and flexibility is crucial for enhancing organisational resilience. Managers should invest in digital tools to enable real-time monitoring and optimisation of operations, allowing their organisations to respond quickly to disruptions. Furthermore, emphasising collaboration with external partners is essential for expanding the organisation's capabilities and managing risks effectively.

Additionally, the importance of stability through long-term service agreements should not be overlooked. Managers should focus on building stable, long-lasting relationships with customers through tailored service contracts. Finally, adopting a modular approach to service design allows organisations to remain flexible and agile while managing operational complexity. This approach ensures that adjustments can be made efficiently in response to changing customer needs or market conditions, which is vital in a fast-evolving business landscape.

Despite its contributions, this study has some limitations. First, it relies on a meta-synthesis of case studies, meaning the findings are context-specific and may not be readily generalisable across all industries. The case studies analysed here are drawn from specific sectors, such as manufacturing and technology, and the results may differ in other industries with varying degrees of servitization. Additionally, the study focuses on identifying general dimensions of resilience. However, it does not provide detailed insights into how different organisational models (e.g., product-oriented, use-oriented, and result-oriented) might impact these dimensions differently.

Future research could address these limitations by exploring how different product-service offering models influence organisational resilience. Each model, such as product-oriented, use-oriented, or result-oriented services, may affect resilience in distinct ways. During the

study, it became evident that various models have different impacts on dimensions like adaptability, stability, and flexibility, which warrants further investigation. More empirical studies across different industries and contexts would help clarify these dynamics and offer deeper insights into the role of servitization in resilience building.

Additionally, future research should explore how modularity and stability—underexplored dimensions in the current literature—interact with other aspects of servitization to enhance resilience. Researchers could also examine how digitalisation and partner collaboration contribute to long-term organisational resilience in sectors currently underrepresented in servitization studies, such as healthcare, education, and services.

In conclusion, while this study has highlighted the critical dimensions through which servitization enhances resilience, it opens the door for further exploration into the specific mechanisms and models that drive these outcomes. By investigating these aspects more thoroughly, future research can provide managers with more precise strategies for leveraging servitization to build more resilient organisations.

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